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Science and Nature in the Medieval Ecological Imagination

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ABSTRACT OF THE DISSERTATION

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by

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This dissertation explores the intersections between nature and culture in medieval literature and art with particular focus on Geoffrey Chaucer's *House of Fame*, the thirteenth-century French *Bible Moralisée* (Vienna, Österreichische Nationalbibliothek Codex Vindobonensis 2554), and William Langland's *Piers Plowman*. Current academic paradigms tend to place the study of nature firmly within the sciences and the study of culture firmly within the humanities, creating a gap between the fields that effectively isolates their respective methodologies and vocabularies from one another. This dissertation seeks to bridge that gap between the sciences and the humanities by approaching medieval literature through the lens of studies in science, technology, and society (STS). Examination of medieval literature reveals just some of the ways that the sciences and humanities overlap to create permeable intellectual spaces for the study of nature and culture. Framed within the ecological analyses of G. Evelyn Hutchinson, this dissertation demonstrates how scientific topics can be approached from a literary perspective and how, in turn, literature can be read scientifically.

This project uses a highly interdisciplinary approach that relies heavily on the theories in STS developed by Bruno Latour. Latour's theories, typically applied to writing and procedures found in modern science, provide the initial groundwork for establishing the connections between nature and culture in medieval literary sources. Because much of the previous work on science in the Middle Ages has primarily focused on the history of science through the study of educational texts and treatises, there is relatively little material available that takes on scientific observation of the natural world in medieval literature, poetry, and art. As such, the modern divide between the sciences and the humanities anachronistically separates nature and culture in ways that often unnecessarily isolate the two fields in medieval studies.

By first problematizing and historicizing the academic development of science and its perceived animosity with the humanities, I strive to break down modern paradigms of knowledge to demonstrate how a medieval understanding of human culture was inextricably connected to perceptions of the natural world. The study of Chaucer's *House of Fame* takes on special attention to the roles of language and translation in literature. My subsequent examination of the *Bible Moralisée* moves beyond the constraints of language to explore visual representations of science and nature in an explicitly Christian context. Building on the religious influences of medieval portrayals of ecology and science, I investigate Langland's use of natural imagery in his portrayal of religious enlightenment in *Piers Plowman*. Each of these works demonstrates how the medieval imagination established a versatile permeability between science and the humanities that is far less common in the studies of modern science and literature.

Chapter 1

(Re)Defining Science and Medieval Ecology

"The imagination is most accurately excited by familiar things, which are well enough known to be picked up from a world where they lie at random, taken apart, reconstructed and redesigned, and put in exact places where they are appropriate."
                                                                    - George Evelyn Hutchinson[1]

Research for this project began in 2009, the year that marked the fiftieth anniversary of

C. P. Snow's Rede Lecture in the Senate House at Cambridge. Snow's lecture addressed the

widening gap between the humanities and sciences in higher academic institutions, claiming that

the growing divide between the two fields was detrimental to western society. In his original

1959 lecture published as *The Two Cultures*, Snow claims the intellectual split resulted in a

widening and increasingly impassable gap between two polar groups:

> Literary intellectuals at one pole – at the other scientists, and as the most
>
> representative, the physical scientists. Between the two a gulf of mutual

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[1] G. E. Hutchinson, known in the scientific community as the "Father of Ecology," was acutely aware of how the natural world could impact language. This summary of his philosophy of ecology can be found in the introductory pages of Hutchinson's first publication, *The Clear Mirror*, where his detailed descriptions combine environmental and cultural observations (3-4). This characterization of the imagination marks Hutchinson's transition from nature to culture in the text.

incomprehension – sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding. (4)

Snow subsequently clarified the main purpose of his lecture in 1963, emphasizing that his intent was to address the risks to humanity that result from this divide:

> In a time when science is determining much of our destiny, that is, whether we live or die, [the divide] is dangerous in the most practical terms. Scientists can give bad advice and decision-makers can't know whether it is good or bad. On the other hand, scientists in a divided culture provide a knowledge of potentialities which is theirs alone. All this make the political process more complex, and in some ways more dangerous, than we should be prepared to tolerate for long, either for the purposes of avoiding disasters, or for fulfilling – what is waiting as a challenge to our conscience and goodwill – a definable social hope. (98)

Although he was addressing concerns of the mid-twentieth century, Snow's warnings carry just as much, if not more, weight in the twenty-first century as competition for funding in universities becomes increasingly fierce. And while the influence of Snow's words fixed the landscape for the relationship between scientific and literary culture to this day, his arguments were merely a continuation of a public (yet cordial) debate between Matthew Arnold and T. H. Huxley established in the previous century.

Over the years 1868-1883, Arnold and Huxley participated in a number of public appearances that pitted literature and science against one another.[2] Arnold defended the centrality of classical languages and *belles lettres* in education while Huxley advocated for an emphasis on science. The debate can be summarized by two specific public appearances: the first being Huxley's address entitled "Science and Culture," which was delivered at the opening of Sir Josiah Mason's Science College in Birmingham in 1880, followed by Arnold's "Literature and Science" Rede Lecture at Cambridge (the same venue for Snow's reiteration of the debate years later) in 1882. In "Science and Culture," Huxley argued that education should not only be free from the influences of politics and religion but also move beyond what he perceived as the pretensions of humanists and their emphasis on literature. Huxley saw science as a vital component of a balanced education, if not the primary component required for cultural enlightenment: "for the purpose of attaining real culture, an exclusively scientific education is at least effectual as an exclusively literary education."[3] Arnold, on the other hand, believed that science lacked any connection to human culture or experience in its quest to produce only facts while literature provided access to the underlying values of human nature: "the importance of humane letters in a man's training becomes not less but greater in proportion to the success of modern science in extirpating what it calls 'medieval thinking'."

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[2] See David A. Roos's "Matthew Arnold and Thomas Henry Huxley: Two Speeches at the Royal Academy, 1881 and 1883" for detailed descriptions of the timelines and content of the series of speeches and correspondences between Arnold and Huxley.

[3] It should be noted that Huxley was primarily an advocate of a balance between science and literature and was acutely aware of the dangers of narrow specializations on either side: "Nevertheless, I am the last person to question the importance of genuine literary education, or to suppose that intellectual culture can be complete without it. An exclusively scientific training will bring about a mental twist as surely as an exclusive literary training. The value of the cargo does not compensate for a ship's being out of trim."

The 'medieval thinking' to which Arnold refers stems from Huxley's criticisms of the role of religion in education in the Middle Ages, where Huxley argues that the medieval Church stifled the study of nature under its religious dogma:

> The business of the philosophers of the Middle Ages was to deduce from the data furnished by the theologians, conclusions in accordance with ecclesiastical decrees. They were allowed the high privilege of showing, by logical process, how and why that which the Church said was true, must be true […] That the study of nature – further than was the requisite for the satisfaction of everyday wants – should have any bearing on human life was far from the thoughts of men thus trained. Indeed, as nature had been cursed for man's sake, it was an obvious conclusion that those who meddled with nature were likely to come into pretty close contact with Satan.

Huxley identified medieval ambivalence toward study of the natural world as one of the main reasons to be skeptical of the heavy-handed role of classical approaches to education that had been established in the Middle Ages. Such approaches, Huxley argued, were inevitably influenced by the Church in ways that specifically excluded any inclination to explore the natural world through science and had no place in the nineteenth-century classroom. Arnold, in turn, criticized Huxley's scorn for medieval approaches to education by touting the emergence of medieval universities:

> The medieval universities came into being, because the supposed knowledge, delivered by Scripture and Church, so deeply engaged men's hearts, by so simply,

easily, and powerfully relating itself to their desire for conduct, their desire for

beauty. All other knowledge was dominated by this supposed knowledge and was

subordinated to it, because of the surpassing strength of the hold which it aimed

upon the affections men, by allying itself profoundly with their sense for conduct

their sense for beauty.

Despite the superficiality of each of these descriptions of medieval learning, it is clear from this

exchange between Arnold and Huxley that religion and medieval culture have played historically

significant roles in the debate between literature and science and cannot be disregarded in any

contemporary examination of the perceived divide.

As a scholar and teacher of science, literature, and religion, I am deeply interested in the

intersections between these three fields and how they have shaped contemporary culture. The

arguments put forth by scholars such as Arnold, Huxley, and Snow demonstrate that I am not

alone. In particular, the practical implications of the split between the humanities and the

sciences are evermore apparent in universities. As subject matter in each of the fields becomes

increasingly specialized and university departments struggle to justify their existence

economically, animosity between the two would seem to be inevitable.[4] I believe that the study

of medieval literature can prove especially useful in bridging the ever-widening gap between the

two poles; this sense of animosity between the fields of arts and sciences in modern academia

was not at all apparent in the Middle Ages, which therefore has the potential to serve as a useful

model for integrating science and literature. Walter Clyde Curry uses Geoffrey Chaucer as his

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[4] Personal experiences as the spouse of a scientist have consistently proven that there is at the
very least a casual disdain for funding of the humanities among many science scholars.

prime example of the extensive crossover between arts and sciences in the Middle Ages: "Since

poetry and science are now supposed to be antithetical and mutually exclusive, it has been

difficult to conceive that one of the major English poets ever exercised his mind to any

remarkable extent in the realm of scientific theory and abstraction; and that he should have been

impressed to the point of taking seriously – at least for artistic purposes – these monstrosities of

error, now seems almost unbelievable" (xi). While this overlap between science and literature in

medieval scholarship is perhaps most pronounced in the works of Chaucer, it is not the only

representative example of how medieval literature connects the two fields, which now seem so

disparate. This dissertation seeks to identify ways in which medieval writers, including Geoffrey

Chaucer as well as William Langland and the creators of the *Bible Moralisée*, used science and

nature as tools for communication in the humanities. In this study, it is vital to first pinpoint

exactly how science, as understood by modern scholars, functions in medieval literature.

Meanings and connotations of the term "science" have changed significantly since the

Middle Ages and therefore any work on medieval science necessitates some discussion of the

definition of the term. Many modern definitions of medieval science have relied heavily on the

medieval academic categorizations of seven liberal arts in the *trivium* and the *quadrivium*.[5] Such

definitions are useful in establishing a foundation of meaning but are limited in that they rely

solely on the medieval categorizations of knowledge in universities that are based on the Greco-

Roman educational models. These kinds of categorization of medieval science are inadequate for

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[5] Scholars such as Linda Ehrsam Voigts and Patricia Deery Kurtz rely on such definitions in
Scientific and Medical Writings in Old and Middle English. See also Lynn Townsend White's
Medieval Religion and Technology, Toby E. Huff's *The Rise of Early Modern Science*, and
Edward Grant's *The Foundations of Modern Science in Middle Ages* for definitions of medieval
science characterized by the *trivium* and *quadrivium*.

the study of a broad range of medieval literature because they do not sufficiently reflect the

shifting boundaries of science in the late medieval period nor do they allow for applications of

modern theories on science, technology, and society (STS). Some scholars have noted the

limitations of using contemporary academic boundaries to characterize medieval science and as a

result there have been some attempts to create more inclusive definitions of the term that

examine texts beyond scientific treatises. These definitions tend to include both theoretical and

practical applications of knowledge that come closer to blurring the now definitive lines between

arts and sciences.[6] These more inclusive definitions of medieval science are useful in that they

begin to take into account the relationships between medieval science, medieval technology, and

medieval society. Including texts from a variety of sources is essential to both historicize and

problematize the term "science" in the context of medieval literature for modern readers. Rather

than reinforce the systematic categorization of academic knowledge, I seek first to identify and

then disrupt academic boundaries to discover and probe ways in which what might now be

classified as science figured in the medieval artistic imagination.

The primary focus of much of this dissertation is on those aspects of science most closely

related to the natural world in what would be identified as modern biology, ecology, and

biophysics. As such, this chapter presents a brief discussion of the philosophical developments of

the medieval understanding of nature in a Christian context followed by a brief account of how

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[6] In "The Vernacularization of Science, Medicine, and Technology in Late Medieval Europe: Broadening Our Perspectives," William Crossgrove argues that the vernacularization of science in the Middle Ages helped shape modern science by creating textbooks for medicine and technologies used in farming and warfare. The encyclopedic and instructional qualities of these texts would seem to exclude literary works of fiction from medieval science studies. This dissertation seeks to broaden the categories of medieval texts worthy of science studies as defined by Crossgrove.

ecology emerged as a distinct field of study in the sciences. The twelfth century serves as a

historical locus of rediscovery of classical texts where philosophers began to view nature as both

a separate entity worthy of study and as a contributing factor to human culture. It is significant,

then, to consider how medieval conceptions of Aristotelian natural philosophy and Neoplatonism

became rooted in the medieval literary imagination and accommodated to fit emerging Christian

ideologies.[7] Medieval reconsideration of classical sources resulted in a "scientific sensibility"

regarding the study of nature,[8] a sensibility that made space in the religious conceptions of the

universe to allow for study of the natural world for its own sake entirely. From there, I examine

how Aristotelian natural philosophy both fits and defies the boundaries of modern scientific

paradigms as defined by Thomas Kuhn[9] and eventually the field of ecology as established by

George Evelyn Hutchinson. Exploration of how the paradigms of science place restrictive

boundaries on the study of science in medieval literature informs my analyses of medieval

literature in subsequent chapters. Further, it is essential to examine the work of those scholars

who have sought to find new approaches to analyzing medieval science and literature. The

methodologies of STS studies that explore the connections between science and modern society

can also be used to expand the modern boundaries of science, thereby opening the field to

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[7] This shift in thought has been referred to in the past as "renaissance" in the twelfth century, with arguments put forth by scholars such as Marie-Dominique Chenu in *Nature, Man, and Society in the Twelfth Century* and Charles Homer Haskins in *The Renaissance of the Twelfth Century*.

[8] The phrase "scientific sensibility" is put forth and described in detail by Brian Stock in *Myth and Science in the Twelfth Century*. According to Stock, this sensibility was much like a scientific primer that led to a readiness of medieval scholars to seek hidden spiritual truths in the study of nature.

[9] Thomas Kuhn's *Structure of Scientific Revolutions* is perhaps one of the most influential works of the philosophy of science that shaped the boundaries of modern science, and as such, proves useful to the historicization and problematization of the term.

include all interactions between medieval writing and the natural world. In particular, Bruno Latour's analyses of modern applications and definitions of science serve as ideal models for alternate analyses of medieval literature, bringing into question the boundaries of science and demonstrating just how tenuous those boundaries can be. Latour's STS models also bring the complex interactions of politics and non-humans to the forefront of scientific studies and inform the examination of non-humans and humans in medieval texts. Ultimately, this study of science in medieval literature is one that incorporates traditional academic definitions of the term with the complexities of STS models.

Common uses of the term "science" were not contradistinguished from the term "art" until the late seventeenth century,[10] when the shifts in philosophies and politics of the Enlightenment swept away medieval world-views in favor of new educational paradigms. But science, as it is broadly understood in modern terms, certainly existed before the scientific revolution of the sixteenth and seventeenth centuries despite the fact that it was not yet established as a distinct academic field. Though modern terminology and categories of scientific knowledge were not yet in use, medieval thinkers placed a high value on knowledge that could be gained through observation of the natural world. Evidence of these observations can be found not only in academic textbooks and treatises, but also in religious and literary works. Medieval works are of particular interest to study of the history of science because the institutionalization of science as a distinct academic field was beginning to emerge at this time – specifically by the

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[10] The OED identifies the first instance of science explicitly described as distinct from art in 1678 with Joseph Moxon's advice in *Mechanick Dyalling*: "Though we may justly account Dyalling originally a Science, yet..it is now become to many of the Ingenious no more difficult than an Art."

late twelfth century – in Western Europe.[11] While the formal study of science in the middle ages was not yet distinct from the study of arts or other skills, the institutional and political transitions of the middle ages laid the foundations for some major cultural shifts that would later become the foundations for the Scientific Revolution of the sixteenth and seventeenth centuries. First, medieval universities were emerging as institutions separate from the church and state, which allowed the study of subject matter that pushed the boundaries of scriptural study and traditional monastic education models. Second, new classes of scholars and thinkers who classified themselves as theologian-natural philosophers were growing, resulting in a philosophy where science became the "handmaiden to theology" to create the basis for categories of modern science. And finally, Greco-Arabic texts were being translated into Latin at a remarkable rate to make the material accessible to a wider audience, thereby widening the knowledge base of subjects that had previously been limited to scholars of Greek and Latin. These changes played key roles not only in the establishment of science as a field of knowledge worthy of study on its own, but also in the increased dissemination of scientific knowledge in writings found in places other than textbooks and treatises.

In medieval universities, mastery of a variety of classical texts, keen observation, and careful contemplation were essential skills for any scholar. In medieval academia "science" and "art" were used interchangeably to refer to any branch of knowledge or skill that was the subject of dedicated study. "Science" derives from the Latin term *scientia*, meaning "knowledge," or

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[11] Edward Grant uses the work of science historian Pierre Duhem (1861-1916) to trace the institutionalization of science in Western Europe from 1175-1500 in *The Nature of Natural Philosophy in the Middle Ages*. Duhem writes extensively on the history of medieval science and lauded the sophistication of medieval scholars such as John Buridan, Nicole Orseme, and Roger Bacon.

more specifically "the state of fact or knowing; knowledge or cognizance *of* something" and "a particular area of knowledge and study; a recognized branch of learning" (OED). The OED, in line with scholars such as Linda Ehrsam Voigts, Patricia Deery Kurtz, Lynn Townsend White, Toby E. Huff, and Edward Grant, goes further to specify that "science" in the Middle Ages referred to all seven subjects forming the *trivium* and *quadrivium*. Given the breadth of subject matter under the umbrella of "science" in medieval terms, it would be exceedingly difficult to rely on the medieval definition of the term in any STS approach to medieval literature. Therefore, this discussion of science in medieval writing relies on modern conceptions of the term as they function within medieval paradigms of philosophical study and the discussion of medieval science that follows relies on an anachronistic use of the term. Analysis of medieval science subsequently identifies the term as it primarily (though certainly not exclusively) relates to the *quadrivium*, particularly with the concepts found in geometry, music, and astronomy as the fields that most directly deal with concepts of space and time in natural world. These inquiries are vital to the exploration of just how medieval writers understood not only interactions in the natural world itself, but also how humans fit into those interactions.

The now distinct fields of arts and sciences were not mutually exclusive categories in the Middle Ages but they did exist as two separate – yet complementary – categories of knowledge. In fact, art served as a primary means for the promotion of science as a distinct field of study in its infancy. When discussing the importance of the origins of the modern field of science in *Science and the Modern World*, twentieth-century science scholar Alfred North Whitehead emphasizes the historical dependence of science on art:

The rise of Naturalism in the latter Middle Ages was the entry into the European

mind of the final ingredient necessary for the rise of science. It was the rise of

interest in natural objects and in natural occurrences, for their own sakes. The

natural foliage of a district was sculptured in out-of-the-way spots of the later

buildings, merely as exhibiting delight in those familiar objects […] The simple

immediate facts are the topics of interest. (15)

Before the conventions of scientific writing were established by the Scientific Revolution of the

sixteenth and seventeenth centuries, the natural world was celebrated and explored in other ways,

predominantly in more creative efforts during the Middle Ages. Using formats such as the dream

vision and illumination, medieval interest in the natural world employed imaginative freedoms

that would not typically be found in modern science studies. The appearance of the natural world

in writing and artwork demonstrates the variety of ways in which medieval thinkers could

explore natural philosophy within the confines of classical and theological scholastic traditions.

Though much of medieval philosophy is characteristically theological, classical

influences contributed significantly to the field of natural philosophy. Science historians

typically mark the birth of science in the medieval period with the works of Saint Augustine of

Hippo (354-430), who was influenced predominantly by Aristotle and Boethius.[12] Augustine

would have encountered the sciences (including natural philosophy) as part of the classical

tradition where the accumulated learning of ancient Greece was adjusted for the geography,

language, and culture of his own. As a Christian scholar, Augustine had a cautious attitude

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[12] Throughout their extensive bodies of research in the history of science, both Edward Grant and
David C. Lindberg consistently identify Augustine's work as the foundation of western science.
For just a few examples of Augustine's influence, see Grant's *The Foundations of Modern
Science in the Middle Ages* (1996) and *The Nature of Natural Philosophy in the Middle Ages*
(2010) as well as Lindberg's *The Beginnings of Western Science* (2007).

toward pagan learning but believed any rational activity that was properly grounded in Christian

faith constituted acceptable forms of scholarship. Of primary importance, then, was the central

role of scripture in academic study. For early medieval Christian scholars like Augustine, the role

of science and study of the natural world were only useful to the extents that they could inform a

more thorough understanding of scripture as a handmaiden to theology. David C. Lindberg

explores the concept of natural philosophy as handmaiden to theology in detail; he argues that

study of the natural world in medieval scholarship only incorporated natural philosophy in ways

that would ultimately serve Christian doctrine. He traces this attitude back to Augustine, who

repeatedly admonished Christians to "steal" classical philosophy for Christian reappropriation

while simultaneously limiting its influence: "Insofar as pagan learning is of utility, Augustine

wants Christians to employ it; but he does not believe that such utility extends far. His writings

are laced with cautions against overvaluing pagan philosophy" ("Roger Bacon and the Patristic

Tradition" 523). For Augustine, the purpose of natural philosophy did not extend beyond the

confines of scripture.

In *De doctrina Christiana*, Augustine explicitly outlines the place for natural philosophy

in a Christian education. While study of the natural world has the potential to be useful, it must

be based first on what can be found in scripture:

> I think it might be possible, if any capable person could be persuaded to undertake
>
> the task for the sake of his brethren, to collect in order and write down singly
>
> explanations of whatever unfamiliar geographical locations, animals, herbs and
>
> trees, stones, and metals are mentioned in Scripture. The same thing could be

done with numbers so that the rationale only of those numbers which are

mentioned in the Holy Scripture is explained. (10)

For Augustine, any information beyond that which is found in scripture is superfluous. He offers

further explanation for the use of natural philosophy in his exegetical analysis of Genesis,

commenting on the variety of species that emerged in creation:

> I, however, must confess that I have not the slightest idea why mice and frogs
>
> were created, and flies and worms; yet I can still see that they are all beautiful in
>
> their own specific kind, although because of our sins many of them seem to be
>
> against our interests. There is not a single living creature, after all, in whose body
>
> I will not find, when I reflect upon it, that its measures and numbers and order are
>
> geared to a harmonious unity. (55)

Augustine admits that there are components of the natural world, such as biodiversity, that he

does not understand but insists that consideration of any natural living creature has the potential

to provide invaluable insight into the workings of God. All told, Augustine's work demonstrates

a deep ambivalence when it comes to classical natural sciences; the sciences have no more than a

secondary level of importance to spiritual salvation and yet are indispensable for the

interpretation of scripture and defense of Christian faith. While he can admire the beauty and

variety of the world around him, Augustine struggles to see any purpose in studying that world

beyond the sense of unity established through the numbers and order found in scripture.

Augustine's model of a Christian education and his approach to science was one that

would have been followed closely by most early medieval scholars in the west. Up until the

establishment of universities, learning was largely confined to the monastic schools whose central purpose was the exegetical study of scripture. While it is certainly true that natural philosophy had some place in an early medieval education, the monastic schools were primarily dedicated to spiritual pursuits. As demonstrated by Augustine, any elements of natural philosophy were only included insofar as much as they contributed to religious ends. However, not all medieval scholars were as ambivalent toward the natural world as Augustine. Even in the schools so heavily influenced by Augustine, some scholars sought to preserve elements of classical natural philosophy as distinct from the study of theology. Lindberg identifies the efforts of Isidore of Seville (ca. 560-636) and the Venerable Bede (d. 735) in particular as central to the continuity of science and natural philosophy in the monastic schools as they "struggled to preserve the remnants of classical learning and pass them on, in usable form, to the Christian world of the Middle Ages" (*Beginnings of Western Science* 158). Works such as Isidore's *Etymologiae*, containing (among other classical sources) material from Pliny the Elder's *Natural History,* and Bede's *De natura rerum*, influenced by Isidore's work, were popular throughout the Middle Ages and provided a lifeline for the survival of classical philosophy in the monastic education systems. Although these scholars did not contribute to the field of science by way of new discoveries or scientific principles, they are extremely important to the history of science simply because they were able to preserve classical natural philosophy and scientific knowledge that might have otherwise disappeared under the immense force of focus on religious study.

It is clear that the study of science did exist alongside religious study as a legitimate – though clearly precarious and subordinate – source for investigation of the natural world in medieval schools. Although observational evidence was not yet a priority (much scientific study

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during this period relied on logic and reasoning) and government support for science was wanting, vernacular vocabularies that were needed to describe elements of science including natural phenomena, planetary astronomy, and optics were being developed, albeit often limited to the audiences of scholars of the church. Dissemination of classical scientific knowledge may have been slow but it was at least protected and preserved in the monastic schools as means of promoting literacy and for reading scripture. This preservation of scientific thought in monastic schools was vital to the future extension of scientific knowledge to wider audiences. By the eleventh and twelfth centuries educational institutions were shifting away from rural monasteries to urban cathedral schools, which were much larger and able to offer a broader range of subjects. Eastern sciences were also beginning to infiltrate Western European thought as the translation of texts from Arabic and Greek into Latin proliferated. Both foreign and classical texts gained a greater acceptance for study alongside the Bible and contributed to the subsequent changes in medieval educational institutions. The efforts of Isidore and Bede, identified by Lindberg as medieval natural philosophers (*Beginnings of Western Science* 157), allowed for the survival of classical models of natural philosophy that could later flourish in universities.

With the shift to urban cathedral schools from the monastic tradition in the ninth century came the first suggestions of science worthy of study independent from scripture. Together, geometry (the study of numbers in space), music and harmonics (the study of numbers in time), and astronomy (the study of numbers in space and time) make up the primary components of what Edward Grant refers to as the "exact sciences" of elementary education the Middle Ages (*Nature of Natural Philosophy* 8). These "exact sciences" would have been part of the inherited Byzantine education traditions that were organized in theory around the traditional seven liberal

arts of the *trivium* and *quadrivium*. As he moves beyond the commonly established medieval

educational categories, Grant is quick to point out the importance of natural philosophy as an

often-overlooked component of medieval learning. Unlike the more exact study of Greco-Roman

mathematical theories that relied heavily on measurement and logic, natural philosophy opened

the field of science up to more creative outlets and played a vital role in the "transformation of an

inheritance into something ultimately beneficial for the development of early modern science"

(*Nature of Natural Philosophy* 9). Grant argues that this creative component of science

ultimately led to the establishment of scientific studies in fields such as meteorology, physics,

and geology. However, it was not until the establishment of the medieval university and influx of

Arabic and Greek texts, particularly those related to natural philosophy, being translated into

Latin that the foundations for the continuous development of science to the present day emerged.

Grant further attributes this popularization of natural philosophy in medieval universities as one

of the most significant developments in the history of science, stating that "along with

Aristotelian logic, natural philosophy constituted the most significant part of the arts curriculum

of every medieval university" (*Nature of Natural Philosophy* 19). It is therefore worthwhile to

place special emphasis on the role of universities in the development of modern science.

As previously mentioned, with the acceptance of non-scriptural texts came a new sense of

academic freedom that allowed science to begin to emerge as a subject worthy of study

independent of religious instruction. Institutionalization of the classical tradition (as opposed to

the monastic tradition) in education and subsequent independence of the sciences became

possible with the emergence of universities in the twelfth century. The *Authentica Habita*,

composed by Emperor Frederick I Barbarossa in 1155 to protect imperial scholars who studied

law, provided a framework for the basic rights and privileges granted to medieval scholars that granted them immunities and freedoms similar to those held by the clergy. With the *Authentica Habita,* privately funded institutions were able to grant students greater amounts of academic freedoms than what was permitted in the monastic schools to allow for study beyond the parameters of scripture. Independent academic institutions began to emerge with the first formally recognized university established in Bologna in 1088, followed by the University of Paris (officially recognized in 1150) and the University of Oxford (officially recognized in 1167). The subsequent development of curriculums in medieval universities coincided with reintroduction of works by not only Aristotle but also those of Byzantine and Arab scholars. This new academic freedom allowed for an unprecedented influx of classical and Eastern thought that paved the way for the emergence of science as a subject worthy of study in its own right and the study of natural philosophy could begin to cast away its role as handmaiden to theology.

Medieval university scholars placed a significant emphasis on ways of knowing and approaching nature in the study of Aristotelian natural philosophy, relying heavily on causality, necessity, and contingency in the process of inductive reasoning. Though it is not clear exactly how students might have encountered Aristotle in the medieval classroom, Grant identifies a number of Aristotelian texts concerning natural philosophy that formed the basis of a medieval university education: *Physics*, *De caelo (on the Heavens), On Generation and Corruption, On the Soul, Meteorology, Parva Naturalia (Small Works on Natural Things), History of Animals, Parts of Animals, Generation of Animals* (*Nature of Natural Philosophy* 32). Medieval scientists and theologians would have been familiar with some, if not all, of Aristotle's works on natural philosophy. It is important to note that theologians were now trained at the universities in

addition to the monastic schools where they were versed in Aristotelian science and philosophy in addition to eight to nine years of training in the subtleties of theological study (*Nature of Natural Philosophy* 39). Lindberg also emphasizes the importance of Aristotelian texts in medieval universities, stating that no student would have emerged from a university education without being thoroughly versed in Aristotelian natural philosophy (*Beginnings of Western Science* 223). Further, Lindberg asserts that we cannot underestimate the freedom of the medieval scholar, who, though under broad theological limits, was not scrutinized by religious scholars in the newly emerging medieval universities (*Beginnings of Western Science* 224). Greek and Arabic sciences had found a somewhat secure institutional home where students could be committed to "the critical examination of knowledge claims through the use of Aristotelian logic" (*Beginnings of Western Science* 224). Under this relative stability, elements of scientific study could emerge free from the constraints of scripture.

It is with the establishment of medieval universities that the qualitative elements of modern science can be identified in their infancy with the work of scholars such as Robert Grosseteste (1175-1253) and Roger Bacon (1214-1294), who laid the groundwork for what would later become firmly established as a cornerstone of scientific study – the scientific method. While there is some debate among science historians regarding the precise influences of Grossteste and Bacon on modern science,[13] the overarching approaches of Grossteste and Bacon

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[13] A. C. Crombie identifies Grosseteste and Bacon as primary sources for the current emphasis on qualitative analysis in modern science (*Robert Grosseteste and the Origins of Experimental Science, 1100-1700*). While Thomas Kuhn would later agree with Crombie's categorization in "Mathematical vs. Experimental Traditions in the Development of Physical Science," several other science historians such as Martin Heidegger and Alexander Koyré accuse such interpretations of reading aspects of modern science back into Bacon's work.

mark a very real methodological nexus between medieval and early modern science. Along with

his manuals on pastoral care, Grosseteste composed a number of scientific texts and treatises in

the sciences where he introduced the ideas of controlled experiments as they relate to

demonstrative science, namely the foundations for the scientific method.[14] Grosseteste's

conception of the subordination of sciences demonstrates a desire to categorize (and rank) types

of knowledge in scientific study that has survived through to modern scientific studies. One of

the first scholars to fully employ the dual path of scientific reasoning envisioned by Aristotle,

Grosseteste also used his treatises to make generalizations from particular observations into

universal laws and then back from universal laws to the prediction of particulars ("resolution and

composition"). Following in the footsteps of Grossteste, Roger Bacon further advocated the

practice of "experimental science" as a means of drawing logical conclusions from observations

of the natural world.[15] Bacon was one of the first university masters to teach Aristotle's works on

natural philosophy in the 1240's and by 1255 all known works of Aristotle were mandatory

teaching materials in the faculty of arts (Lindberg, *Beginnings of Western Science* 228). Though

the two scholars might not be considered scientists in the strictest of terms today, their promotion

of Aristotelian natural philosophy, experience, and observation clearly influenced the future of

scientific scholarship.

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[14] Some of these treatises include: *De artibus liberalibus*, *De generatione sonorum*, *De sphaera*, *De generatione stellarum*, *De cometis*, and *De iride*. For more on biographical accounts of Grosseteste's life and influences, see N. M. Schulman's "Husband, Father, Bishop? Grosseteste in Paris." A chronological analysis of Grosseteste's work can be found in James McEvoy's "The Chronology of Robert Grosseteste's Writings in Nature and Natural Philosophy."
[15] Bacon's use of experimental science is perhaps most pronounced in his *Opus majus* and *Opus tertium*, where he argues that direct confrontations with reality allow for the discoveries of truth. Lindberg warns that "experimental science" as a methodology in medieval scholasticism refers to an extremely broad range of activities and might better be described in a more general sense as "experience" ("Roger Bacon and the Patristic Tradition" 533)

While Aristotelian and other classical and Eastern resources were attractive in terms of their intellectual content and utility, it is important to remember that they were pagan in origin and had the potential to be theologically dubious to medieval scholars.[16] The works of Aristotle would frequently butt up against Christian doctrine and cause friction in academic circles. Albert the Great (d. 1280) and Thomas Aquinas (d. 1274) led the philosophical movement that favored Aristotelian natural philosophy but they also sought to harmonize philosophy and theology, to "Christianize Aristotle by confronting and wrestling with the Aristotelian doctrines that appears to conflict with the teachings of revelation, and correcting Aristotle where he had fallen into error" (Lindberg, *Beginnings of Western Science* 243). Though scholars like Albert and Aquinas were keen to demonstrate their reverence for Christian doctrine, not all university masters were concerned with maintaining the delicate balance of control between theology and philosophy. The eternity of the Aristotelian cosmos was a particularly dangerous feature of natural philosophy that could not be reconciled with the account of creation found in scripture, which clearly states that the dependence of the created universe on God. Philosophical radicals began to question the authority of scripture with their staunch adherence to the principles of philosophy. In *De summa bono,* for example, Boethius of Dacia presents an extremely Aristotelian description of the rational contemplation of truth, regardless of religious faith. Under such logic, Boethius drew a number of conclusions that came into direct conflict with Christian doctrine including the impossibility of the creation story and denial of eternity and resurrection

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[16] David C Lindberg provides a thorough account of the variety of pagan resources that were emerging in "The Recovery of Greek and Islamic Science" in *The Beginnings of Western Science.* In addition to the Latin translations of Plato's *Timaeus* and much of Aristotle's work, medieval scholars also had access to a wide array of translated texts including Euclid's *Elements*, Ptolemy's *Almagest*, al-Khwārizmī's *Algebra*, Ibn al-Haytham's *Optics*, and Avicenna's *Canon of Medicine*.

of the dead. It was becoming apparent that if philosophy was to consistently reach conclusions that would contradict Christian faith, it could no longer function peacefully outside of theology and was instead a genuine threat.

In response to the growing threat of these seemingly anti-Christian developments of Aristotelian philosophy, Etienne Tempier, the bishop of Paris, issued condemnations in 1270 and 1277 (Grant, *Nature of Natural Philosophy* 41, Lindberg *Beginnings of Western Science* 246). Over 200 forbidden propositions were identified, all of which were grounds for excommunication. Aristotelian philosophy had been identified as restricting God's power (Grant, *Nature of Natural Philosophy* 51) and Tempier therefore thought it essential to forbid propositions that contradicted Christian teachings, such as the eternity of the world, monopsychism, denial of personal immortality, determinism, denial of divine providence, and denial of free will (Lindberg, *Beginnings of Western Science* 246). Any philosophical proposition that limited the power of God was forbidden, resulting in significant impingements on any emerging developments in natural philosophy. That is not to say that Tempier's condemnations destroyed natural philosophy entirely (it is clear today that if it were an attempt to do so it clearly failed). The purpose of the condemnations was not to eliminate Aristotelian natural philosophy but rather to redefine the parameters of study of the natural world such that they no longer threatened Christian doctrine. According to Grant, the main result of the condemnations was that scientific focus had to be restricted to the world as it actually existed rather than offer speculations on the potentials of God (*Nature of Natural Philosophy* 56). The condemnations, then, did not eradicate the study of natural philosophy but rather established defined boundaries for the field that would actually allow science to emerge independently from

under the shadow of theology. Though what academic developments followed the condemnations in the thirteenth century is not entirely clear,[17] it is fair to say that the claims made by philosophy no longer served theological purposes and any overlap between the two fields diminished significantly.

The dominance of Aristotelian natural philosophy in universities ended with the emergence of a rival philosophy, Epicurean atomism. Lucretius's *On the Nature of Things* was known in the Carolingian court circles in the ninth century and was later even more widely circulated in the fifteenth century (Lindberg, *Beginnings of Western Science* 364). Epicurean atomism differs from Aristotelian natural philosophy in that it goes into detail to describe the universe as a collection of lifeless indivisible atoms ("atom" literally meaning "uncuttable") that move randomly in an infinite void. Teleological explanation and divine intervention play no part in atomism; every composite of atoms is produced purely by material interactions. Atomism rendered study of the natural world purely external and physical, providing a clear boundary between scientific and theological study.[18] The revival of atomism in the fifteenth century marked a radical conceptual shift in the study of nature that influenced the founders of the Scientific Revolution: Nicolas Copernicus (1473-1543), Galileo Galilei (1564-1642), Rene

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[17] Historical records and writings immediately following the condemnations are murky. On the historical analysis of the development of science in the fourteenth century, Lindberg claims "it is not possible at this time to even draw an adequate sketch" (*Beginnings of Western Science* 251).
[18] Somewhat ironically, the divide between science and religion that was established with the atomistic emphasis on the physical world is now disintegrating as scientists prove that creation *ex nihilo* is indeed possible. See theoretical physicist Lawrence Krauss's work, *A Universe From Nothing: Why There Is Something Rather Than Nothing*, which takes up a debate with Augustine and Biblical scholars using quantum physics to explain how it is possible to create "something" from "nothing." See also the work of physical chemist Nir Goldman at Lawrence Livermore National University, who has successfully demonstrated how life-building compounds (proteins) can be formed from simple elements and compounds under extreme thermodynamic conditions.

Descartes (1596-1650), Robert Boyle (1627-91), and Isaac Newton (1642-1727), among others. Intellectual developments in the sciences continued at an accelerated rate in the eighteenth century as philosophers of the French Enlightenment relied on science and reason in various intellectual movements.[19]

The shift from Aristotelian natural philosophy to Epicurean atomism had a profound effect not only on the development of science as field of academic study but also on the ways in which scholars could explore the natural world. The emphasis on inductive reasoning in Aristotelian natural philosophy created an interiority of thought and analysis for medieval thinkers that would no longer be acceptable in scientific study that would later rely so heavily on Epicurean atomism, observation, and the scientific method. Medieval scholars who were influenced by natural philosophy had access to an imaginative freedom that was ultimately squashed by the empirical pressure of atomism and its methodologies inherently concerned with the accumulation quantitative physical data. Lindberg summarizes the conceptual shift as such and suggests that the new exteriority of study allowed for science and theology to coexist with greater ease: "as for Aristotelian teleology, which discovered purpose *within* nature, defenders of this new mechanical philosophy substituted the purposes of a creator God, imposed on nature from without" (*Beginnings of Western Science* 365, emphasis in original). This shift in conceptual framework is what marks perhaps the most significant scientific revolution in history, according to Thomas Kuhn. Kuhn's characterization of a revolution as "the community's

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[19] The scope of this dissertation makes it impossible to recount the entire history of science and its exponential growth from this point on. Developments and changes in science from the Renaissance through to the twentieth century were many and are detailed in the many works of David C. Lindberg and Edward Grant.

rejection of one time-honored scientific theory in favor of another incompatible with it" (6) precisely describes the shift in science that occurred in the early modern period, where it suddenly became impossible for both Aristotelian natural philosophy and Epicurean atomism to guide the principles of scientific study. Ultimately Epicurean atomism emerged as the preferred model for study of the natural world and marked the beginning of the Scientific Revolution.

Central to Kuhn's characterization of scientific revolutions is the concept of paradigm shifts, which he explains at great length in *The Structure of Scientific Revolutions*. First published in 1962, Kuhn's work broke with the previously held positivist approaches to science that value quantitative analyses and quasi-absolute laws above all else in research, approaches that became entrenched over time as a result of the acceptance of atomism. Until Kuhn, philosophers of science and science historians held a heroic view of science as a progression towards some greater good. While Kuhn does not explicitly accuse others of romanticizing the progress of science, he does identify "normal science" as "research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practice" (10). Kuhn's description perhaps reveals an inkling of how pervasive the positivist approach of science has become, if not in Kuhn's own perceptions of science then at least in the language used to describe science – the emphasis on "achievements" brings to mind a sense of accomplishments, successes, and triumphs while the image of a solid foundation alludes to the quasi-absolute laws so valued by the positivists. Closely related to normal science is the concept of "paradigm," which according to Kuhn is characterized by two primary components: first, there must be a set of beliefs or arguments that are convincing enough to attract a group of adherents away from

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competing sets of beliefs and arguments; second, the set of beliefs and arguments must leave

space for further discoveries and contributions to the set of beliefs (10-11). The paradigm is what

allows a set of assumptions in science to be accepted as fact by a group of followers and

subsequently knowledge is able to build on itself because the established set of accepted facts do

not need to be proven again. A paradigm shift occurs when a competing set of beliefs wins over

the followers to establish a new set of beliefs that is in opposition to the previous set. Of course,

Kuhn's account of paradigm shifts does not exhaustively apply to all patterns of scientific

development, but his suggestions are useful in that they demonstrate how popular thought in

specific fields of knowledge can shift over time. It is clear, then, that when the stark quantitative

approach of Epicurean atomism came up against the more qualitative approaches of Aristotelian

natural philosophy, the two sets of beliefs were incompatible. However, this paradigm shift did

not result in the complete destruction of Aristotelian natural philosophy. When more modern

scholars like George Evelyn Hutchinson and Bruno Latour play a role in the analysis of medieval

texts, Kuhn's paradigm models become extremely useful tools to bridge the gap between the

approaches of medieval Aristotelian natural philosophy and modern Epicurean atomism.

 Most importantly for the work in this dissertation, Kuhn asserts that one-to-one

identification of scientific communities with scientific subjects as part of the paradigm model

applies only to the subject matter and not to the practitioners:

> The members of all scientific communities, including the schools of the "pre-
>
> paradigm" period, share the sorts of elements which I have collectively labeled 'a
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> paradigm.' What changes with the transition to maturity is not the presence of a

paradigm but rather its nature […] There was, for example, no physics community before the mid-nineteenth century, and it was then formed by the merger of parts of two previously separate communities, mathematics and natural philosophy (*physique expérimentale*). What is today the subject matter for a single broad community has been variously distributed among diverse communities in the past. (178-9)

Kuhn's example demonstrates that although physics was not a distinct category of science prior to the nineteenth century, it does not mean that the content of material now within the paradigm of physics did not exist or was not subject to study. Likewise, the subject matter once contained within the realm of Aristotelian natural philosophy is now part of a variety of other fields: principles regarding motion (found in texts such as Aristotle's *Physics* and *De caelo*) are now found in physics and astronomy while studies on animals (found in texts such as Aristotle's *Parva Naturalia (Small Works on Natural Things), History of Animals, Parts of Animals, Generation of Animals*) are now subdivided into a number of fields including biology and zoology. The boundaries between fields of knowledge are fluid and change as perspectives on the knowledge change. I would argue further that not only do the categorical boundaries of knowledge change over time, but they are also in a constant state of flux at any given moment to reflect the diverse perspectives of members in each field.

To illustrate how the change of perspective functions in paradigm shifts in the sciences, Kuhn uses examples from Gestalt experiments. Kuhn singles out the duck-rabbit illusion (see fig.

1.1) as his primary example to emphasize the static nature of the knowledge subject to paradigm shifts:

> What were ducks in the scientist's world before the revolution are rabbits afterwards. The man who first saw the exterior of the box from above later sees its interior from below. Transformations like these, though usually more gradual and *almost* [emphasis added] always irreversible, are common concomitants of scientific learning. Looking at a contour map, the student sees lines on paper, the cartographer a picture of terrain. Looking at a bubble-chamber photograph, the student sees confused and broken lines, the physicist a record of familiar subnuclear events. Only after a number of such transformations of vision does the student become the inhabitant of the scientist's world, seeing what the scientist sees and responding as the scientist does. (111-12)

The key word in Kuhn's warning here is "*almost*." To those within the field of the paradigm, focused on forward progress (particularly in the hard sciences), the transformation seems unidirectional. However, to go back to Kuhn's example of the Gestalt duck-rabbit, it is possible to move in both directions. While it may not be possible to "unsee" either the duck or rabbit once it has been identified, it is entirely possible to switch between the two images. Not only is it possible to see either the duck or the rabbit in one moment, but there is also a third transitional duck-rabbit hybrid that can be identified. In his work on aesthetic perception, Marcus B. Hester analyzes the nature of the duck-rabbit figure and argues that "the relation between the duck aspect, the duck-rabbit figure, and the rabbit aspect is a transitive relationship" (208). The

relationship is therefore a symmetrical one: both aspects are present in the same figure though

perhaps only one is dominant at a time.
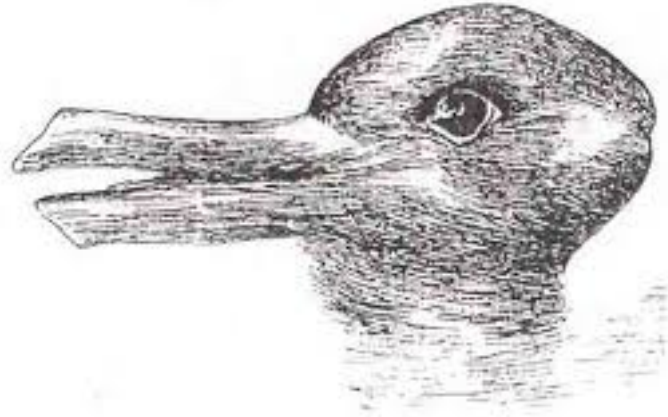
Figure 1.1: Gestalt duck-rabbit

This ability for perspective to move back and forth is one that Kuhn downplays with his

claim that the transformation between paradigms is "almost always irreversible."

Characterizations of science that depict it as a series of advancements or evolution towards an

ideal state would, indeed, contribute significantly to the irreversible nature of perspective in the

scientific paradigm; such a view is inevitable with the twentieth century tendency to celebrate

scientific progress.[20] "Progress" necessarily implies a movement in one direction, a forward

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[20] The tendency to celebrate scientific progress is evident in a number of journal titles in science, such as *Reports on Progress in Physics*, *Advances in Ecological Research*, and *Advances in Production Engineering and Management*. Critical analyses of Kuhn and Latour also demonstrate this tendency. In his discussion on the influence of Kuhn and Latour in modern science studies, Steve Fuller makes a plea to "promote a metaphysical horizon more conducive to a progressive scientific ideology […] by securing an institutional basis for inquiry that might encourage young academics to think of themselves as inhabiting a 'progressive' world" (433-34).

movement in one direction towards a specified destination. The work of this dissertation requires us to exploit Kuhn's "almost" and reverse the transformation between paradigms in order to use modern science theories to explore the ecological imagination in medieval literature.

The paradigm model along with the Gestalt duck-rabbit metaphor is a useful one though I am cautious with its application. Kuhn's scientific paradigms are invaluable for tracing the development of science over time because they function to place categories on knowledge that not only distinguish science from non-science, but also the many sub-fields of science from one another. However, as stated by Steven Fuller, Kuhn's model has limitations because it casts "scientists as natural born dogmatists whose single-mindedness inclines them to run their paradigms into the ground, absent the intervention of some relatively disinterested parties – be it the state of a client pool – capable of checking for diminishing returns on scientific investment" (430). I would extend Fuller's criticism further to argue that while Kuhn's scientific paradigms are useful for placing boundaries on categories of knowledge, they do not fully address the social or historical context of those categories, nor do they take the relationships between categories into consideration. Kuhn's paradigm model effectively isolates individual fields of science. It is at this point that the work of Bruno Latour comes in to undermine the restrictive boundaries and characterization of science promoted by Kuhn. Latour's focus on the multiple, overlapping, heterogeneous networks that integrate the formal study of science with society seeks to blur (if not eliminate) the boundaries put in place by Kuhn. Fuller is quick to point out the limitation of Latour's approach to science studies as well, claiming that "Latour's version of this insight loses – and encourages readers to forget – the normative sensibility that lay behind the desire to keep science, in some sense, 'autonomous' from the rest of society" (431). A more thorough

discussion of Latour follows but at this point it is clearly evident that the theories of Kuhn and Latour have the potential to serve complementary roles, particularly for the study of ecology in medieval literature. Relying too heavily on the work of a single theorist runs the risk of being far too restrictive and limiting the scope of study; we can use both to successfully establish boundaries and trace the development of ecology as a distinct field of science over time while examining the influences and interactions that extend beyond those established boundaries.

The publication of Bruno Latour's *Science in Action* came almost exactly 25 years after Kuhn's *Structure of Scientific Revolutions*. Together, they are two of the most influential texts in modern science studies.[21] The title of Latour's work points to the ever-changing nature of sciences; Latour approaches the study of science as an action rather than as a finished product. Rather than build on Kuhn's idea of paradigm shifts in science, Latour complicates and problematizes the paradigm shifts by exploring the myriad of networks and social components that influence the contents of Kuhn's paradigms. The first element Latour examines is the role of literature in science. Scientists must first compose texts and documents to present a series of arguments. The success of the scientist is undetermined until other scientists engage with the literature in some way at later points in time. Any literature that is ignored by future scientists remains outside of the paradigm while literature that is engaged with in any way (positive of negative) becomes part of the paradigm, or part of the conversation in that particular field. Latour's analysis suggests a definition of science that relies heavily on hindsight. It is nearly impossible for scientists and thinkers to see themselves as part of any particular paradigm

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[21] To mark the coincidence of 50th anniversary of Kuhn's *Structure of Scientific Revolutions* and the 25th anniversary of Latour's *Science in Action*, *Social Studies of Science* published a special issue in 2012 entirely dedicated to both theorists.

because it is the reception of their work by subsequent researchers that will ultimately include or exclude the selected literature. It is this selectivity of later generations that is, in part, responsible for the exclusivity of accepted scientific texts that I hope to challenge.

Of particular interest to my analysis of medieval texts here is Latour's assertion that "science" is not a separate entity. In *Science in Action*, Latour's first extended study in STS studies, he states that associations are the only elements that distance "science," "technology," and "society" from one another; the three are not separate entities but rather parts of a series of networks that interconnect. Rather than seeking to identify the categories for each component of a network ("science" or "social"), we must strive to list all the connections that exist between components. Again, Latour firmly establishes the importance of process in studying science while simultaneously breaking down, and even completely disregarding, the boundaries of modern definitions of science. In such an analysis, it is the study of the connections and networks that emerge from the study of science that is most important; for Latour, science is a constantly evolving and endlessly integrated process as opposed to a static and isolated field of knowledge. By tracing the networks and various associations between the natural world, scientists, and society, Latour claims we are able to come closest to defining what "science" is exactly.

As previously stated, Latour begins his analysis of science by examining the role of literature in science. Although much of his discussion deals specifically with the rhetoric of scientific papers, his approach to the staging and framing of scientific literature is also applied to the study of medieval literary texts examined in this dissertation. Latour notes that the audience of any modern scientific writing is defined first by the title, references, figures, and technical

details of a paper and that the more technical, controversial, and resource-laden a paper is, the more limited the audience will be (*Science in Action* 52). These limitations speak to the modern sense of exclusivity in the sciences, where readership of scientific content constitutes a relatively small percentage of the general population. In order to popularize scientific literature, Latour claims that the content must be simplified:

> If one wishes to increase the number of readers again, one has to decrease the intensity of the controversy, and reduce the resources. This remark is useful because the difficulty in writing "popular" articles about science is a good measure of the accumulation of resources in the hands of a few scientists. It is hard to popularize science because it is designed to force out most people in the first place. No wonder teachers, journalists, and popularizers encounter difficulty when we wish to bring the excluded readership back in. (*Science in Action* 52)

With their inclusion of science in literature, particularly literature composed in the vernacular and literature that relies heavily on images, the medieval writers studied in this dissertation can be seen as Latour's popularizers who seek to disrupt the boundaries of scientific study of the natural world. Regardless of the intended audience, science in literature occurs through "a cascade of transformations" (*Science in Action* 39) via immutable and combinable mobiles (*Science in Action* 227), namely observations of the natural world that have been written down and communicated in some form.[22] Using these elements of Latour's analysis, we find that science exists in literature well outside the boundaries of the paradigms established by scientists.

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[22] I explore Latour's definition of immutable mobiles in greater detail in Chapter 2.

Latour's analysis extends to all fields of science but I would like to focus primarily on his interest in the natural world. In *Politics of Nature*, Latour warns against relying on social representations of nature and characterizes modern science as being disconnected from nature:

> It seems to be the case that the most sophisticated of human sciences have also long since abandoned the notion of nature, by showing that we never have immediate access to "nature in general"; humans only gain access, according to the historians, the psychologists, the sociologists, and the anthropologists, through the mediation of history, of culture – which are specifically social and mental categories. (*Politics* 32)

The value of social science lies in its ability to recognize two simultaneous branches of knowledge of nature, that there is "the human history of nature on the one hand, and on the other, the natural nonhistory of nature, made up of electrons, particles, raw, causal, objective things, completely indifferent to the first list" (*Politics* 33). Latour further notes the difficulty of accessing the "natural nonhistory of nature" because as soon as scientific study – with its instruments, recorded observations, measurements, and calculations – enters the picture, we cease to talk about nature and are instead referring to "what is produced, constructed, decided, defined, in a learned City who ecology is almost as complex as that of the world it is coming to know" (*Politics* 35). In other words, the cultural influence on depictions of nature in science and literature is absolutely unavoidable and therefore plays a significant role in my analysis of medieval literature. However, it is also my goal to catch a glimpse of the medieval ecological imagination that has the potential to move beyond conventional modern science, to learn how

medieval writers and artists saw the natural world by both becoming aware of and also blurring

the division between the "nonhistory of nature" and the "human history of nature." I seek to

emulate Latour's model: "by making the history and sociology of the learned City visible, I am

aiming at blurring the distinction between nature and society *durably*, so that we shall never have

to go back to two distinct sets, with nature on side and the representations that humans make on

the other" (36). The task is a daunting one, indeed, but certainly worthy of an attempt.

With Latour's Actor-Network Theory (ANT), binary oppositions such as "city" and

"ecology" or "nature" and "society" are eliminated when we consider the intricate interactions at

work in the creation of a "nature-culture" hybrid. Michael Bell provides one of the most striking

examples of Latour's "nature-culture" hybrid with the development of the theory of natural

selection by Charles Darwin in the mid-nineteenth century. Although evidence for the theory of

natural selection existed before Darwin came to see it, cultural and social conditions up until that

point had not provided the imaginative framework needed to visualize the process. Bell identifies

the rise of capitalism as the cultural shift required for the theory of natural selection to emerge:

> It could be argued that before the rise of a form of social organization like
>
> capitalism, people did not have the conceptual resources – the forms of
>
> understanding – needed to envision natural selection. Before this form of social
>
> "seeing" developed, people were not able to see natural selection. A certain cast
>
> of mind is prepared to see things that other casts of mind cannot – but there has to
>
> be something there to "see." Indeed, the fossil record provides abundant material

evidence – abundant performances, in Latour's terminology – that corresponds

with Darwin's basic propositions. (225)

While Bell's example effectively demonstrates how nature and culture converge, it also raises an

interesting problem with the application of Latour's theories to medieval literature; Latour's

analysis of networks in science is primarily an *external* enterprise based on the modern scientific

method whereas much of medieval science emerges from *interior* thought processes based on

imaginative reorienting of the natural world. Bell alludes to this problem without explicitly

identifying it with his use of "social seeing" and "certain cast of mind." While Latour's work is

exceptionally useful for examining external networks, it leaves gaping holes where imagination

and morality are concerned. Much like the science writing that he examines, Latour's work deals

primarily with the perceived objective observations of the physical sciences.

Katinka Waelbers and Philipp Dorstewitz identify the same absence of interiority in

Latour's ANT, claiming that "the approach is poor from an ethical point of view: the doings of

things and people are couched in one and the same behaviorist (third person) vocabulary without

giving due recognition to the ethical relevance of human intelligence" (23). Their suggestion for

remedying this problem is to turn to an example of the "nature-culture" hybrid identified by Bell,

namely the work of Charles Darwin. In their exploration of whether ethical considerations have

any place in Latour's ANT, Waelbers and Dorstewitz first find a common ground between

Latour and Darwin: "both the theory of Evolution and Actor Network theory are naturalist

frameworks, and both translate normative and teleological categories, such as 'agency',

'intention' and 'purposes' into a language of natural processes and causal coupling" (30). What

Darwin provides that his contemporaries and Latour lack, though, is a "non-teleological virtue-ethics with an account of human nature that clearly identifies environmental and non-human influences on the development of moral behavior" (Waelbers and Dorstewitz 32). Along with this approach to science that is concerned with both external circumstances and internal motivations, Darwin's work serves to bridge the gap between science and literature in terms of both content and form.

Darwin's *Origin of Species* has been read both as imaginative literature as well as an exercise in poetics within the field of science.[23] Isabelle Stengers goes so far as to pronounce Darwin "not only as the founder of the science of the evolution of species, but as 'the first Darwinian author,' the creator of a style much more than explanatory hypothesis" (170). This style of scientific writing is one born out of necessity because the processes Darwin describes are ones that transcend standard scientific methods of observation. The process of natural selection occurs over hundreds of thousands of years and is therefore far too slow to be seen and recorded according to the established protocols of the scientific method. The very nature of Darwin's focus of study necessarily requires an integration of external observations and internal imaginative processes; Gillian Beer argues that evolutionary biology must embrace "a form of imaginative history [because] it cannot be experimentally demonstrated sufficiently in any present moment" (8).[24] This imaginative approach to describing the natural world is perhaps

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[23] On the role of imagination in Darwin's work, see T. Baird's "Darwin and the Tangled Bank" and Stanley Edgar Hyman's *The Tangled Bank: Darwin, Marx, Frazer, and Freud as Imaginative Writers*. Analysis of Darwin's use of metaphors, similes, personification, and imagery can be found in sources such as Bulhof, Cannon, Beer and Martins, Flint, and Browne.
[24] Benjamin Sylvester Bradley argues against Beer's assertion to claim that Darwin's work relies not on the imagination but on logic and reasoning. I would argue that the imagination is what

most pronounced in chapter four of Darwin's *Origin of Species*, where Darwin repeatedly

implores his readers to use their imaginations and explicitly employs literary devices such as

metaphors, similes, and personification in his description of natural selection.

Rhetorical devices are key to Darwin's work as he sets the stage for natural selection by

repeating the phrase "let it be borne in mind" as a means of inviting the reader to open the

imagination to a dizzying array of possible interactions between living organisms (93-94). Later,

to illustrate how survival of the fittest works, Darwin "beg[s] permission to give one or two

imaginary illustrations" (103). While Darwin bases his imaginary scenarios on very real species

(he uses examples of wolves hunting deer as well as nectar-producing plants), his use of the

hypothetical to reason with the reader is not a method typically condoned in modern science

writing. Even further from the traditions of modern science writing is Darwin's overtly explicit

use of literary devices. For example, Darwin personifies nature as a means of comparing natural

selection to the selective breeding employed by man:

> Nature, if I may be allowed to personify the natural preservation of survival of the
>
> fittest, cares nothing for appearances, except in so far as they are useful to any
>
> being. She can act on every internal organ, on every shade of constitutional
>
> difference, on the whole machinery of life […] It may metaphorically be said that
>
> natural selection is daily and hourly scrutinizing, throughout the world, the

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allows Darwin's logic and reasoning to become effective means for the analysis of natural
selection; there is no need for use of the imagination and use of logic to be mutually exclusive
enterprises.

slightest variations; rejecting those that are bad, preserving and adding up all that are good. (96-97)

It seems that Darwin is aware of the potential for literature and the imagination to inform scientific study, particularly with the process of communicating scientific theories to audiences outside of the scientific community. This use of the literary to inform the scientific imagination augments Latour's externally-based analyses of writing and communication in the sciences.

For Latour, political ecology presents a complex definition of science, one that involves tracing the methods used to extract, record, and transport information on the natural world. This analysis is invaluable in that it is keenly cognizant of historical and cultural influences on how knowledge of the natural world is constructed by scientists. George Evelyn Hutchinson, who, like Darwin, demonstrates that there is space for the literary in science, offers a far simpler definition in his 1953 publication *The Itinerant Ivory Tower: Scientific and Literary Essays*. He quotes Simone Weil on the title page to express his own philosophical approach to science: "*la vrai definition de la science, c'est qu'elle est l'étude de la beauté du monde*."[25] For Hutchinson, science is first and foremost an appreciation of beauty in the world done through careful observation and study. His methods of systemically analyzing and recording the natural world may have pushed ecology firmly into the realm of hard sciences, yet his gift for prose made his observations accessible to audiences beyond the scientific community in ways that echo medieval observations of the natural world. It is this type of work that scholars like Bruno Latour should also be interested in; Hutchinson's ability to record observations of natural phenomena

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[25] "The true definition of science is the study of the beauty of the world."

through written documentation is a primary requirement of modern science, though his ecological studies are unique in that the appeal of his written work extends far beyond that of the scientific community.

Though it is one of the more recent subspecialties of science to emerge, ecology is the field perhaps most closely related to the concepts explored in Aristotelian natural philosophy by medieval scholars. As founder of the field of ecology, Hutchinson has produced a body of work that demonstrates a tremendous amount of diversity in terms of content and a style that is easily accessible by a wide range of readers. For example, his writing in *The Clear Mirror* defies Latour's characterization of modern scientific writing and serves as both a literary narrative and scientific classification of observations he made while on the Yale North India Expedition in 1932:

> On darker mornings, when the rising sun is hidden by storm clouds, and the sparkle of the sinuous ripples around yellow and white water-lilies for a time is lost, the aspect of the lakes in this fertile valley, though changed, is still in accord with the country's fertility. The green vegetation of the marshes, no longer having to compete with a luminous blue above, now seems the source of light on the landscape. Seen through the rain-bearing air, the bright details of the landscape disappear; only the boundaries between the water and air and earth remain, and they become suddenly sharpened. (101)

This description of lakes in the desert of northern Kashmir evokes a poetic disassembling and reassembling of nature that we also see in medieval descriptions of the natural world.

Hutchinson uses language to do more than objectively list his observations of the lake; he strives to reconstruct the scene using vivid imagery in order to transport his readers to northern Kashmir in their imaginations. His descriptions of the natural world serve not only to recreate the physical scene before him in the imaginations of his readers, but also to demonstrate a poetic appreciation of the beauty of the natural world.

Hutchinson himself wondered about the roles of the natural world in literature and his research in various fields of ecology extended into medieval studies with a publication in *Isis* in 1974: "Attitudes toward Nature in Medieval England: The Alphonso and Bird Psalters." In his study, Hutchinson seeks to "throw some additional light on the understanding and appreciation of nature during the Middle Ages by a scrutiny of certain illuminated manuscripts made in England at the end of the thirteenth and beginning of the fourteenth centuries" ("Bird Psalters" 5). In his study of the psalters, Hutchinson indexes the zoological iconography throughout the folios and notes the literary influences that various birds, such as the crane, had in medieval literature.[26] He also notes that various elements of the natural world served different purposes in earlier medieval literature; while botanical illustrations were primarily concerned with medical uses, illustrations of animals in bestiaries served moral and theological purposes ("Bird Psalters" 23-24). Hutchinson's research on the use of the natural world in medieval literature seems to

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[26] Hutchinson's analysis of the crane follows: the crane was "apparently bred in East Anglia during the Middle Ages, and possibly in Ireland also. Enormous numbers were taken for food; no ceremonial banquet was complete without them. Apart from its repute as a table bird, the crane was subject to various legends, fables, and literary incidents. It was believed that a sentinel crane stood on one leg holding a stone in the raised foot; should the crane fall asleep, the stone would drop, waking the bird. This and Aesop's fable of the fox and the crane both occur in English medieval wood carvings. The War of the Cranes and the Pygmies, familiar in antiquity, presumably lies behind the representation of the bird being shot on the *Beatus* page of the Alphonso Psalter" ("Bird Psalters" 17-19).

identify the beginnings of an epistemological shift in medieval thinking about nature where its

purpose in literature and images could include both moral and theological representations as well

as an interest in natural science as a distinct field of study. He also notes the role of the

vernacular with Albertus Magnus's use of German to describe species of finches in the thirteenth

century, which, "as taxonomic designations of local species, were ahead of the learned,

international, but traditional Latin usage" ("Bird Psalters" 24). Additionally, Hutchinson

attributes the increasing skill in accurate representation of individual species of birds to a keen

interest in studying the details of the natural world. Overall, what Hutchinson identifies in his

analysis of the psalters might be considered the very beginnings of a shift in general perception

of the purpose of using the natural world in literature.

Though the shift that Hutchinson identifies might be considered one of Kuhn's paradigm

shifts in its infancy, Hutchinson is adamant that the emergence of ecology and study of the

natural world is *not* a paradigm shift itself but rather a *process* belonging to the paradigm of

evolution. Hutchinson goes into tremendous detail on the roles of ecology within the paradigm of

evolution in his 1965 publication, *The Ecological Theatre and the Evolutionary Play*. The book

contains a series of three lectures that use the analogy of a theatre to demonstrate how the study

of ecology is akin to studying the stage and actors while the study of evolution provides analysis

of the action and production of the play. These claims came very early in the formal emergence

of ecology as an academic field and it might be argued that the study of ecology is now an

established paradigm in and of itself, but his model of using study of the natural world as a

backdrop or actor that pushes the action of a larger epistemological goal is an extremely useful

one. This dissertation extends Hutchinson's model of the role of ecology in evolution to explore

the role of ecology in medieval literary texts that are not explicitly scientific. Ecology – through various depictions of nature and the physicality of the natural world –functions as but one of the many actors at work in a network of meaning and representation in medieval texts.

So far I have outlined the development of science in the Middle Ages and noted some of the social and political influences that came into play during its development. I have also used Kuhn's paradigm model of scientific revolution to illuminate the current distinct categorizations of scientific fields of study, followed by a summation of some of Latour's critiques of the boundaries that are so firmly established by the paradigm model. Of the many distinct modern sciences, the work of Hutchinson convincingly argues that ecological approaches to medieval literature have tremendous potential to provide further insight not only into allegorical and symbolic uses of nature in medieval literature, but also into the development of ecology as a field of study that considers the role of human interactions with the physical world. Given that I rely on a modern definition of ecology in this study, it is important to be cognizant of the fact that what might be considered medieval ecology looks very different from what appears in twenty-first-century ecological journals. In *An Environmental History of Medieval Europe,* Richard C. Hoffmann explains the relative absence of empirical observations of the natural world in medieval writing:

> it is important to recognize that the European Middle Ages lacked self-consciousness or even coherent tacit discourse on relations of humans to nature or on nature as an entity, to say nothing of such concepts as environment or ecology, both of which are modern, not medieval ideas […] The closer an investigation

manages to come to actual things of nature – an animal, a plant, a planet, a rock, a

human body – and their explicit medieval representations and programs, the

greater diversity that appears in medieval minds. (86)

I would argue that Hoffmann's point is not that the environment or ecology did not play any role
in medieval literature; rather, medieval study of the environment and ecology was able to take on
a multiplicity of meaning that is not accorded to modern scientists. The medieval ecological
imagination is far freer than the modern one to be "excited by familiar things, which are well
enough known to be picked up from a world where they lie at random, taken apart, reconstructed
and redesigned, and put in exact places where they are appropriate," as Hutchinson would hope.
What follows is an analysis of that medieval ecological imagination at work in Chaucer's *House
of Fame*, Langland's *Piers Plowman*, and an example of one of the *Bibles Moralisées*. Medieval
ecology proves itself to be far more versatile than any modern version of the field, where the
natural world is able to carry multiple layers of meaning in the poetry and images crafted by
medieval imaginations.

Chapter 2

Translation, Science, and Chaucer's Construction of *The House of Fame*

As the process of vernacularization became increasingly common in Europe during the late Middle Ages, scientific concepts that were previously limited to scholastic texts and treatises became increasingly accessible to audiences outside of academic institutions. As outlined in the previous chapter, monastic schools of the early Middle Ages relied heavily on the Augustinian approach to science as the handmaiden of theology, an approach that was carried forward in the more religiously-independent setting of medieval universities. Early medieval scholars would have certainly encountered scientific inquiries in the Latin translations of Aristotelian natural philosophy but by the fifteenth century wider audiences would have also had increased access to scientific information through compositions in vernacular English. The growing popularity of vernacular literature allowed for an exploration of the natural world that was no longer limited to Latin translations of classical and Eastern sources influenced by the church and its concerns with the supernatural. Vernacularization of science freed the medieval ecological imagination from the constraints of theological approaches and technical academic treatises; images of the natural world could carry meaning outside the allegorical spheres favored by religious scholars not only to educate a vernacular audience, but also to draw parallels between the natural world and human

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culture. Chaucer's work is an especially valuable example of this shift as he both represents the growing interest in vernacular literature as well as a desire to explore science for non-scriptural purposes. In particular, Chaucer's *House of Fame* functions, in part, as a commentary on the function and processes of language and sound in human culture. Much of the poem revolves around the process of translation, where both classical literature and scientific principles are translated linguistically into vernacular English and visually into images. Thus, the process of translation in Chaucer is a dual one that allows the natural world to carry meaning in literature beyond those accessible only through allegorical interpretation.

To date, much of the research on vernacular science in the Middle Ages has primarily focused on the translation of academic texts or technological instruction manuals originally composed in Greek, Latin, and Arabic.[1] The early years of the translation movement began with medicine and astronomy in the tenth and eleventh centuries, with a shift in focus to astrological works and mathematical treatises by the twelfth century (Lindberg, *Beginnings of Western Science* 217). Though translation of texts into the vernacular certainly occurred prior to the fifteenth century, it was not until the late Middle Ages that the quest to make scientific knowledge accessible in vernacular texts became popular. There was an extremely sudden increase in translation in the late Middle Ages; Päivi Pahta and Irma Taavitsainen describe the shift in attitude as a violent disruption in the tradition of academic literature, stating that "the

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[1] William Crossgrove's studies on the use of vernacularization in medieval science explore the greater complexities of language at work, claiming that no single vernacular identity formed the cultural framework of medieval Europe. According to Crossgrove, "vernacularization presupposes the existence of vernacular culture in opposition to something more learned, more conscious, more prestigious" (50). While in Chaucer's case we will take "vernacular" to refer to English, it is certainly true that the term can refer to any number of languages.

fifteenth century witnessed an explosion in vernacular text production" (11). Evidence for this explosion can be seen clearly in the *eVK* database, a catalogue of scientific translations compiled by Linda Ehrsam Voigts and Patricia Deery Kurtz, which shows a forty-fold increase in the number of vernacular translations of scientific treatises between the fourteenth and fifteenth centuries. This dramatic increase in the number of translations in the span of a single century could be indicative of a greater general interest in making scientific literature more accessible to Western audiences in addition to creating a means of "ownership" of the knowledge borrowed from classical sources and the East. These interests in accessibility and reappropriation of knowledge can be found throughout much of Chaucer's work but is perhaps most prevalent in *The House of Fame.*

Likely composed between 1379 and 1380, *The House of Fame* is one of Chaucer's shorter poems and has been identified as the "most bookish of Chaucer's books."[2] The poem demonstrates the breadth of Chaucer's awareness of literature with allusions and adaptations of a range of classical poets such as Ovid, Virgil, and Boethius along with the Bible, Dante, and French love poets such as Jean de Meun. The poem is a dream vision composed in octosyllabic couplets and divided into three books, each book with an introduction/invocation and a shift focus in terms of content. Book I begins with some reflection on the nature of dreams before launching into the dream itself. The dreamer, later identified as Geffrey, finds himself in a temple of glass depicting the story of Troy on its walls. Chaucer devotes much of Book I to the retelling of Virgil's accounts of Dido as the dreamer marvels at the images on the walls. Book II

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[2] A. J. Minnis identifies *The House of Fame* as the text that most puts Chaucer's learning on display; it is by far the most concerned with demonstrating the breadth of Chaucer's literary knowledge (*Oxford Guides to Chaucer: The Shorter Poems* 183).

then shifts from a literary focus to a more natural or physical scientific exploration as the dreamer is snatched up by an eagle, who serves as Geffrey's guide and tutor through the heavens as the two approach the House of Fame. In Book III, Geffrey enters the House of Fame, situated high atop an icy mountain, where literary and scientific concerns converge. Echoing the images found in the temple of glass from Book I, the icy walls in Book III display the names and deeds of various artists (some of which have melted in the sun). Moving on to the main hall, Geffrey becomes overwhelmed by the din of those seeking fame until the book ultimately ends, presumably unfinished, with the expectation that the dreamer is about to meet "a man of gret auctorite" (2158). Though the overall narrative structure of the poem as a whole is relatively weak in comparison to the works to which he alludes, Chaucer clearly demonstrates a keen awareness of the role of public perception and narrative. *The House of Fame* is complex poem that explores the nature of fame itself by juxtaposing language and the natural world. Chaucer's work goes beyond that of a typical dream poem to reveal the poet's awareness of his place in both literary history and the physical world.

　　The House of Fame is a text concerned not only with language and literature, but also with the creation and transmission of knowledge across a variety of disciplines and fields. There is a wide range of criticism that addresses the role of other literature in *The House of Fame*, primarily analyzing the appropriation of classical sources throughout the poem.[3] Other recent criticism on *The House of Fame* deals primarily with how language functions in the poem in

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[3] A small selection of examples from the past half century include Dean Swinford's analysis stellification as mythic apotheosis in the poem, Leslie K. Arnovick's reading of *The House of Fame* as a negotiation between literary and oral poetic traditions, Laura Ruffolo's account of Chaucer's subversion of literary authority, and Alfred David's discussion on Chaucer's use of literary satire in *The House of Fame.*

terms of classical influences.[4] Some criticism goes further to suggest the poem presents

Chaucer's desire to establish a greater sense of authority for vernacular Middle English in

addition to his desire to simultaneously exploit and displace the authority of classical texts.[5]

While the literary concerns of poetic composition, preservation, and language are often at the

forefront of such studies, analyses of *The House of Fame* have traditionally not been overly

concerned with categories of knowledge that address observations of the natural world, such as

Chaucer's exploration of the transmission of sound and the study of astronomy. I hope to build

upon previous scholarship by opening *The House of Fame* to the field of science studies as a

means of exploring Chaucer's extensive use of metaphors and explanations derived from

scientific principles in Book II. Analysis of how Chaucer both explores and exploits

observations of the natural world in his construction of *The House of Fame* provides modern

readers with some insight into the intimate relationship between knowledge (especially

knowledge of the natural world as observed through visual senses) and vernacular English

literature in the medieval period. With a poem that creates several visual models of scientific

concepts using vernacular medieval English, Chaucer's work provides an example of the

interdependence of categories of knowledge in the Middle Ages by translating scientific concepts

into vernacular metaphors in *The House of Fame*.

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[4] Two such examples include Rita Copeland's "The History of Rhetoric and the Longue Durée:
Ciceronian Myth and Its Medieval Afterlives" and Christopher Baswell's final chapter in *Virgil
in Medieval England: Figuring the* Aeneid *from the Twelfth Century to Chaucer*.
[5] Just one such example is the argument presented in "Chaucer and the Field of Cultural
Production: Humanism, Dante, and 'The House of Fame'" by Glenn A. Steinberg, which states
that Chaucer mimics Dante's use of the vernacular as part of a poetic tradition established by the
early Italian humanists (183). Steinberg's assertion that Chaucer's work in *The House of Fame*
participates in the humanist movement of the early Renaissance is in the line with the
observations of this chapter, which suggest that Chaucer was also participating in early
movements in the emerging fields of science.

Translation and the rise of the vernacular were essential for the creation of an environment whereby greater numbers of individuals had access to scientific concepts through literature. Though not translating scientific treatises explicitly in *The House of Fame*, Chaucer was participating in a movement that ultimately resulted in an established tradition of translation of scientific and philosophical works. There is a substantial amount of scholarship that examines Chaucer's erudition in the sciences, dealing primarily with the astrolabe along with Chaucer's use of astrology and mythology in his poetry.[6] Such scholarship often asserts that much of Chaucer's writing uses astrological details and scientific erudition to create dense, multilayered meanings where scientific details serve the primary purpose of enhancing literary fictions. In Book II of *The House of Fame* Chaucer, however, the model is reversed and it is often the literary fiction that serves to enhance the observations of the natural world. Book II is exceptional in that natural phenomena replace literary concerns as the grounding force of the narrative. Chaucer's use of scientific metaphors in Book II of *The House of Fame* shows how the creation of a new vernacular space in literature allowed for scientific concepts to transcend the traditional limits of academic texts and treatises.

Chaucer seems to be fully aware of the potential impact that scientific content can have on his work. When Chaucer invokes Apollo in Book III of *The House of Fame*, he makes a claim for the priority of content over form in his poetry, stating that it is the meaning of his words that are meant to take precedence over poetic form:

> O god of science and of light,

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[6] One of the more recent indices of Chaucer's astronomical erudition can be found in Jacqueline de Weever's *Chaucer Name Dictionary: A Guide to Astrological, Biblical, Historical, Literary, and Mythological Names in the Works of Geoffrey Chaucer*.

Apollo, thurgh thy grete might

This litel laste book thou gye!

Nat that I wilne, for maistrye,

Here art poetical be shewed,

But, for the rym is light and lewed,

Yet make it somewhat agreeable

Though som vers faile in a sillable;

And that I do no diligence

To shewe crafte but o sentence. (HF 1091-1100)

Although these lines demonstrate Chaucer's ironic sense of self-deprecation towards his own poetic success (part of the modesty topos not uncommon in medieval literature), his plea for readers to pay particular attention to the meaning of the text reinforces one of the poem's central concerns, a concern with the transmission and use of knowledge. Addressing his plea to Apollo[7], identified here as the "god of science and light" and concluding the statement with a reference to "sentence", or knowledge, Chaucer frames the invocation to emphasize the role of knowledge and content in this particular work. Chaucer's appeal to Apollo is one to a deification of knowledge itself. The *MED* cites the term "science" as a reference to a wide variety of types of knowledge, all of which are reflected in Chaucer's use of the term in *The House of Fame*; self-

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[7] Apollo, the classical god of poetry, light, medicine, and truth, was one of the most commonly used gods in medieval literature. Further details on the role of Apollo in medieval vernacular writing can be found in Jamie C. Fumo's *The Legacy of Apollo: Anitquity, Authority, and Chaucerian Poetics*. Throughout his book, Fumo provides a detailed account of how medieval writers appropriated classical authority by referencing Apollo in vernacular texts to grant their own writing a greater sense of historical legitimacy. Chaucer most certainly was participating in this tradition in *The House of Fame*, but the reference to "science" in particular adds yet another layer of meaning for modern readers.

knowledge, experiential knowledge, the role of memory, and specialized forms of knowledge found in the seven liberal arts and sciences are all cited as potential meanings.[8] Though Chaucer clearly would not have used the term "science" in the invocation of Book III with the more reduced scope of the word in mind, his plea to pay close attention to the content of his work prompts us to explore a myriad of descriptions of how nature works as often found in the fields of physics and biology today. Additionally, considering the possible meaning of "science" as a skill or craft, Chaucer's reference to his own writing as something requiring "crafte" indicates that the construction of language in poetic form also has the potential to fall under the umbrella of medieval science. As such, Chaucer's *House of Fame* becomes almost as much a teaching tool for students of natural philosophy as it is a model of poetic structure and form.

Beyond a concern with the construction of poetry and its function in society, Chaucer's work demonstrates elements of appreciation for the natural world as a subject of study. Chaucer's use of nature throughout the poem serves to not only illustrate his theories on the social construction of literary fame, but also stands alone as a subject worthy of exploration through poetry. Science philosopher Alfred North Whitehead notes that the proliferation of nature in medieval art and literature stemmed from an "unbridled rationalism of the thought of the later Middle Ages" that led to the belief that "the avenue to truth was predominantly through a metaphysical analysis of the nature of things" (39).[9] Though Whitehead makes only a passing

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[8] Definitions of science provided by the MED include all forms of knowledge: self-knowledge, accurate knowledge, certain knowledge, experiential or emphatic knowledge, knowledge in the mind or memory. Definitions also include wisdom, book-learning, branches of knowledge, and skill of craft. Further discussion of the varied categorization of science can be found in the previous chapter.

[9] Whitehead only mentions Chaucer very briefly as his only example of a medieval poet who explored metaphysical aspects of the natural world, but he does devote an entire chapter to the

reference to Chaucer's work in general as an example of this emerging metaphysical interest in the natural world, I would argue that Chaucer's work in the *House of Fame* is far more complex and recognizes a reciprocal relationship between nature and art that exists far beyond Whitehead's characterization of metaphysical concerns. Book II of *The House of Fame* illustrates this reciprocal complexity in detail; the careful and deliberate observations of nature presented in a poem that is astutely concerned with the longevity of literature demonstrate how Chaucer might have envisioned the connections between nature and art. Chaucer uses the logic, observation, and rationalism of the Eagle's instruction to provide an analysis of natural phenomena that was capable of reinforcing scientific principles in a literary context for medieval audiences. *The House of Fame* defies any subsequent perceived division between the science and the arts to promote the dissemination of scientific knowledge while simultaneously advancing the position of vernacular poetry in the arts in ways that highlight their interdependence. The artistic and scientific functions of Chaucer's images from the natural world are so intertwined with each other that it is difficult to argue whether one approach to knowledge can or should take precedent over the other. What seems to be apparent in Chaucer's *House of Fame* is evidence of a complete disregard for any perceived drift in the medieval curriculum that ultimately divided formal studies into the modern pedagogical categories of arts and sciences.

Typical readings of *The House of Fame* as either a medieval dream poem or love vision leave little space for consideration of the scientific functions of the content in Book II; Chaucer's inclusion of various ecological observations and theories (such as his exploration of wave theory, the nature of sound, and principles of gravity and buoyancy) is atypical of either genre. One

analysis of the works of Romantic poets to prove his point. Though his focus is not on Chaucer, it is clear that Whitehead sees a connection between the natural world and literary endeavors.

argument for reading the poem as a love vision comes from J. D. North who notes that "it begins as such, and ends more or less as such, even though central parts stray beyond the characteristic limits of genre both in style and content" (13). North goes on to assert that although *The House of Fame* is not a typical love vision, it does resemble one of the most popular models of the love vision, *The Romance of the Rose*. For the purpose of the analysis in this dissertation, it is also worth noting that *The Romance of the Rose* is a love vision where science does play a small role, particularly with Nature's confession to Genius that includes allusions to the motion of planets and aspects of vision in relation to mirrors. Unlike Chaucer's *House of Fame*, each of these descriptions of the natural world does not stand on its own but rather relies heavily on the narratives that address the topics of love and chance. In *The Romance of the Rose*, Nature speaks specifically to the roles of language and modeling in teaching scientific concepts in the vernacular to lay people, stating:

> it would be a burdensome thing to tell and very difficult to understand, even if someone knew how to teach it without speaking generally, especially to lay people. They could not believe that the things were true, particularly the things about the mirrors that work in such different ways, unless they saw them with instruments, provided that the students who knew this wonderful science through demonstration wanted to let them use their instruments. (18273-76)

But it is here that Chaucer's *House Of Fame* deviates substantially from Jean de Meun's model; while Jean de Meun shies away from a place for scientific explanation of the mechanics of light and mirrors in a love poem, Chaucer seems to embrace the love vision as a platform for presenting visual models of scientific concepts. Chaucer asks his audience to use common sense

and personal experience as means to verify the scientific concepts that he presents, none of which he assumes are "burdensome thing[s] to tell" or "difficult to understand." Rather than assume his audience is not learned enough to grasp concepts such as sound theory without the aid of instruments, Chaucer places faith in the power of imagination to effectively make use of scientific metaphors in his poetry.

The House of Fame's categorization as a dream vision places it in a somewhat precarious position with regard to the role of modern science, but not so with a more medieval understanding of science. As part of the medieval reverence for the potential predictive and divine nature of dream visions, the genre was inevitably closely bound to writings in the philosophical, theological, and scientific traditions (Kruger 2). Chaucer's use of the dream vision not only offers a tremendous amount of freedom in terms of the fictional narrative, but also lends a sense of authority and mysticism to the content of the poem. The interpretation of dreams carried a certain amount of reflexivity on the part of the poet and the significance of this reflexive nature of the genre becomes particularly amplified in works where the poet considers his place in the physical world. Exploration of the natural, physical world within the metaphysical world of the dream vision creates a sense of interdependence between nature and art that Angus Fletcher describes as a "transactional relationship" identified in early modern fiction. This transactional relationship is based on the reciprocal contributions of study of the natural world and that of the human soul: "Looking outward to nature and its laws is always, to an important degree, looking inward to the human capacity for looking outward. Inside and outside are perpetually confounding each other's ontological independence" (41). Fletcher's description of the transactional relationship also speaks to medieval works, particularly in

Chaucer's use of science in literature, where the medieval dream vision becomes the ideal locale for not only an examination of the exterior physical world but also a contemplation of the place of humanity in it, laden with self-consciousness. Vision, of both the physical and metaphysical worlds, is of primary concern in much medieval dream poetry, especially in Chaucer's *House of Fame*.

The self-consciousness of the dream vision was also intimately related to language and establishment of the vernacular in medieval literature. A. C. Spearing suggests that the self-consciousness of dream poetry (that is such an essential component of the transactional relationship for Fletcher) stemmed, in part, from new ideas relating to the importance of translation and vernacular poetry that were beginning to arrive from Italy in the fourteenth century (*Medieval Dream* 5). Chaucer clearly participates in this translation movement in *The House of Fame* where he uses a vernacular fiction to explore the processes of language and translation in the creation and popularization of poetry. In Book I, the dreamer sees the translation of classical literature via images on the wall, which are then translated to the vernacular language of the poem itself. When Spearing describes Book I of Chaucer's *House of Fame*, he identifies this translation as a "medievalization" where "the translation of the story into another medium, from words to pictures, helps to underline the medievalizing 'disjunction' involved" (*Medieval to Renaissance* 22).[10] Chaucer takes the act of translation even further in

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[10] I take Spearing's use of the word "disjunction" here to refer to a distinction and separation of classical content and form, as described by Panofsky's "principle of disjunction" found in *Renaissance and Renascences in Western Art*. In particular, Spearing refers to the content of Virgil being translated from language to image on the wall within Geffrey's dream as described in Book I. This description seems to illustrate Panofsky's main argument that while content would remain consistent in classical and medieval art, the form had a tendency to change drastically between periods. This change in form is yet another example of translation at work

Book II when the dreamer learns about the literal translation of broken air into meaningful language. The eagle uses the opportunity to explain how sounds are translated into words with scientific principles that are translated next into visual metaphors. Thus, translation becomes a process that extends beyond that of moving information between languages. Where in Book I translation relies on the appropriation of classical mythology with Chaucer's retelling of Virgil's *Aeneid*, in Book II translation occurs through the use of scientific metaphors.

Translation for Chaucer goes beyond the transformation of language. Chaucer's translation also involves a movement between categories of knowledge as he shifts the focus of his work from popular literary history to that of physical science. By using literary frames such as those of classical literature to discuss a variety of observations of the natural world, Chaucer engages in a form of translation that carries scientific content into the realm of dream visions. This process of translation in science is a complex one; translation in science works on several levels simultaneously and that has been explored in great detail in several studies conducted by Bruno Latour. The process of translation, according to Latour, is not exclusively the process of shifting scientific knowledge from the domain of one language to another language; rather, it is the process of shifting the language of science "from political terms into scientific terms and vice versa" (*Pandora* 87). In the process of Latour's model of translation "scientists begin to speak in truth because they plunge even more deeply into the secular world of words, signs, passions, materials, and mediations, and extend themselves ever further in intimate connections with the nonhumans they have learned to bring to bear on their discussions" (*Pandora* 97). In *The House of Fame*, particularly in Book II, Chaucer might be considered to emulate Latour's model of

in medieval literature.

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scientists by continuing to explore the secular world of words first introduced in Book I.

Leaving the palace of Book I that is defined by human culture, Geffrey becomes immersed in a

non-human environment when he is swooped into the heavens by an eagle. Once in the heavens,

it is up to Geffrey and the Eagle to draw the connections between humans and non-humans for

Chaucer's audience. If the work of Book I is primarily focused on the cultural production of

literature (one might even argue as a political statement in the act of vernacularization), then

Book II might be seen as Chaucer's attempt to place that work into scientific terms. With a

subsequent return to cultural aspects of fame melded with the physical construction of the House

of Fame later in Book III, Chaucer effectively performs Latour's act of translation across the

three books by bringing the language of politics and culture to that of nonhumans and then back

again.

Further complexities in translation in *The House of Fame* might also be considered as

Latour's definition of the term becomes more ambiguous. Latour explicitly comments on the

multi-layered meaning of the term "translation" in *Science in Action* stating that, "in addition to

its linguistic meaning (relating versions in one language to versions in another one) it also has a

geometric meaning (moving from one place to another)" (117). Translation and the vernacular in

The House of Fame, then, serves a dual function for Chaucer: first, he performs an act of

translation on texts as he converts texts from foreign languages into the Middle English

vernacular and second, he performs an additional act of translation as he shifts language from

traditionally scientific genres to a genre such as the dream vision. As previously mentioned, by

inviting nonhuman (scientific) elements to become such integral components of the vernacular

(literary) narrative, Chaucer is able to introduce a new vernacular science by way of human-

nonhuman interactions in the text. But in addition to that level of translation, Chaucer effectively moves scientific learning and understanding of the natural world into a literary space by translating science into poetry. By reducing descriptions of the natural world to visual metaphors encoded in language, Chaucer creates what Latour identifies as "flattened inscriptions" and "immutable mobiles." Such flattened inscriptions allow for information to be translated in the geometric sense in a very physical manner; observations of the three-dimensional natural world and scientific principles are recorded in such a way that they can be transported from one area to another in addition to moving across genres and categories of knowledge. Chaucer creates a space in *The House of Fame* where language-culture exists alongside science-nature in ways that move the traditional genre of dream poetry into an entirely new realm.

The ability to visualize natural phenomena gains primary importance in the coming lines as part of what Latour would identify as the first step in the establishment of scientific theories, namely that of creating "immutable mobiles." Scientists create immutable mobiles when they record observations from the natural world that can be transported to other places, such as laboratories or classrooms. For Latour, a scientific study of nature depends entirely on the establishment of immutable mobiles. Recorded observations are required in science, according to Latour, because "if scientists were looking at nature, at economies, at stars, at organs, they would not *see* anything […] Scientists start seeing something once they stop looking at nature and look exclusively and obsessively at prints and flat inscriptions" ("Visualisation" 15).[11] Once the

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[11] Latour's model depends heavily on the established use of the printing press and other writing technologies as means of both recording and reproducing scientific data. To accommodate the absence of the printing press and general access to writing technology in medieval science, we might substitute the Eagle's "imagynacioun" and memory for the printing press and modern writing technologies described by Latour.

observations are recorded and recalled, they gain a sense of permanence and can be transported to locations other than where the observations took place, which is what happens in Book II with the Eagle's recollection of observations. *The House of Fame* illustrates this process as Chaucer records observations of the external natural world within his dream vision to create immutable mobiles that exist both within the vision and outside of it. These immutable mobiles are essential for gaining an understanding of how the House of Fame physically functions on a literal level in the narrative. Metaphorically, the immutable mobiles represent modes for Chaucer's exploration of larger truths in terms of how the natural physical world relates to the literary cultural world. As with audiences of modern scientists reading the flattened inscriptions in their academic journals, Chaucer's audience can not physically *see* the stars or natural phenomena under investigation, rather, these scientific elements of the poem become realized exclusively in the imaginations of the audience to grant those elements even greater mobilization.

To fully understand the role of Chaucer's immutable mobiles, it is essential to consider Chaucer's language of choice in composition. His use of the vernacular to create immutable mobiles, as vehicles of both transmission of scientific knowledge and creation of poetic metaphors, is indicative of his keen interest in removing linguistic barriers to knowledge to establish as inclusive an audience as possible. The emphasis on "kinde" in Book II, a book with an invocation addressed to "every manere man / That Englissh understonde can" (*HF* 509-510), seems to gesture towards an exploration of both the place of language in human culture as well as a contemplation of the position of vernacular in various social levels. Chaucer advocates for the use of the English vernacular as both the "common tongue" and the "kynde tongue" because the vernacular provides a form of innate and natural access to meaning that Latin, even to those

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who are learned in it, is far less likely to provide; furthermore, "writing in English can thus do rather more than provide a practical vernacular means of access to knowledge; it can *signify* clarity and open access" in a variety of texts (Wogan-Browne 325). By establishing a set of immutable mobiles in the vernacular, Chaucer makes both academic and social statements by indicating that the content of his poetry should be accessible to all.

Chaucer's interests in science, literature, and use of the vernacular function find an almost symbiotic relationship throughout Book II of *The House of Fame*. As previously mentioned, Chaucer begins the invocation of Book II with an inclusive invitation that is highly conscious of his language choice and speaks to the interconnectedness of content and form:

> Now herkneth, every maner man
>
> That Englissh understonde can,
>
> And listeth of my drem to lere;
>
> For now at erste shul ye here
>
> So sely an avisioun,
>
> That Isaye, ne Scipioun,
>
> Ne King Nabugodonosor,
>
> Pharo, Turnus, ne Elcanor,
>
> Ne mette swich a drem as this! (*HF* 509-17)

By beginning the invocation with a plea to all those "that Englissh understonde can," Chaucer intimates his awareness of the ability for a vernacular text to reach a far wider audience than would a text composed in some language other than English. Chaucer implies that the contents of the dream are something that "every maner man" would be able to understand by virtue of his

choice of language alone, explicitly eliminating the academic exclusivity of knowledge

encouraged by the use of languages such as Latin. Further, by juxtaposing his promotion of the

vernacular with a claim that this dream is one that not even the most famous and revered of

dreamers and dream-theorists have addressed, Chaucer elevates the status of the English

language worthy of dream analysis in addition to celebrating his own originality. Having already

established his knowledge of classical literature and his ability to translate it in Book I, Book II

becomes a space in which Chaucer is able to move beyond the works and traditions of his

literary predecessors, a wider and more inclusive space in terms of both audience and content.

For Chaucer, English is a language privileged enough to create new ways of understanding

various forms of knowledge, not merely a tool to re-create what had previously been presented in

other languages.

It is in Chaucer's later work in his *Treatise of the Astrolabe* that we can find further

insight into the claims for the use of English in science from the Invocation of Book II.

Astrolabe is an extremely valuable resource because it is Chaucer's only piece of non-fiction,

free from the complexity and layers of meaning and irony so often mixing in his poetry, that

contains one of the most comprehensive examples of how Chaucer might have viewed the role of

the English language in literature (and science). In the Prologue to *Astrolabe*, and argument in

prose on the subject of translation, Chaucer makes a claim for the use of "naked wordes in

Englissh" (*Astrolabe* 26-7). As Chaucer's "longest piece of original prose," the Prologue

provides "an important indicator of Chaucer's sense of literary authority" (Cole 1131), one that

is intimately connected to his use of English in his other work. The literary authority of English

is most apparent in Chaucer's discussion of how any language that is a mother tongue is the one

best suited to the transmission of any knowledge:

> But natheles suffise to the these trewe conclusions in Englissh as wel as sufficith
> to these noble clerkes Grekes these same conclusions in Grek; and to Arabiens in
> Arabik, and to Jewes in Ebrew, and to the Latyn folk in Latyn; whiche Latyn folk
> had hem first out of othere dyverse langages, and writen hem in her owne tunge,
> that is to seyn, in Latyn. And God woot that in alle these langages and in many
> moo han these conclusions ben suffisantly lerned and taught, and yit by diverse
> reules; right as diverse pathes leden diverse folk the righte way to Rome.
>
> (*Astrolabe* 28-40)

Chaucer clearly makes a claim for the value of inherent truths that are capable of being expressed in any language while elevating the English language to the same level of those that had traditionally experienced higher statuses in the hierarchy of academic languages. This rhetorical move is significant in that Chaucer seeks to validate the use of all languages, not just English, by leveling the playing field and arguing that any language as a mother tongue is the one most suited for teaching and learning. Though Chaucer's work here is, in part, an argument in favor of vernacularization of science, it is more complex than a straightforward promotion of the English language alone.

In his discussion of the vernacularization of scientific literature in medieval Europe, William Crossgrove argues that "vernacularization presupposes the existence of vernacular culture in opposition to something more learned, more conscious, more prestigious" (50). In order to establish English as a language just as valuable as Latin in terms of scientific study and effectively destroy the linguistic academic hierarchy, Chaucer validates *all* vernacular languages

and identifies (and perhaps even debases) Latin itself as a vernacular language. According to Cole, "Chaucer here not only supplies a treatment of translation and English that is more substantial than the desultory views his characters express, but he also appears to allude to several classical and European models for vernacular writing" (1131).[12] Though he only examines *A Treatise on the Astrolabe*, Cole's observations also extend to a reading of *The House of Fame*. Chaucer's claims that *The House of Fame* is a literary work written for "every manere man / That Englissh understonde can" (*HF* 509-10) in a "rym" that is "light and lewed" (*HF* 1096) combined with the dense allusions to the works of Virgil, Ovid, and Dante throughout the poem certainly indicate a desire to produce a substantial literary work that promotes a sense of authority in terms of both content and style. Though he gestures that his use of the vernacular aids in creating a poem that is stylistically simple, Chaucer is acutely aware that his work is anything but.

Chaucer's interests in language and form seem to be not only concerns with poetic composition but also as modes of social and pedagogical commentary. By promoting the use of vernacular English in a scientific treatise like *Astrolabe*, Chaucer seeks to eliminate the linguistic and social boundaries typically placed on audience with the use of languages such as Latin. Chaucer's use of the vernacular and his (potentially ironic) claims for simplicity in *Astrolabe*

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[12] Cole identifies Augustine as one of the most significant influences to Chaucer's views of translation and vernacular, particularly in Chaucer's suggestions that all essential truths can be symmetrically expressed in all language as Augustine noted that "the thing itself is neither Greek nor Latin" and truth is therefore able to move between languages (1132). Cole later makes a case for Wycliffite influences, stating that "when Chaucer expostulates on Latin to English translation, he provocatively follows a line of reasoning instanced in multiple Wycliffite tracts on translation and introduces into his canon and number of new specialized idioms derived from what is itself a new body of interpretation, Wycliffite vernacular hermeneutics" (1140).

presents what Jenna Mead suggests is "an apparently unique instance of a technical manual whose readership seeks to be inclusive of both student-reader and non-academic practitioner" (997). Chaucer's pedagogical approach to the translation of scientific texts represents a relatively unusual one in medieval literature; not only did he translate texts into vernacular English, but he also sought to present the material in a way that was accessible to all in terms of argument and reasoning by relying on visual models for the principles of sound and cultural models for astrological phenomena. Precluding this pedagogical approach in *Astrolabe* is Chaucer's inclusive plea from *The House of Fame* for "every maner man / That Englissh understonde can" to pay attention to the content of the dream vision. It is no accident that the subsequent scenes in the dream vision depict scientific lessons and observations of nature provided by the Eagle. Of those observations, the Eagle's musings on the role of astrology are of particular interest with relation to *A Treatise on the Astrolabe*.

Mead contends that the academic value of *Astrolabe* lies not only in a critical interest in "the nature of 'science' in the late fourteenth century" but also in a more recent appreciation for a "cultural valency of astrology" in the vernacular context of Chaucer's works (973). The beginnings of this "cultural valency," where the heavens and human culture collide, can be seen in *The House of Fame* as the Eagle draws Geffrey higher into the heavens and provides a brief lesson on the role of human culture and language in astrology:

> "Now," quod he tho, "cast up thyn eye;
>
> See yonder, lo, the Galaxye,
>
> Which men clepeth the Milky Wey,
>
> For it is whyt: and some parfey

Chaucer's reference to the Milky Way as "Watlinge Strete" is indicative of an intersection

between human culture and the natural world. These lines invert the more typical use of nature as

a metaphor for human culture to use a combination of the technology for human transport and

cultural references as a metaphor for a celestial galaxy. Chaucer not only vernacularizes

astrological studies for a lay audience, but he also uses cultural metaphors that would be easily

understood by and accessible to many. The reference is immediately followed by the story of

Phaeton, from Ovid's *Metamorphoses*, to provide further explanation of the heavens.[13] Here

Chaucer presents another (more typical) intersection between human culture and the natural

world as he explicitly connects an observation of the heavens to classical mythology. The stars

themselves and the gods that they represent become absolutely interchangeable at this point of

the narrative. As Chauncy Wood notes, "at least some of the manifold artistic uses of astrology

may be traced to the lack of any distinction between a planet and a planetary 'god' in the Middle

Ages – a situation that does not indication 'confusion,' but rather a disinclination to distinguish"

(62). It is this fusion of astrology and mythology identified by Wood that enables Chaucer to

translate (or move) content between distinct categories of knowledge in ways that are simply

impermissible by the established paradigms of modern science.

Chaucer intensifies the fusion of astrology and mythology further when the Eagle

challenges Geffrey on his astrological knowledge after having him gaze up at the heavens:

"Lat be," quod he, "thy fantasye;

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[13] The story of Phaeton was a familiar one to medieval audiences, often used as a warning against excessive pride. The Eagle claims that the Milky Way once burned with fire when Phaeton, in a quest to prove his status as son of Helios and against all advice, chose to drive Helios's chariot and ultimately lost control.

Wilt thou lere of sterres ought?"

"Nay, certeynly," quod I, "right nought."

"And why?" "For I am now too old."

"Elles I wolde thee have told,"

Quod he, "the sterres names, lo,

And al the hevenes signes therto,

And which they been." (*HF* 992-999)

The Eagle then goes on to echo the sentiment of the earlier scene and comments on the cultural

capital to be found in a knowledge of astrology, emphasizing that the knowledge is useful "for

whan thou redest poetrye, / How goddess gonne stellifye" (*HF* 1001-1002). The Eagle continues

to describe "in his casual and pedestrian way the variety of divine transformations chronicled by

classical mythology" (Lynch 67n). Again, the physicality of the constellations and their

mythological interpretations are fused when the Eagle provides Geffrey with the mythological

references as they soar through the heavens, further reinforcing the reciprocal relationship

between literature and study of the natural world. The overall effect is the creation of a science-

literature hybrid that allows content to slide back and forth between categories and shift in

meaning. Such medieval descriptions of the astrological mythography might be seen as "fiction

of hybrids," described by Latour as entities that emerge from "nature seen as fiction, and fiction

seen as nature, with all the elements made so homogeneous in space that it is now possible to

reshuffle them like a pack of cards" ("Visualisation" 8). Science and literature become

necessarily interchangeable at this point and meaning doesn't just shift between categories, it

exists in each one simultaneously.

It is shortly after this scene that Geffrey and the Eagle approach the House of Fame, where Chaucer yet again demonstrates the intricate connections between literature and science. Chaucer locates the House of Fame in a middle ground, "right even middes of the weye / Betwixen hevene, erthe, and see" (*HF* 714-715), further evoking a sense of balance or intersection between worlds. Further, astrological lore identifies the tenth house (associated with Saturn and Capricorn), the seat of fame, as the ascending entrance to mid-heaven.[14] This reference adds yet another layer of meaning to the description of the House of Fame's location where Chaucer potentially makes use of astrological charts to signify physical spaces within the poetic narrative. The Eagle provides a literary reference to Ovid's *Metamorphoses* as he carries Geffrey to Fame's palace: "First shalt thou here wher she dwelleth, / And so thyn owne book it telleth; / Hir paleys stant" (*HF* 710-713). This literary reference is juxtaposed with a framework of the natural world for the Eagle's further elaboration on the physical nature of sound. The Eagle further explains the location and function of Fame's palace through a series of scientific explanations and metaphors based on observations in nature along with allusions to both classical mythology and grammatical theory. The Eagle heeds Geffrey to listen well, stating that "I wille / Tellen thee a proper skille, / And a worthy demonstracioun / In myn imagynacioun" (*HF* 725-728). Of the most important modes of acquiring knowledge is the ability to use mental images (imagination) for what the Eagle is about to describe. When considering the context of the Eagle's words – lessons given by a talking bird with great visual acuity within a dream vision – it is impossible to ignore the roles vision and observation have in the transmission of knowledge in *The House of Fame*.

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[14] For diagrams and an extensive explanation of astrological readings along with diagrams of the astrolabe, see Chapter 2 of J. D. North's *Chaucer's Universe*.

In illustrating how exactly the physical and cultural aspects of language intersect, the

Eagle first explains that every spoken sound travels to the House of Fame by virtue of the order

of nature. Repetition of the word "kindly"[15] at the outset of the explanation emphasizes the

importance of the order of nature and that the coming arguments are, in fact, inherent truths:

> Geffrey, thou wost right wel this,
>
> That every kindly thing that is,
>
> Hath a kindly stede ther he
>
> May best in it conserved be;
>
> Thurgh his kindly enclyning,
>
> Moveth for to come to
>
> Whan that it is awey therfro. (*HF* 729-736)

The Eagle informs Geffrey, in no uncertain terms, that every thing in nature has its place and is

naturally drawn to that place. What then follows are observations of the physical world that

cannot be denied or argued against; they are simple facts of nature that have become further

solidified as truths by being recorded in linguistic terms. Stone and lead fall (*HF* 739) while fire,

sound, and smoke rise (*HF* 742-743). Fish live in water (*HF* 751) and trees grow in earth (*HF*

752). The extensive descriptions of the natural world lead up to a statement that serves, in part, to

naturalize the House of Fame itself when the Eagle states that "Thus every thing, by this resoun,

/ Hath his proper mansioun" (*HF* 753-754). The terms "kind" and "mansioun" are echoed again

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[15] The MED definition of the word "kindeli" emphasizes the natural state of the physical world, specifying that the term relates to all this natural as opposed to supernatural or spiritual. Chaucer's repetition of the term here provides great emphasis on the physicality of the natural world in a way that presupposes the impartial objectivity that modern scholars are supposed to employ in all scientific inquiries. The term "kind" and its relationship to the natural world is discussed further in Chapter 4 with my analyses of *Piers Plowman*.

at the conclusion of one of the Eagle's extensive descriptions of how sound travels:

>   every thing enclyned to is
>
> Hath his kindeliche stede.
>
> That sheweth it, withouten drede,
>
> That kindely the mansioun
>
> Of every speche, of every soun,
>
> Be it either foul or faire,
>
> Hath his kinde place in aire. (*HF* 828-834)

Further repetition occurs with "every soun, pardee, / Moveth kindely to pace / Al up into his kindely place" (*HF* 840-842) and ultimately concludes with the observation:

> That every speche of every man,
>
> As I thee telle first began,
>
> Moveth up on high to pace
>
> Kindely to Fames place. (*HF* 849-852)

The dual meaning of the word "mansioun" as both a physical dwelling place and an astrological house resonates with the subsequent astrological mythography that the Eagle presents Geffrey as they make their way to the House of Fame. Though theoretically a cultural construction, Chaucer effectively naturalizes the House of Fame with his descriptions and use of immutable mobiles.

Intersections between culture and science become especially poignant in the Eagle's reduction of speech sounds to broken air. Martin Irvine argues that the Eagle's exposition on speech sounds in Book II is borrowed entirely from grammatical sources, particularly those of the commentaries on Priscian's *De voce* where the physicality of sound becomes emphasized.

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According to Priscian, and identified as the source of the Eagle's metaphor by Irvine, all spoken

utterances (*vox*) are composed of air, which is a corporeal substance (856). On the physicality of

sound, Priscian argues that "if air is corporeal, then *vox,* which consists of struck air, is shown to

be corporeal since it touches the ear and is divided into three ways which pertain to corporeal

things."[16] From there, Priscian explores the complex relationship between the signifier and

signified whereby physical sound is transformed into meaning followed by a classification of *vox*

into categories according to the meanings carried by sound. In Chaucer's presentation of the

argument, the Eagle begins his explanations of grammatical theory with a simplified version of

Priscian's definition of *vox*:

> Soun is nought but air y-broken,
>
> And every speche that is spoken,
>
> Loud or privee, foul or fair,
>
> In his substaunce is but air. (*HF* 765-768)

What follows is a series of examples that Chaucer borrows from a number of grammatical

sources that follow the exact order of topics and examples found in commentaries on *De voce*.[17]

This effort to reinforce the corporeality of sound emerges in the Eagle's examples: comparison to

smoke and flame (*HF* 769), music from instruments as bent air (*HF* 773-778), and the ripple-

effect of a stone thrown into water (*HF* 789-802). In terms of grammatical theory alone, this

oversimplification of voice and sound that relies so heavily on only the corporeal argument

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[16] Translated by Martin Irvine from Priscian's *Institutiones grammaticae*, Ed. M. Hertz in H.
Keil's *Grammatici Latini* (Cambridge: Cambridge UP, 2010, originally published in 1855).
[17] Irvine provides an extensive side-by-side comparison of Chaucer's text with sources from
grammatica to illustrate the extent to which Chaucer relies on the language and commentaries of
Priscian (862-867).

behind Priscian's theory of *vox* is one that borders on the absurd.[18] When considering Chaucer's selection of examples in a scientific context, however, the reading takes on meaning beyond that of an oversimplification of *grammatica*. By borrowing from a variety of sources and simplifying voice and sound to a visual image of broken air, Chaucer reduces sound to the simplest of Latour's flattened inscriptions. Chaucer's use of these flattened inscriptions demonstrates a participation in the transmission of scientific knowledge that goes beyond grammatical theory to potentially undermine it.

Chaucer clearly demonstrates his grammatical knowledge of Priscian when the Eagle defines *vox*, but the oversimplified definition demonstrates a corruption of categories that Katherine Zieman identifies in the Eagle's claim that *all* sounds are voices:

> The Eagle transforms the distinction to produce a syllogistic principle: "speech is soun" (762); sound is broken air; therefore speech is broken wind. The equation of sound, speech, and air (or wind) allows him to substitute mere sound for *vox*, a conflation of concepts emphasized by the reductive "noght but." (82)

This oversimplification of *vox* is not unique to Chaucer, as Zieman points out. Rather, this description, along with that of how sound is amplified, can be found in the grammatical commentaries on Boethius's *De institutione musica* to describe the corporeal nature of *vox*. Zieman identifies this reliance on the acoustical emphasis of Boethius as a means of redefining the language of *litteratura*; the oversimplification is not just a confusion of categories but rather an attempt to establish the vernacular as a "literary" language (83). To be sure, Chaucer

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[18] A. J. Minnis refers to the Eagle's logic as an element of *"reducto ad absurdum"*(*Oxford Guides*, 204) while Kathryn L. Lynch calls the Eagle's description of speech as only sound a "charming absurdity" (72).

demonstrates a vested interest in progressively silencing classical authors while celebrating the

vernacular throughout the poem. But the Eagle's syllogism also suggests a "leveling" of all

languages and sounds such that none is superior to another. These observations point to multiple

levels of translation at work: first, the translation of Boethius (and Priscian) from their original

sources into the vernacular of the Eagle; second, the translation of all sounds (animal, human,

and otherwise) into "air y-broken"; and third, the translation of an acoustic model into a visual

one. By reducing speech sounds to the level of broken air, Chaucer is able to employ visual

models of sound borrowed from musical theory to promote his establishment of an authoritative

vernacular voice in poetry.[19]

Valerie Allen also traces the roles of the human voice and language in medieval music

treatises. She outlines the analogy of the human body as an orchestra: "the throat, like a pipe,

represents the wind instrument; the chest, like a harp, represents the stringed instrument; and the

pulse a percussion instrument. *Vox* [voice] refers to a single note of an instrument as well as to

human sound" (29). Further, "musical terminology plunders that of grammar, aligning verbally

correct and the musically pleasing phrase, as if to imagine an instrument speaking" (Allen 29). If

we consider Allen's analogy, Chaucer's equivocation of all sound as "air y-broken" may well

have been borrowed from any number of musical treatises. Allen goes on to describe the

relationship between nature and art in the instrument-body analogy:

The analogy between musical instrument and body represents every part and

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[19] There is also, of course, the joke on "air y-broken" as representations of "the rumblynge of a fart, and every soun, / Nis but of air reverberacioun" (*The Summoner's Tale*, III.2233-4) and the fart of Nicholas "as greet as it had been a thunder-dent" (*The Miller's Tale*, 699). Chaucer essentially destroys any perceived hierarchy of language when he equates all forms of speech with the sound of farting. For an extensive examination of the role of farting in Chaucer, see Valerie Allen's *On Farting: Language and Laughter in the Middle Ages.*

function of the body as an aesthetic event. If creating art is our nature then our natural body is also our art. Bodily comportment and the satisfaction of bodily need provide the occasion of virtuous or vicious acts and constitute an art of living. (31-32)

Chaucer's reduction of all sounds to "air y-broken" proves Allen's assertion; for Chaucer, *vox* is a creative process that functions in both nature and culture. By simplifying spoken language to *vox*, Chaucer effectively merges culture and nature such that the two are indistinguishable.

Chaucer's flattened inscriptions, namely his emphasis on the corporeal properties of *vox*, can be found with slight variations in a number of texts used in medieval sound theory such as Aristotle's *De anima*, the pseudo-Aristotelian *Probelmata*, Albertus Magnus's *Summa de creaturis*, and Robert Grosseteste's *De generatione sonorum*, in addition to the work of Boethius, which was perhaps the most influential source of sound theory in the Middle Ages.[20] It is therefore entirely possible that Chaucer would have been familiar with at least one, of not several or all, of these sources. Zieman notes that Irvine's assessment of *vox* in *The House of Fame* is based on the potentially erroneous assumption that Chaucer gleaned his knowledge of Boethian music theory through its use in other grammatical texts and treatises, rather than from any of these scientific texts directly. Zieman asserts that by ignoring Boethius (and, I would argue, any other number of scientific texts and treatises) as potential source material for *The House of Fame*, Irvine "misses the possible permutations that arise from emphasizing different constituents of a complex source containing strands from different traditions" (90). If we are to follow Latour's model of the analyses of flattened inscriptions, it is imperative that we go

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[20] See Charles Burnett's "Sound and its Perception in the Middle Ages" for summaries of each of these theories of sound.

beyond grammatical sources to identify the various strands that contribute to Chaucer's network of sound theory, including the potential influence of scientific commentaries.

Chaucer's familiarity with Boethius's *De institutione musica* and his preference for physical science over grammar becomes clearer as the Eagle's description of sound continues in Book II, though he conflates the scientific theories of sound and of light. When the Eagle goes on to explain his theory of sound, he unexpectedly relies on a model typically used to describe light[21]:

> Be experience; for yf that thow
>
> Throwe on water now a stoon,
>
> Wel wost thou hyt wol make anoon
>
> A litel roundell as a sercle,
>
> Paraunter brod as a covercle;
>
> And ryght anoon thow shalt see wel
>
> That whel wol cause another whel
>
> And that the thridde, and so forth, brother,
>
> Every sercle causynge other
>
> Wydder than hymselve was. (*HF* 788-98)

This shift marks not only a translation from grammar to science, but also a translation within the field of science itself. By drawing a connection between light and sound with his metaphor for the amplification of voices as they rise to the House of Fame, Chaucer effectively relocates his

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[21] The model is also one that is still commonly used by teachers in physics classrooms today; illuminated wave pools are frequently projected onto large screens and used to demonstrate principles of reflection and refraction for sound and light.

explanation of sound into metaphors typically used to describe vision. Suzanne Conklin Akbari points out that the stone-in-water metaphor identified above is also present in John Pecham's *Perspectiva communis*, another standard textbook in medieval science.[22] According to Pecham's theories, all objects emit light rays which are then seen by the observer: "all the pyramids in a single body of illumination constitute essentially one light [...] In the same way, when a stone is thrown into water, distinct circles are generated, which nevertheless do not differentiate the water."[23] Clearly, the Eagle's metaphor is drawn from either Pecham or some other shared scientific source. But the question remains as to why Chaucer employs a theory of light to describe sound; what purpose might this confusion serve?

One possible explanation for the Eagle's use of metaphors typically reserved for vision in an explanation of how sound works might be Chaucer's awareness of the primary importance of sight in science. Suzannah Biernoff identifies this medieval popularization of the superiority of sight in the writings of Roger Bacon, a medieval thinker often identified "as heralding the nascence of modern science" (63). Of chief importance to Bacon was the necessity of sight as a means of exploring knowledge of the natural world, and further, the translation of those observations into mathematical principles. According to Alistair Cameron Crombie, the language used by Bacon throughout his discussions on the "multiplication of species"[24] indicates Bacon's

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[22] David C. Lindberg claims that the relatively large number of extant manuscripts of Pecham's text proves that the text was widely used in medieval science studies (*Beginnings of Western Science* 29).

[23] Akbari takes the quotation from David C. Lindberg's translation of Pecham's *Perspectiva communis* 1.6.

[24] The "multiplication of species" refers to Bacon's theory of perception and visual cognition, borrowed from Robert Grosseteste (a Neo-Platonist). The "species" represents influence that emits from an agent in the natural world. For example, a flame generates the species of fire in the surrounding air where the air then becomes hot. The air assimilates heat from the fire but does

desire to mathematize study of the natural world to create a standard set of laws to describe

natural phenomenon (149-150). Bacon makes this desire explicit when he argues: "that the laws

of reflection and refraction are common to all natural actions I have shown in the treatise on

geometry."[25] Bacon's reduction of natural phenomena to a set of universal mathematical laws is

similar to Chaucer's reduction of sound and light to the same metaphor. Though the Eagle's

misrepresentation of the metaphor may also function as just one more example of Chaucer's love

of irony, the conflation also points to Chaucer's awareness that sight and sound might be

interchangeable and act via identical mathematical principles.

Chaucer's awareness the role of sight in studies of the natural world is reflected not only

in the Eagle's reliance on visual metaphors to illustrate natural phenomena but also on his

selection of an eagle, known for its visual acuity, as Geffrey's guide through the cosmos. It is

likely that Chaucer borrowed the carrier-eagle from Dante's *Commedia*, though it is important to

note that Dante's eagle does not speak as it lifts Dante up to the gates of purgatory (9:19-33).

That is not to say that Dante's eagle does not communicate at all; as Akbari notes, Dante's eagle

does communicate via light and the sense of sight. Chaucer's rather vocal Eagle differs

dramatically from Dante's model as it serves to diminish the superiority of vision, "to deny that

vision has the capacity to mediate transparently between subject and object" (Akbari 203).

Rather than rely on embodied light as a tool for communication like Dante's eagle, Chaucer's

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not become fire itself. For a summary of Bacon's theory of the multiplication of species, see
Dallas G. Denery II's *Seeing and Being Seen in the Later Medieval World* (84-89).

[25] Alastair Cameron Crombie borrows the passage from Pierre Duhem's *Un fragment inédit de l'Opus tertium de Roger Bacon*: "*Que vero sint leges reflexionum et fractionum communes omnibus actionibus naturalibus, ostendi in tractatu geometrie, tam in Opere Tertio quam Primo; sed pincipaliter in Opere separato ab his, ubi totam generationem sepcierum, et multiplicationem, et actionem, et corruptionem explicavi in omnibus corpibus mundi*" (90).

eagle communicates with Geffrey by means of oral narration. Chaucer's conversion of Dante's eagle as an instrument of light to an instrument of sound serves as an inverse of the Eagle's conversion of sound theory to a light metaphor; sound and light are rendered interchangeable and equivalent, capable to being reduced to a single wave theory, just as all forms of language and sound are interchangeable and equivalent, capable of being reduced to nothing more than "air ybroken."

For a writer whose text demonstrates a keen awareness of the power of language as a means to fame, Chaucer's shift away from Dante's model is a reasonable one. The emphasis on the role of speech also points to the value of language as a pedagogical tool. While Chaucer's use of an eagle as guide provides an acknowledgment of the perceived superiority of vision in scientific study, it is perhaps more a commentary on the process of learning rather than on scientific methodology. The Eagle functions as a mediator both literally as he carries Geffrey from the earth up to the heavens and the House of Fame and figuratively as he transmits knowledge of the natural world to Geffrey via language. Though the setting is an informal one, the patterns of conversation between Geffrey and the Eagle indicate a keen awareness of pedagogical practice. Conversation in the form of question-answer exercises, much like the one modeled by Geffrey and the Eagle, was a common pedagogical tool in higher learning, as noted by Copeland: "in the medieval university, what we would think of as 'discussion' between teachers and students seems to have been regulated through the highly formalized structures of question and answer, disputational exercises, or structured public events like the theological *quodlibetales*" (*Pedagogy* 10). After explaining the location of the House of Fame and the basic

theories of sound, the eagle tells Geffrey that he

> wol thee teche
>
> How every speche or noise or soun,
>
> Thurgh his mutliplicacioun,
>
> Though it were pipes of a mouse,
>
> Mot need come to Fames House. (*HF* 782-6)

What follows for the remainder of Book II is a series of questions and answers that exemplify a

desire for the eagle to both *show* and *teach* just how the House of Fame functions. While the

Eagle (and Chaucer) relies on language for communication, the content of the language, within

its pedagogical discursive format, is laden with images and references to sight that emphasize the

importance of vision in learning.

The Eagle's instruction, particularly his requests for Geffrey to recall images such as the

stone falling into water, demonstrate Chaucer's reliance on sight and imagination as tools for

instruction, particularly with matters relating to science. Sight, perspective, and the ability to

imagine and re-imagine objects are all essential components of the rationalization that shaped the

scientific revolution, where rendering objects into linear perspectives allow them to be

transferred and translated.[26] Once an observation from the natural world has been translated into

a linear perspective, it is able to appear to an audience even when it is no longer present as an

immutable mobile. Latour's analysis of this first step in the creation of immutable mobiles and

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[26] Latour uses W. R. Ivins's *On the Rationalization of Sight* (New York: Plenem, 1973) as his
main source to describe how objects can be transformed into immutable mobiles when using a
linear perspective because all distortion is eliminated and a two-way relationship exists between
the object and the figure. Latour identifies this ability for objects to maintain their perspective
through transformations as "optical consistency" – the first step in the establishment of
immutable mobiles in the scientific community (*Visualisation* 7).

the role of sight speaks to literature beyond that of the scientists; Latour argues that "optical consistency" enables fiction and nature to mix with one another:

> Fiction – even the wildest or most sacred – and things of nature – even the lowliest – have a meeting ground, *a common place*, because they all benefit from the same "optical consistency." Not only can you displace cities, landscapes, or natives and go back and forth to and from them along avenues through space, but you can also reach saints, gods, heavens, palaces, or dreams with the same two-way avenues and look at them through the same "windowpane" on the same two-dimensional surface […] Impossible places can be drawn realistically, but it is also possible to draw possible objects as if they were utopian ones. (*Visualisation* 8)

Latour's description could very well describe Chaucer's work in his *House of Fame*, where the fictions of the dream vision and physical realities of the natural world intermix to the extent that it is nearly impossible to disentangle the two. Chaucer has not just created a set of immutable mobiles by translating elements of the physical world into images conveyed through language (vernacular language, at that), he has also established a relationship between those immutable mobiles and his fictional dreamscape such that the natural world and elements of the dream vision become interchangeable.

While on the one hand Chaucer borrows from his observations of the natural world to imagine Fame's palace, on the other he borrows from his imagination to create fictional observations of the natural world as seen through Geffrey's eyes as the Eagle carries him through the sky. Though Chaucer certainly would not have experienced such a flight himself, he takes

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time to describe physical elements of the earth that would be seen from such heights:

> And I adoun gan looken tho
>
> And beheld felds and plaines,
>
> And now hilles and now mountaines,
>
> Now valeys, now forestes,
>
> And now unnethes grete bestes,
>
> Now riveres, now citees,
>
> Now tounes and now grete trees,
>
> Now shippes saillinge in the see.
>
> But thus sone in a whyle he
>
> Was flowen fro the grounde so hye,
>
> That al the world as to myn eye
>
> No more semed than a prikke,
>
> Or ells was the air so thikke
>
> That I ne mighte nat discerne. (*HF* 896-909)

The lack of detail and speed with which Chaucer runs through the list of landscape elements is indicative of the tremendous speed Chaucer might have imagined was required for such a flight in addition to demonstrating the diversity of the English ecological landscape. Fields, plains, mountains, rivers, cities, towns, and trees all whiz through the text in the span of six lines. Not long after the Eagle takes Geffrey so high that the world appears to be nothing more than a "prikke," though he is quick to note that it might not be the height but rather the thickness of the air that makes his sight unreliable at that point. Geffrey's admission of his potentially faulty

vision at this point in the poem not only establishes the Eagle as the more reliable source of visual information, but also diminishes the primary role of vision as a tool for observation. Geffrey's casual disregard for the accuracy of his physical sight makes space for the imaginative use of immutable mobiles and the mind's eye throughout the rest of the poem. By de-emphasizing the importance of accurate vision with Geffrey's observation of the Earth from space, Chaucer effectively enhances the validity of his imaginative recreations of scientific observations.

Chaucer's *House of Fame* creates an imaginative space where scientific theories could be explored and challenged in a celebration of vernacular English. We've seen translation at work on many levels throughout this chapter; scientific concepts move not only between languages in Chaucer's work but also between categories of knowledge, both theoretical and empirical. Embedding scientific language in a literary dreamscape, Chaucer manipulates empirical knowledge of the natural world in ways that challenge the traditional hierarchies of knowledge in both literature and science. This manipulation is intricately tied up in the connections between sight and sound such that the two become nearly indistinguishable at times. This manipulation also serves to map cultural observations onto physical phenomena as Chaucer employs a multitude of scientific metaphors in an attempt to visualize the process of literary fame, to render the invisible visible. While the logical positivists of the early twentieth century concluded that science had no place in culture and that "the only things scientific language can do is describe patterns in the observable realm" (Godfrey-Smith 36), Chaucer's *House of Fame* proves the assertion wrong. Chaucer's use of scientific models in a literary space demonstrates how those patterns from the observable realm can be applied to the invisible, to both cultural and natural

phenomena. It is the process of translation that makes this movement from the invisible to the visible possible. For Chaucer, and for other medieval thinkers, being able to visualize processes, either by external observation of the natural world or by internal re-imaginings, was an essential step in understanding those processes. The next chapter further explores the role of vision and translation in medieval science by examining the roles of science and nature in an explicitly Christian context in the *Bible Moralisée*.

<center>**Chapter 3**</center>

<center>**Allegorical Translation of Science in the *Bible Moralisée***</center>

Translation of science in Chaucer's *House of Fame* demonstrates the potential for medieval imaginations to incorporate elements of the natural world in literature. The previous chapter touches on some of the ways in which a scientific understanding of the natural world could be translated, manipulated, and integrated into a dream vision to augment cultural commentary in literature. This type of multi-layered literary translation is more complex than the straightforward understanding of linguistic translation that remains within modern paradigms of science writing; interpretations of the natural world become increasingly intricate as translation moves beyond the field of science and into the fields of literary and religious studies. Ecologist G. Evelyn Hutchinson considers this significance as he contemplates the roles of translation, religion, and the natural world in "Methodology and Value in the Natural Sciences in Relation to Certain Religious Concepts":

> As far as scientific content is concerned, it is completely translatable. It could be recast in some ideal formal language. It could be recast in some ideal language, expressed perhaps as Woodger has done for many of the statements of elementary biology, in a notation derived from Whitehead and Russell's *Principia*

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Mathematica. Translation of this sort is obviously not possible when we leave scientific and consider poetic language, which loses a great part of its significance when translated; though, if the translation is by a poet, new and different significance may in part replace what has been lost. (176)[1]

Hutchinson asserts that linguistic translation of scientific content within the field of science is relatively straightforward; so long as the vocabulary exists in each language to describe a phenomenon, there is little ambiguity in the process. However, once translation leaves the paradigms of science, significances and meanings can be gained and lost with the interpretive freedom that increases through literary modes of transmission. What, then, happens to translation of the natural world when it moves even further – beyond linguistic frameworks into visual representations? Further, how does translation function when the Bible is brought into consideration? This chapter explores these intersections of translation where the content of medieval science moves into the paradigms of religion and the visual arts. The analyses that follow should shed some light onto the ways in which natural philosophy could function under the constraints of medieval Christianity.

The ambiguity of linguistic translation and epistemology in science is not a concern that is unique to Hutchinson's observations on modern biology. In *Science, Art and Nature in Medieval and Modern Thought*, A. C. Crombie identifies three intellectual components that

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[1] Hutchinson refers to the work of Joseph Henry Woodger (1894-1981), a British theoretical biologist who sought to base biology more rigorously on empirical data, essentially translating biological observations into mathematical formulae. Similarly, *Principia Mathematica* (first published in 1910), by Alfred North Whitehead and Bertrand Russell, attempts to describe a set of axioms and inferences rules in symbolic logic to prove all mathematical proofs. The work in these fields sought to use mathematics as a universal language in the sciences that could transcend translation.

shape the scientific thinking of a particular period or society. First, Crombie asserts that language itself has conditioned conceptions of nature in science and has therefore defined its scheme of existence and knowability to man (2). Vocabulary and syntax necessarily shape how observations of the natural world are formed and understood in any given language. Further, the organization of scientific inquiry and the perceived nature of science direct research and observations in particular directions. Thus, the boundaries of science are often established by intellectual conventions well in advance of the explanations that science might provide; dominant intellectual commitments to patterns of investigation and research have the potential to place boundaries on the field of science (4-5). Finally, there exists an intellectual and moral commitment to "what could and should be done" (5). Referring specifically to medieval and early modern Christian society, Crombie notes that the teaching and preservation of theological truths would invariably condition all human inquiries into the natural world (5). Much of the medieval perception of the history of science was a program that sought to define man's relation not only to God but also to nature as God's creation (33). Theology and language were therefore inextricably connected to any observations of the natural world for medieval thinkers.

Though religion and language have the potential to place boundaries on scientific inquiry, they likewise have the ability to push inquiry beyond that which is immediately knowable to explore that which is unseen by means of metaphors and symbols. Commenting on the similarities between science and religion, Bruno Latour states, "in religion as in science, there are artifacts that must be carefully dismantled" (*Rejoicing* 8). Dismantling of these artifacts requires the use of language and symbols. Throughout *Rejoicing: Or the Torments of Religious Speech*, Latour addresses the barriers that Moderns face when using language to describe

experiences with religion in particular, though these barriers also apply to science. Translation

and rationalization of scripture (and the natural world) necessitate symbolic readings of text,

especially in the production of art. Latour claims that "art doesn't save or resurrect, except

through metaphor" (104) as it "turns our over-accustomed gaze towards the remote, towards the

distant, towards the foreign – even though, contrary to the travail of reference, it never worries

about exercising control over the places it allows us to reach" (105). As Latour warns of the

dangers in placing too much emphasis on absolute meaning in art, that same freedom from

boundaries of absolute meaning opens up new perspectives on how we might "read" both

scripture *and* science. One particularly rich text that allows us to go beyond Latour's analysis to

read scripture and science simultaneously is the *Bible Moralisée*, with its lavish illustrations,

moralized interpretations, and (French) vernacular translations of the Vulgate. This chapter

moves beyond religious content in the *Bible Moralisée* to explore the ways in which the

relationships between culture and nature, humans and nonhumans, as well as science and religion

figure in the medieval Christian imagination.

Of primary importance to this chapter are the images of science and nature found in the

Bible Moralisée. Though brief commentary in vernacular French surrounds each image, the text

is arranged in a way that the images are primarily intended to convey meaning to the reader. The

images clearly take precedence over language in this manuscript as the sources of symbolism.

Speaking to the power of religious images such as those found in the *Bible Moralisée*, Latour

states that "we cannot do without images, intermediaries, mediators of all shapes and forms,

because this is the only way to access God, Nature, Truth, and Science" (*Modern Cult* 68).

Further, Latour links religion and science by their intrinsic (and what he identifies as erroneous)

disdain for evidence of the human intervention. This shared interest in *acheiropoiete*,[2] or the

creation of images without human hands, lies in the belief that human intervention somehow

nullifies any transcendence to truth in both religion and science (70-1). And yet images and

inscriptions are the primary means to access truth. In a quest to make some sense of the power of

images, Latour compares the patterns of image-making found in religion, science, and art, but

only in the most generalized sense without addressing any specific examples. Because it is

impossible to remove evidence of the human hand from our understanding of religion and

science, it behooves us to examine works of art in which evidence of the human hand is most

pronounced, such as the *Bible Moralisée*. By embracing evidence of the human hand in an

exploration of truth, we escape the pretense of façade and charges of counterfeit knowledge.

In terms of studying the intersections of science, religion, and art, each of the *Bibles*

Moralisées provide examples of just how complex the intersection of the three fields was in

medieval scholarship. These bibles, exquisitely illustrated interpretations of scripture, once

intended to provide moralized readings of scripture for medieval royalty, now present insights

into not only the medieval moral interpretations of the Bible but also snapshots of medieval

culture and society. Seven such manuscripts exist, all produced between the thirteenth and

fifteenth centuries. Vienna, Österreichische Nationalbibliothek Codex Vindobonensis 2554

(Codex 2554), the manuscript of study in this chapter, is one of the earliest manuscripts available

to modern readers that provides an example of what Arthur Haseloff identifies as "*la plus waste*

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[2] Latour's use of the term derives from its use in Joseph Koerner's "The Icon as Iconoclash" (*Iconoclash* 164-213) and Marie-José Mondzain's "The Holy Shroud: How Invisible Hands Weave the Undecidable" (*Iconoclash* 324-25).

enterprise du Moyen Age en fait de miniature."[3] Study of Codex 2554 is useful not only as a

model for subsequent *Bible Moralisée* manuscripts, but also as a visual model of medieval

biblical exegesis. The illustrations provide ample examples of the integral roles that typology and

allegory played in the interpretation of sacred texts as well as how exegetes figured the role of

science in medieval Christian society.[4] Typology and allegory were essential in that they

provided medieval exegetes with the means to appropriate the Old Testament in ways that

effectively created a non-linear sense of time and allowed the past, medieval present, and future

to exist simultaneously. These images provide insight into not only the ways in which medieval

Christians sought to define themselves in a biblical context, but also the ways in which their

views of technology shaped their relationship to the natural world. The complex relationship

between natural philosophy and religious piety is apparent throughout the manuscript; this

chapter explores some of the most profound moments of juxtaposition.

Before exploring the ways in which science and nature figure in the *Bible Moralisée*, it is

important to fully understand the ways in which medieval scholars read and interpreted the

Bible. Passages were not just to be taken literally but also subjected to typological and allegorical

interpretations, thus opening multiple meanings as possibilities for a single passage. G. H. W.

Lampe notes the prevalence of typology in biblical exegesis, stating that "this drastic

reinterpretation of the Old Testament as the key to the understanding of the Gospel, and as a

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[3] "The most vast enterprise of the Middle Ages in the making of miniatures," quoted in Guest (1).

[4] The four senses of scripture referenced in the *Cambridge History of the Bible* that medieval exegetes most often discuss are: literal or historical, typological or allegorical, moral or tropological, and anagogical or mystical (196). Though the intent of the *Bible Moralisées* was to provide a moral reading of scripture, this dissertation focuses primarily on typological and allegorical readings of that moralization as they apply to natural philosophy.

record whose true meaning was unintelligible except in relation to its Christian fulfillment, was carried through so rapidly that an established tradition of prophetical and typological exegesis had been built up by the time that the Pauline epistles were composed" (157). Following the writings of St. Augustine, medieval scholars hypothesized ways in which the dual meanings created by typology could be extended to inform other modes of signification in biblical exegesis, particularly allegory. Allegory in biblical exegesis, according to David Lawton, "is more than a historical curiosity. Critically, it is a key to what we do when we read in a systematic way: modern critics, though many would deny it or not be aware of it, are types of allegorical exegetes. Historically, it is a key to European culture and the most coherent model of reading as a social activity ever presented" (17). Northrop Frye also points to the complexities of how typology and allegory in the Bible have evolved over time: "the function of the Bible, for the Church, came to be not to teach doctrine but to prove or illustrate it" (85). The *Bible Moralisée* quite literally does just that with its detailed illustrations of both Biblical text itself in addition to allegorical readings. What is of primary interest to this chapter is how the incorporation of scientific and natural images might work in a religiously allegorical text.

Medieval exegetes were acutely aware of the importance of allegorical readings of the Bible. Hugh of Saint Victor explained that allegorical readings of Biblical passages were not merely permitted, but were in fact essential for full comprehension of scripture, stating that "it is certainly necessary that the student of Scripture adhere staunchly to the truth of the spiritual meaning and that the high points of the literal meaning, which itself can sometimes be wrongly understood too, should not lead him away from the central concern in any way whatever" (Minnis and Scott 81). Spiritual meaning and literal meaning were almost never one and the

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same – scripture often required careful exegesis in order to make sense of events that were historically distant. Interpretation of these events was vital for gleaning a moral code from the Bible that fit into contemporary medieval culture. Hugh's comments on the moral development of Christians (tropology) emphasize the inseparable relationship between allegory, typology, and morality: "it is more the meaning of things than the meaning of words which seem to pertain to it. For in the meaning of things lies natural justice, out of which the discipline of our own morals, that is positive justice, arises. By contemplating what God has made we realize what we ourselves ought to do" (Minnis and Scott 82). According to Hugh, a true understanding of the Bible as it applied to the betterment of the soul transcended the literal use of language. It was not so much the words that mattered as the ideas that those words represented and it therefore comes as no surprise that interpretive texts such as the *Bibles Moralisées* became valued commodities.

The layout of the *Bible Moralisée* is organized to present simultaneous allegorical and typological readings of scripture and it is therefore important to distinguish between the two: "typology is not allegory: allegory is normally a story-myth that finds its 'true' meaning in a conceptual argumentative translation, and both testaments of the Bible, however oblique their approach to history, deal with real people and real events" (Frye, *Great Code* 85). In essence, especially for medieval exegetes, the historical facts of the Biblical past did not lend themselves to fictional applications of allegorical readings. The historicity of typology was an essential component in understanding the Bible and it enabled the Church to develop a "progressive and forward-moving structure of doctrine" (Frye, *Great Code* 85). As a figure of speech, Frye points out, typology "moves time: the type exists in the past and the antitype in the present, or the type exists in the present and the antitype in the future" (*Great Code* 80). This movement of time –

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both forward and backward – creates a theory of history that Frye refers to as a "historical

process: an assumption that there is some meaning and point to history" (81). While typological

readings of scripture were rooted in historical fact yet fluid in meaning, allegorical readings of

scripture provided additional flexibility to render meaning even more transitory. And while

typological readings of the Bible grounded interpretations of the New Testament in the history

of the Old Testament, allegorical readings had the potential to do the exact opposite and free the

New Testament from the Old to explore contemporary applications of exegesis. The compound

layout of the *Bible Moralisée* that allows for both allegorical and typological readings to exist

simultaneously effectively serves as a means for exegetes to translate meaning from a historical

focus to a moral focus in scripture.

While allegory and typology might be distinct from one another, they were not

impossible to employ simultaneously in medieval biblical exegesis. The use of typology could

effectively create allegorical figures in texts that had the ability to connect events over vast

expanses of time. Erich Auerbach argues that the uses of typology (or what he also refers to as

"figurative interpretation") and allegory were integrally associated with one another and enabled

medieval thinkers to combine two seemingly disparate events, ones that might be "causally and

chronologically remote from each other, by attributing to them a meaning common to both" (5).

He is also quite careful to distinguish typology (or figurism) from allegory:

> In these [allegorical] patterns, at least one of the two elements combined is a pure
>
> sign, but in a figural relation both the signifying and the signified facts are real
>
> and concrete historical events. In an allegory of love or in a religious symbol at
>
> least one of the terms does not belong to human history; it is an abstraction or a

sign. But in the sacrifice of Isaac considered as a figure of the sacrifice of Christ,

it is essential, and has been stressed with great vigor, at least in the occidental

tradition, that neither the prefiguring nor the prefigured event lose their literal and

historical reality by their figurative meaning and interrelation. (6)

Religious texts containing both historical narratives and symbols necessarily belong to both

human history and the realm of abstraction simultaneously. While allegorical interpretations

create meaning from symbols, typological interpretations create meaning from historical events.

The moralized roundels of Codex 2554 demonstrate both typology and allegory functioning in

between the New and Old Testaments as well as within contemporary medieval society. It is

therefore unsurprising that images of the natural world, science, scientists, scientific tools, and

allegorical figures of scientific knowledge provide distinct examples of how medieval science fit

into a Christian framework using the translational tools employed by exegetes.

Moralized bibles represent a field of medieval art that participates in a set of well-

established rules of symbolism where the images themselves are likened to language and yet are

capable of transcending it. In his analysis of religious art in thirteenth-century France, Emile

Mâle describes the art of the Middle Ages as "first and foremost a sacred writing in which every

artist must learn the characters" (1);[5] art is simultaneously "a script, a calculus and a symbolic

code" (22). In terms of art and the Bible, Mâle identifies the roots of mystical interpretation in

the works of early Church fathers such as Eucherius (*De formulis spiritalis intelligentiae*), Hugh

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[5] Mâle's use of "characters" aptly emphasizes the connection between art and language in medieval Christianity; "characters" simultaneously refers to the individual figures depicted in images used to convey visual meaning and to the letters of the alphabet used to convey linguistic meaning.

of St. Victor (*De Bestiis*), Alain de Lile (*Liber in dictionibus dictionum theologicarum*), and

Garnier of St. Victor (*Gregorianum*) (32). Fragments of such works were collected as a means to

establish a reference guide for identifying the symbolic meaning of the natural world to gain

greater insight into the spiritual world.[6] From Augustine forward, the world itself was symbolic

of a book written by God. The Bible, or the book of God's words, served as a reflection of all

creation, or the book of God's works. Alain de Lile expressed the idea in the twelfth century:

> *Omnis mundi creatura*
>
> *quasi liber et picture*
>
> *nobis est in speculum:*
>
> *nostrae vitae, nostrae mortis,*
>
> *nostri status, nostrae sortis*
>
> *fidele signaculum.*[7]

Images of the natural world found in the *Bible Moralisée* therefore present complex refracted

interpretations of nature; the images of nature throughout the work are at once representations of

what medieval illuminators saw in the world around them in addition to serving as a set of

accepted religious symbols for the exegetical interpretation of that world, functioning as a

universal language by which to explore spiritual truths.

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[6] Mâle refers to a specific reference guide from which religious scholars could work, a dictionary of symbols collected in the ninth or tenth century from a variety of Latin Fathers known as "Key" of Melito. The book functions as an encyclopedia of nature in which all natural objects are assigned specific religious symbolism (32). Mâle maintains that such symbolism was so important that there was "no preacher or theologian in the Middle Ages who did not make use of the symbolic method" (33).

[7] "All the world's creatures, as a book and a picture, are to us as a mirror, in it our life, our death, our present condition, and our passing are faithfully signified." (Alain of Lille, ed. Raby 1959: 369).

Allegory and personification of the natural world are bound together in the typology of Codex 2554 as the images transcend both culture and time in both linear and nonlinear fashions. Images of science and the natural world can be found throughout the *Bible Moralisée* but they are most evident in the first folios of Genesis that depict the creation story. While the manuscript explicitly contains Old Testament narratives found in Genesis, Exodus, Leviticus, Numbers, Deuteronomy, Joshua, Judges, Ruth, and Kings, these narratives are adapted and placed in typological relationships such that portions of the New Testament appear in the moralized roundels that correspond to the narrative order of the Old Testament. Although the Old Testament narratives appear chronologically, the corresponding narrative from the New Testament fail to follow a linear narrative pattern and images of nature are not meant to reflect reality but rather be mapped onto moral interpretations of scripture. The manuscript is by no means complete, and given the exploratory nature of the intellectual climate that allowed for the emergence of scientific study, it is likely that the book was intended to be read in a correspondingly exploratory manner.

As noted earlier, the exegetical tradition of moralized Bibles began in the early thirteenth century, with Codex 2554 among the first to be produced.[8] Codex 2554 currently contains 131 folios with eight roundels on each page, four of which illustrate Old Testament scenes and narratives with four corresponding illustrations of moralized exegesis. The moralized roundels are often typological readings of the New Testament but they also feature contemporary

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[8] John Lowden provides an extensive discussion on the debate surrounding the precise date of production for Codex 2554 in *The Making of the Bible Moralisées* (50-52). Using the evidence put forth by scholars such as Haussher and Branner, Lowden estimates the date of production to be between 1220 and 1230.

medieval characters such as astronomers and philosophers in addition to personifications of the

natural world. The pages measure 344 x 260 mm, though they were likely trimmed at some point

from an original larger size.[9] Each roundel has corresponding text, composed in vernacular

French, which serves to provide the viewer with some guidance in reading the images. The

complexity of the layout enabled the viewer to read the images in a variety of ways (see fig. 3.1),

including reading the images and text in tandem, reading the biblical roundels only, reading the

moralized roundels only, or any combination of the above. With the images functioning as the

primary focus of the manuscript, the text serves more as a framing device both literally and

figuratively. Readers of the *Bible Moralisée* would have the option of looking to the

corresponding text of each image; however, the text does not by any means provide a

comprehensive interpretation of any image and instead provides only the most basic of

descriptions to provide the reader with Biblical reference points. As Gerald Guest notes, the

manipulation of Biblical narrative and ordering of images between roundels are intended to

priviledge visual access for both moralized and typological parallels of the images rather than

the text (31). These moralized and typological parallels necessarily require symbolic

interpretations of any images of the natural world or science where the natural world is mapped

on to religious doctrine and vice versa.

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[9] Lowden argues that, given the similarity in sizes of the painted frames in various Bible
Moralisées (approximately 280 x 210mm) in addition to the fairly standard size of other
thirteenth-century moralized Bibles (approximately 440 x 300mm), further combined with the
indication of Codex 2554 being rebound several times, it is highly likely that the current
manuscript has been cut down from its original dimensions (13).

DIAGRAM 5
Four Possible Scanning Patterns of a Page in *Vienna 2554*
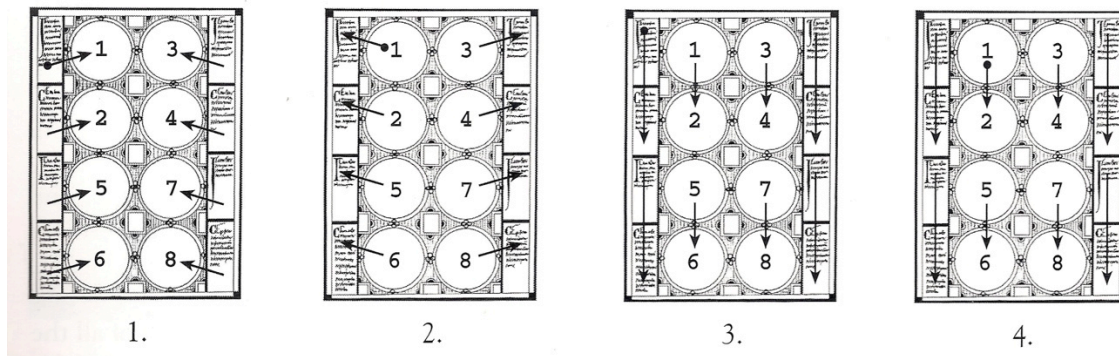(Dot marks starting point)

1. 2. 3. 4.

Fig. 3.1. John Lowden's schematic of possible scanning patterns of Codex 2554 (29).

With the complexity and design of the images, there has been some debate among scholars as to the intended audience of the *Bible Moralisée.* Unlike the widespread accessibility of Chaucer's work, the audience of the *Bible Moralisée* was a far more selective one. Although Michael Camille suggests that the manuscript may have served as a type of instruction manual for the clergy ("Visual Signs" 126), Tracy Chapman Hamilton argues that the intended audience may have been even smaller. Given the high number of images of childbirth and fertility found throughout the text, Hamilton's assertion that the content of the images in conjunction with the extravagance of the manuscript are indicative of a royal female audience (192)[10] is far more convincing than Camille's instruction manual model. Hamilton's argument is convincing because there does not seem to be much purpose for such an emphasis on the portrayal of the

---

[10] Scenes of particular interest to a female audience including those of childbirth, mothering, and fertility can be found on folios 6rA (Rebekah gives birth to Esau and Jacob), 7rc (Jesus nurtured by his mother and God), 8rD (Tamar gives birth to Perez and Zerah), 16r – v (sequence depicting birth and abandonment of Moses), 62rCc (births of Samson and Christ), 63rbc (the soul as a child), 49vDd (mothers of living and dead infants approach Solomon), 58rCD (a woman gives birth and the child dies in her lap).

role of females if the text were intended as a clerical manual. Given the lavish illuminations and cost of the manuscript, the intended audience of the *Bible Moralisée* was clearly an extremely elite one that indicates the likelihood of royal patronage. Guest offers a compromise for Camille's and Hamilton's assertions, arguing that although the manuscript was likely intended for a royal audience, members of the clergy would have invariably had access to the manuscript as well, as they assisted royal patrons with the interpretation of the complex relationships between images and Biblical narrative (17-18). As a member of "the first great Capetian patrons of the visual arts" (Guest 26), Blanche of Castile (wife of King Louis VIII and mother of King Louis IX) would have been likely to commission a work as visually ornate as the *Bible Moralisée*. Lowden notes that Blanche was known for having had in her possession a great number of illuminated manuscripts and one such manuscript, a royal Psalter (Paris, Bibliothèque de l'Arsenal, MS 1186), contains medallions on the frontispiece closely related in style to the medallions found on Codex 2554 (52). Hamilton also provides evidence of Blanche as the patron of Codex 2554, citing feminine declensions in the French commentary in addition to images suited to a female audience (such as the aforementioned images of childbirth) throughout the manuscript (179). Regardless of its exact makeup, it is certain that the audience of the *Bible Moralisée* was an extremely small one in comparison to Chaucer's works.

The *Bible Moralisée* is not only unique in that it was likely intended for an audience of elite women, but also – and more importantly for this dissertation – because it presents an illuminated representation of how medieval religious iconographers viewed the problematic role of science in religion. Somewhat ironically, many of the very same historical conditions that allowed for the proliferation of natural philosophy and institutionalized study of sciences during

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the thirteenth century were also responsible for establishing the interpretive freedom that allowed the creators of the *Bible Moralisée* to include images of science in their illuminations. Though the field of modern science eventually emerged thanks to the fostering of Aristotelian natural philosophy in the Middle Ages, images of scientists and natural philosophers in the *Bible Moralisée* indicate that the religious perception of pure science was an extremely vexed one at the time. For example, human astronomers first appear in the *Bible Moralisée* as allegorical representations of the pagans who sought to construct the Tower of Babel (see fig. 3.2). The presence of an astrolabe with a faded alidade in the hands of a man gesturing to the sky identify the men as astronomers[11] along with the accompanying descriptive text: "That the pagans began the tower of Babel against God's commandment signifies the astronomers and dialecticians who make false proofs against the will of Jesus Christ, and He turns their work to nothing and blinds them and strikes them." While the upper roundel shows pagans falling and being struck down by triangular tiles as they try to construct and climb the tower, the moralized roundel shows even more triangular tiles raining down to impale and blond the tonsured scholars. The scholar on the left holds an open book in his right hand and leans on left arm as though having fallen asleep while studying while the scholar on the right seems to be engaging in some form of debate with the sleeping scholar, as indicated by his hand gestures, and likely represents the dialectician. The middle scholar, clearly representative of astronomers, stands in the middle with the astrolabe in his hands and looking up, only to be blinded by one of the triangular tiles.

---

[11] Tachau identifies a number of contemporary images that confirm the iconographic conventions for depicting astronomers: holding open books, heads directed at heavens, gesturing to the skies, and the presence of scientific instruments such as astrolabes and armillary spheres (13). The image of astronomers from Codex 2554 serves as one of her examples.
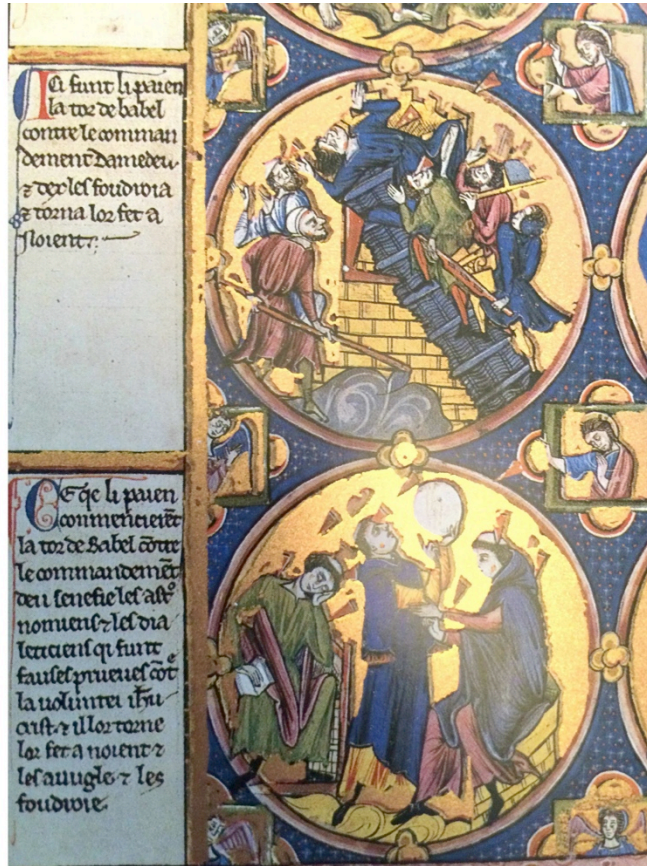
Fig. 3.2. Genesis 11: The Tower of Babel. ÖNB MS 2554, fol. 3v, roundels Cc

The images and accompanying text clearly identify the dangers of studying science

outside the confines of Christianity as the philosophers and dialecticians are explicitly linked to

pagans in the corresponding text. The relationship is further emphasized in the illustrations as

the pagans falling from the tower of Babel in the upper roundel share the upward gaze and raised

hands of the astronomer in the lower roundel. In both roundels, the triangular tiles that rain down

upon the men come directly from the hand of God, who is depicted in a central square set to the

upper right of each roundel. The God of the Old Testament in the upper roundel appears

indifferent to his actions, perhaps even guiding the damning triangular tiles with his other hand,

while that of the moralized interpretation below hangs his head down with eyes closed and left hand raised as if in reluctance. This variation in the depiction of God's response indicates the ambivalence towards medieval scientists. While the pagans building the Tower of Babel are clearly deserving of God's wrath, the astronomers and dialecticians below are less so. It is perhaps not the study of science itself that is problematic but rather the arrogance of men who perceive themselves to be equal with God in knowledge. Natural philosophy might be permitted, but only if it falls within the confines of theological guidance and does not challenge Christian authority.

The astronomer and his scholarly friends reappear on folio 8r in a comparison to the three children of Judah: Er, Onan, and Shelah (see fig. 3.3).[12] The upper roundel depicts the children of Judah (identified as miscreants in the corresponding text) being struck down by the same triangular tiles seen on folio 3v. While the triangular tiles are noticeably absent from the moralized roundel, the description indicates that the fate of these astronomers and dialecticians is the same as those who were earlier compared to the builders of Babel: "The children, who were miscreants and whom God destroyed, signify the astronomers and the dialecticians, who err against God and against nature, and God throws His darts and His arrows at them and confounds and destroys them" (62). The face of the man on the right is not visible but his posture is clearly indicative of pain with his hand to his head. The central figure, still with astrolabe in hand and head to the sky, appears to have his eyes closed, literally turning a blind eye to God. The man on the left is seen holding a bag (of coins?) with eyes closed and tongue

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[12] Er, Onan, and Shelah were conceived through Judah's ungodly marriage to a Canaanite woman and became representative of the corruption of Israel. See Genesis 38:1-30 for the story of Judah and his children.

protruding, indicative of heretical or blasphemous behavior. Again, it is not science itself to which the creators of the *Bible Moralisée* object, but rather any actions under the guise of science that would go against God's will.
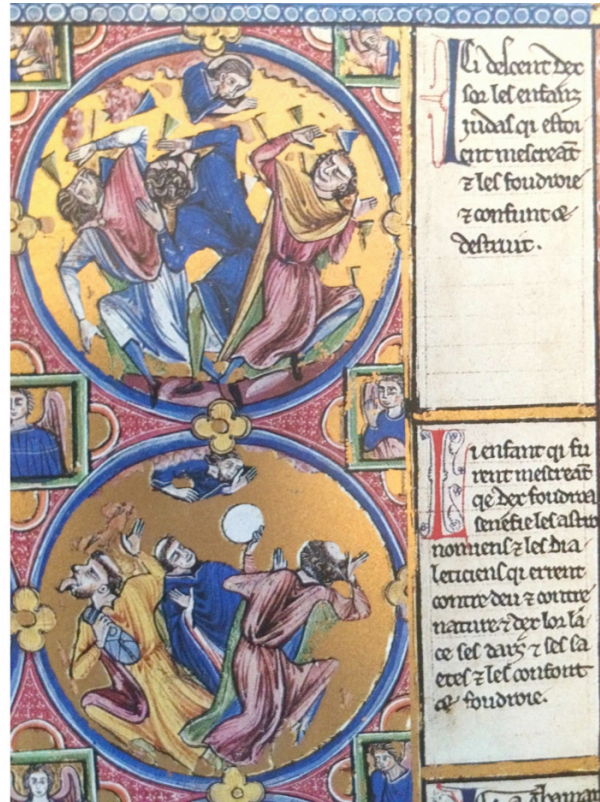
Fig. 3.3. Genesis 38: The children of Judah. ÖNB MS 2554, fol. 8r, roundels Aa

Not all images of the practice of science are presented as heathens and heretics. Strikingly, God appears prominently on the frontispiece as a scientist, poised with compass in hand as he designs the universe (see fig. 3.4). The images found within the manuscript clearly demonstrate a deep ambivalence toward science yet the frontispiece of Codex 2554 is perhaps one of the most referenced images used to represent medieval science, so much so that it has

been reduced to the status of "visual cliché" according to Katherine H. Tachau (7).[13] Along the

very top of the frontispiece, above the top border, read the words "*Ici crie Dex ciel et terre soliel

et lune et toz elemenz*".[14] Though not explicitly depicted in the image, the iconographer clearly

intends to convey that God is creating the entirety of the material world. The move is a cautious

one that protects the iconographer from any charges of heresy or disbelief as God is shown

actively creating the material world from nothing: the left hand holds the primordial universe,

depicted by green and yellow chaos surrounding waves of blue water and emerging stars and

planets, while the right hand wields a material tool, the compass. Although God is clearly

engaged in a distinctly material task, the iconographer is sure to assert God's immateriality with

the green halo in addition to the placement of God's right foot outside of the constraints of the

frame in the lower left side of the image. The juxtaposition of the material and spiritual worlds

establishes a careful balance in the image that clearly establishes God as the creator of the

material world and true master of science. As Tachau notes, overuse of this image of God as

scientist-creator has resulted in an oversimplified understanding of the relationship between

science and religion in the Middle Ages, one where religion fostered scientific growth. Further

analysis reveals that this image, especially in conjunction with other images of science

throughout the *Bible Moralisée*, demonstrates a far more complicated relationship between

science and religion in the Middle Ages.

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[13] Tachau identifies several instances in a single decade of the image being used to highlight the (erroneous) "fruitful interaction of learned science and religious study in the high and late Middle Ages": John Murdoch's *Album of Science: Antiquity and the Late Middle Ages* (1984), Amos Funkenstein's *Theology and the Scientific Imagination* (1986), David C. Lindberg's *The Beginnings of Western Science* (1992), and Alistair Crombie's *Styles of Scientific Thinking in the European Tradition* (1994).

[14] "Here God creates the heavens and the earth, the sun and the moon, and all the elements."

Fig. 3.4. God the architect. ÖNB MS 2554, frontispiece

While it is not entirely unexpected to find an image of God creating the universe, it is

significant to note that God is creating the universe with a man-made tool. There are some

arguments that the origins of God's compass in the *Bible Moralisée* may be scriptural,[15] but it

also entirely possible that the compass is representative of the role that scientific tools have in

shaping knowledge of the universe. Dana Vasiliu argues that the frontispiece of the *Bible*

Moralisée is indicative of efforts to Christianize Plato's account of creation in Timaeus, where

Plato goes into great detail describing the proportions and geometric intricacies of the creation of

the universe. In accordance with Plato's discussion, all elements of the universe and the natural

world as observed on earth were created in specific ratios and mathematical proportions that

fully elucidate the perfection of God's creation. Although medieval geometry was often seen as

an attempt "to enter the mind of God the eternal geometer" and act as a medium for God's will

to create sacred art, the geometry was based on the canonical rules established by Euclid using

only a compass and straight edge.[16] Geometry, then, presented a means by which the

---

[15] Erwin Panofsky identifies the source of the compass in the Book of Wisdom where it is written that God has "ordered all things in measure, number and weight" in the creation of the world (11:20) while Otto von Simson finds evidence for God's compass in Proverbs: "When he prepared the heavens, I *was* there: when he set a compass upon the face of the depth" (8:27). Further discussion on origins of the portrayal of God in the creation story can be found in Conrad Rudolph's "In the Beginning: Theories and images of creation in Northern Europe in the twelfth century."

[16] Colin Joseph Dudley summarizes the rules as follows:
 (a) Only a pair of compasses (or alternatively a bar compass) and an unmarked straight-edge may be used.
 (b) Every exercise of the art must begin with a circle.
 (c) Straight lines must join or pass through predetermined (determinate) points.
 (d) The intersection of any two lines constitutes a point.
 (e) Circles or arcs of circles must be centred on predetermined points and must pass through predetermined points or be tangent to a predetermined line.
 (f) No dimensions may be transferred.
 (g) Symmetry must be maintained. (36-7)

iconographers could combine a respect for mathematic wisdom from classical scholars with a

reverence for Christian exegesis of scripture. Even if the image serves primarily as an

appropriation of classical natural philosophy, the prominence of God's compass on the

frontispiece of such an elaborate work of art points to a keen interest in the role of technology in

the natural world.

Codex 2554 is not the only manuscript to feature God with a compass; creation scenes

showing God as an architect with compass in hand can also be found in the other three moralized

Bibles in addition to earlier Anglo-Saxon manuscripts including the Tiberius Psalter. Elizabeth

Marer-Banasik uses a historical perspective to argue that the compass functions as a standard

symbol throughout medieval history to represent the first step in the history of creation and

salvation.[17] I would like to add to the significance of the compass by moving it beyond Marer-

Banasik's historical perspective to examine its role as a scientific technological object. As

Latour notes, "it isn't the mode of existence of the technological object that we must address but

the mode of existence of technology, of technological beings themselves" (218). The compass is

not merely a means to an end (the creation of the universe), but a representation of modality as

opposed to instrumentality.[18] Latour also speaks to the dangers of imagining technological

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[17] In addition to the Tiberius Psalter, Marer-Banasik also identifies images of God as architect in the Anglo-Saxon Illustrated Hexateuch, Caedmon Genesis, the Lothian Bible, the Holkham Bible, and the Queen Mary Psalter.

[18] In *An Inquiry into Modes of Existence*: *An Anthropology of the Moderns,* Latour states: "Technology is believed to be an action stemming from a human being – most often male, moreover – that would then bear 'on' matter itself conceived through confusion between geometry and persistence [...] Technology then becomes an application of a conception of science that is itself erroneous" (219-20).

objects simply as means to ends in "Morality and Technology: The Ends of the Means." Above all else, Latour claims that "the image of a human being at the helm manipulating inert objects to achieve ends through the intermediary of 'efficient action on matter' appears increasingly muddled. Technologies belong to the human world in a modality other than that of instrumentality, efficiency or materiality" (248). What can we add to that modality, then, with the image of God rather than a human manipulating an inert object of technology?

In this instance of the *Bible Moralisée* frontispiece, the compass as an object of technology represents far more than "mere 'applications of Science' and mere 'domination of Nature'" (*Inquiry* 220). By placing a tool of technology in the hands of God, the iconographers identify God not just as a scientist but also as an artist or a specialist, one who expertly uses tools in the act of creation and translation. This representation of translation simultaneously negates and reaffirms the power of God in the image. The presence of a technological tool in the image demonstrates the creation of the universe as a physical process requiring expertise in the manipulation of material items. The compass creates a network, or series of translations, between mediators that inevitably generate traceable associations. As Latour notes, this type of translation takes on a very specialized meaning: "a relation that does not transport causality but induces two mediators into coexisting" (*Reassembling the Social* 108). On the one hand, the compass partially negates the power of God in the process of creation by the implied necessity of the tool. Both God and the compass become a part of the network of translation that negates power and causality. On the other hand, by placing the compass in God's hand, the iconographers identify creation of the universe as a technical task, one that requires the expertise of a true specialist. Such specialists are granted power by the collective because "when we

admire the technique of a specialist, we rightly recognize it in the passage that no one can master, except him, and specifically him, who besides does not know what he is doing" ("Morality and Technology" 251). By placing the compass in God's hand on the frontispiece of the *Bible Moralisée*, the iconographers create a technological modality that establishes God as the expert in the science of universe creation in such a way that God's power is affirmed by those who created the image rather than that power be inherently granted to God.

Subsequent images of God creating the universe further emphasize the motifs established in the frontispiece. The first folios of exegetical miniatures consistently show a portion of God's body protruding beyond the constraints of the roundel, providing verification that God cannot be limited by physical boundaries, especially those created by humans (see fig. 3.5). The first roundel depicts God separating the day and night while in the second God creates the earth in the middle of the frame with the sea surrounding it. The following roundels depict the creation of plants and birds followed by the sun, moon, and stars. While there are some similarities with the image of the earth and sea formation in the roundels echoing the spheres and wavy lines indicative of water found on the frontispiece, none of the images of God creating the universe within the context of Genesis indicate the use of any tool. The absence of the compass in subsequent miniatures of God is a conspicuous one that stands in contrast to the emphasis placed on scientific instrumentation in the frontispiece. Instead, instrumentation throughout the remainder of the manuscript is limited to the hands of humans who erroneously attempt to imitate the power of God's knowledge throughout the remainder of the manuscript. As Tachau points out,
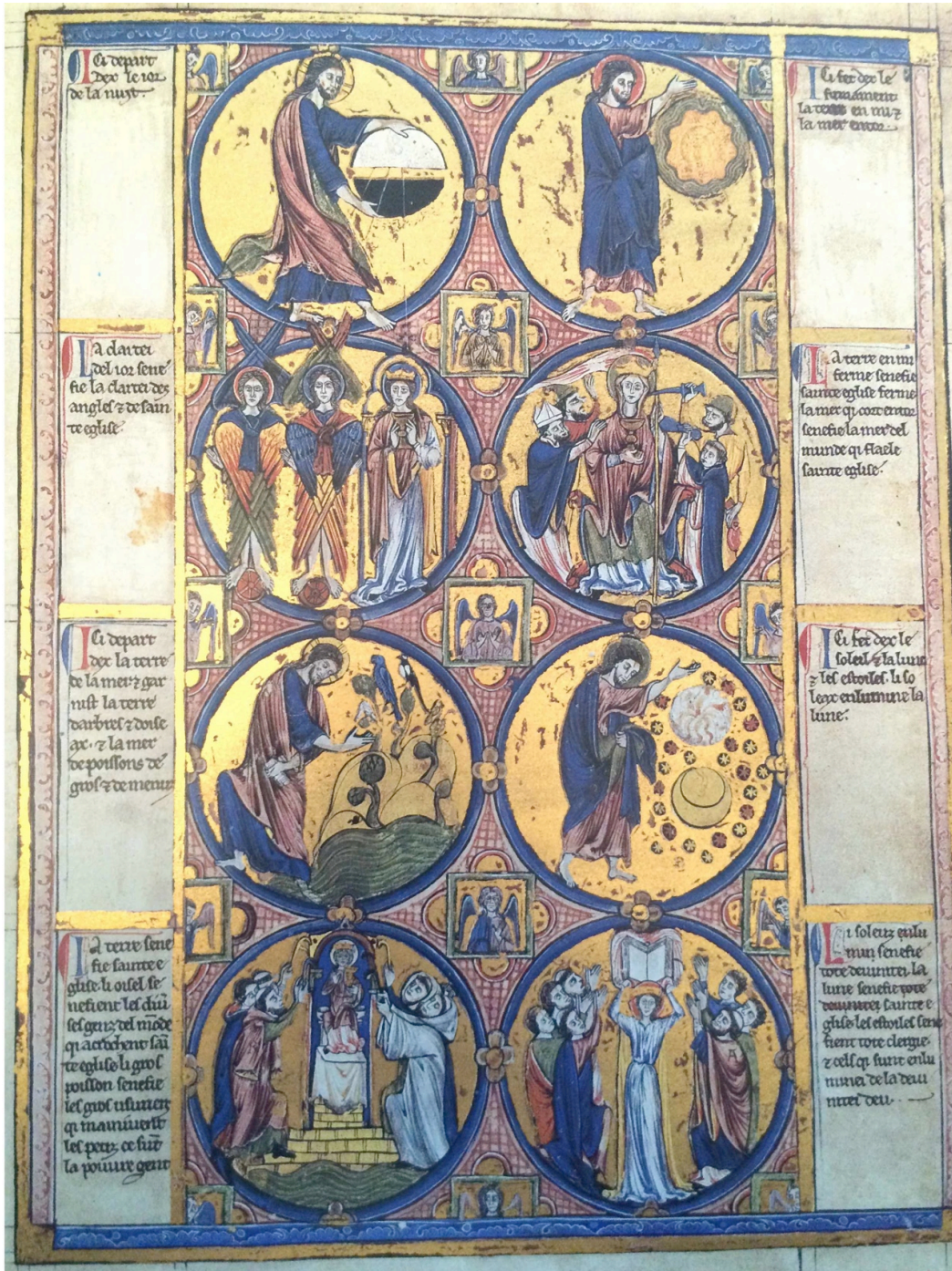
Fig. 3.5. Genesis 1: The first days of creation. ÖNB MS 2554, fol. 1r

while much of the content of the *Bible Moralisée* demonstrates a disdain for the secularization of natural philosophy and the physical sciences,[19] the emphasis placed on God's compass on the frontispiece is indicative of a much greater sense of ambivalence toward the physical study of science and the natural world.

The religious ambivalence toward the natural world that is reflected throughout Codex 2554 demonstrates an extremely complex relationship between humans and nature that goes beyond a hierarchy that would place God above humans and humans above nature, as some scholars have argued. Lynn White Jr. is one such scholar who argues that medieval Christianity clearly created a hierarchy that places humans above nature. Several arguments against the oversimplification of this hierarchy have come to light in response to White's identification of medieval Christianity as the historical root of the modern ecological crisis.[20] White's thesis claims that the ability to exploit nature had to have been integrated into a cultural program that permitted society to do so, identifying medieval Christianity as the source of permission to exploit the environment.[21] According to White, the anthropocentric roots of Christianity

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[19] Much of Tachau's work identifies instances of "the bad scholar as invested with a kind of spiritual laziness" in the form of astronomers and philosophers (15). This chapter also analyzes some of those same images.

[20] See Douglas Lee Eckberg and T. Jean Blocker, "Varieties of Religious Involvement and Environmental Concerns: Testing the Lynn White Thesis." See also Paul A. Djupe and Patrick Kieran Hunt, "Beyond the Lynn White Thesis: Congregational Effects on Environmental Concern." Ethical considerations of White's thesis can be found in Willis Jenkins, "After Lynn White: Religious Ethics and Environmental Problems."

[21] Although Lynn White Jr. addresses the ecological crisis in 1967 ("The Historical Roots of Ecological Crisis," *Science* 115. 3767: 1203-1207), his reasoning would apply to any period of time post-middle ages. He cites Aldous Huxley's lamentation of "man's unnatural treatment of nature and its sad results" in reference to a once grassy glade in England that had since been overrun by brush (1203). He acknowledges that environmental changes are inevitable as ecosystems shift over time but identifies problems such as the combustion of fossil fuels, waste

necessarily insist that humans have dominion over nature and an obligation to exploit it. Further,

White (erroneously) claims that medieval Christianity eliminated all pagan beliefs in the

spirituality of the natural world (1205). White's reasoning clearly demonstrates only a very

superficial understanding of medieval Christianity and paganism and although his depiction of a

medieval ecological hierarchy might be faulty, subsequent elements of his thesis do provide

some insight into how Christianity and natural philosophy could coexist. White makes an

exception in his hierarchy of religion and nature for the work of Francis of Assisi, which

promotes a humbler relationship with nature that approaches pantheism (1206-7).[22] And

although White's hierarchy of dominion is a gross oversimplification, it does reflect the

relationship between *sapientia* (divine wisdom) and *scientia* (human knowledge) that is evident

throughout the *Bible Moralisée.* Rather than a hierarchy of dominion, the *Bible Moralisée*

demonstrates an interest in presenting hierarchies of understanding where *sapientia* is essential

to avoid the dangers of *scientia*.

As outlined in the first chapter, Cathedral schools of the Middle Ages focused on

instruction of the seven liberal arts (the *trivium* and *quadrivium*), or *scientia*. This focus on

theoretical knowledge of the physical world was derived from firm sets of principles and logic

that were based on observation. *Sapientia*, on the other hand, was of primary focus in the

monastic schools and focused primarily on internally derived wisdom along with contemplation

of the soul. As the warnings against *scientia* alone in the *Bible Moralisée* indicate, both *sapientia*

disposal, shifts in chemistry of the atmosphere, and nuclear threats as elements of the ecological
crisis (problems that have continued beyond 1967 and well into the 21st Century).
[22] White further proposed that Assisi be named patron saint of ecology, for which Pope John
Paul II later issued a bull in 1980.

and *scientia* were vital to learning. Honorius of Autun, who popularized clerical learning for the lay community in the twelfth century, distinguished between *scientia* and *sapientia*:

> Just as for the people of God there was an exile in Bablyon, while Jerusalem was their homeland, so ignorance is the exile of the inner man though wisdom (*sapientia*) is his Homeland … The route from this exile to the homeland is *scientia*, for *scientia* deals with earthly matters, while *sapientia* deals with divine matters. One should pass along this route not by steps of the body, but by desires of the heart. Indeed this route leads to the homeland through the ten directing arts and through the books cleaving to the way and serving it like so many towns and villages along a road.[23]

The depiction of science throughout the *Bible Moralisée* points towards this interdependence of *scientia* and *sapientia* described by Honorius. Roger French and Andrew Cunningham identify this emerging interdependence of *scientia* and *sapientia* as the basis for the newly emerging field of "theology," a God-centered subject that relied on the seven liberal arts as a base: "theology was the application of *scientia* to the understanding of the nature of God and of the Christian religion. Pagan learning had thus been brought back as an essential understanding for the divine" (58). One of the most significant components of this pagan learning was the discipline of philosophy, cultivated from the translated works of Aristotle. Although some medieval scholars

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[23] Quoted in French and Cunningham (their translation) from Honorius's "On Exile of the Soul and on Its Homeland; or, On the Arts" (56).

were opposed to the influence of pagan philosophy on Christian study,[24] *philosophia* came to embody all knowledge, both divine and human (French and Cunningham 79).

The influence of *philosophia* can be found throughout the *Bible Moralisée* with the personification of Philosophy in a number of roundels. In a moralized scene from Judges 19, Philosophy becomes the contemporary medieval equivalent of the good man of Gibeah's concubine (see fig. 3.6). The translation of the moralized text identifies Philosophy as the figure who is capable of corruption and reads: "That the Sodomites took the wife of the good man and the good man suffered signifies the heretics and miscreants, who Philosophy took from the pagans to Jerome and Augustine" (Guest 103). Even without the moralized text providing explication of the images, the figure of Philosophy clearly mirrors the figure of the good man's concubine (wife) in the upper roundel with her posture and downward gaze, just as the four Sodomites mirror the four heretics with their postures, clothing, and unattractive facial features. The significance of placing Jerome and Augustine as the recipients of Philosophy lies beyond that of establishing a link between paganism and the Christian ideology of late antiquity. By identifying Jerome and Augustine (two of the four Latin Fathers of the Church) specifically, the creators of the *Bible Moralisée* endow the figure of Philosophy with a sense of authority that mirrors the authority of reason established by the Fourth Lateran Council. The selection of Augustine may also have had a particular significance to Blanche. Just as Blanche played a key role in the religious development of her son, so too did Augustine's mother, Monica. In terms of

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[24] French and Cunningham identify several opponents to pagan philosophy in the twelfth and thirteenth centuries who claimed that study of the Bible should remain free from the influence of pagan philosophy. This opposition had little impact on the curriculums of emerging universities, where pagan learning became the basis of educational programs (58-66).

language and instruction, Jerome was known for having translated both the Old and New Testaments to establish the Latin Vulgate. During an age when biblical translation into the vernacular was gaining in popularity, the identification of Jerome as one the Church Fathers endowed with philosophy served as a way to validate those translations (perhaps even the translation and interpretation into the vernacular of the *Bible Moralisée* itself); the translation provided by Jerome had the potential, therefore, to serve as a model for medieval Christians in France who also sought to translate and interpret the Bible.

Fig. 3.6. Judges 19: Gibeah's concubine. ÖNB MS 2554, fol. 65r, roundels Bb

The allegorical figure of Philosophy in Codex 2554 is relatively consistent with the typical personification of Philosophy as a saintly woman in early Christian art. Nurith Kenaan-

Kedar identifies the source of this model for the personification of Philosophy in Boethius's

Consolation of Philosophy (84). *Consolation* was an extremely popular text in late medieval

France with a tradition of translation into the vernacular that began with King Alfred in the ninth

century (Cropp 244), so this depiction of Philosophy in the *Bible Moralisée* would not be unique

and it is worth giving some consideration to *Consolation* as influencing the relationship between

science and religion in the manuscript. Regard for Boethius's *Consolation* can be found in texts

such as *Roman de la Rose*, where Jean de Meun argues that the *Consolation* is so important that

should be made available to all laity in the vernacular. The text is also an important one as it

demonstrates an attempt to balance secular intellectual inquiry with that of spiritual

contemplation and salvation. Imprisoned and facing execution on charges of treason by

Theodoric in 523, Boethius composed the *Consolation* as part of his lifelong goal to preserve

forms of ancient classical knowledge, particularly philosophy as a mode of intellectual inquiry.

Philosophy condemns the Muses in Book I, deriding emotions and all elements of the physical

world in an attempt to demonstrate that only abstract thought is capable of leading one to

salvation. Christine Herald describes this path to salvation as one in which Boethius seeks to

bridge two world-views: "one, the unsuccessful classical pursuit, through art and philosophy, or

a reasoned universe... the other, the certainties of Christian faith, its Platonic towers built upon

the foundation of Roman inquiry" (27). The figure of Philosophy in the *Bible Moralisée*

functions similarly – Philosophy is an essential component of Christian doctrine, though one that

should never be separated from Christian faith for fear that its virtue be lost.

The portrayal of Philosophy throughout Codex 2554 reflects the shifting understanding of

nature in the twelfth century, where the autonomy of nature had the potential to challenge the

authority of God. In order to nullify the potential threats of Aristotelian natural philosophy and

Arabic influences as they came through translations, the process of reading nature had to parallel

that of reading scripture. Among the medieval scholars who adopted this approach was

Archdeacon Dominic Gundisalvi, identified as one of the most influential translators of the

twelfth century by Cunningham and French.[25] Gundisalvi sought to do more than just translate

the philosophy of ancient and Eastern texts; Cunningham and French note that the interpretation

of Aristotelian philosophy through material borrowed from the Arabs in his *De Devisione*

Philosophiae (composed shortly after 1150) was "not a translation but a careful mixture of these

writers and the more homely Boethius and Isidore, the whole adjusted with some sophistication

to twelfth-century Christianity"(85). By insisting that philosophy embodied all knowledge, both

divine and human, elements of philosophy could be successfully incorporated into a

Christianized view of nature. In *Didascalicon*, Hugh of St Victor likewise represents the origins

of philosophy for the Greeks as a search for the Immutable. Cunningham and French argue that

this approach enabled Hugh to present philosophy as a means to receive Christian truth: "the

ultimate Immutable is God, followed, in Hugh's account, in descending order by the upper and

lower parts of His creation, as cause and effect" (79). Taken together, cause and effect combined

to make up the natural world in accordance with Christian doctrine.

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[25] French and Cunningham provide an extensive description of Gundisalvi's role as a conduit for Aristotle's doctrines emerging anonymously in Arabic writings. Working with the patronage of the Archbishop of Toledo in the Toledan School of Translators, Gundisalvi was at the boundary of Christian and Muslim Spain and was therefore in an ideal position to amalgamate ideas borrowed from writings in both faiths. In particular, his use of the technique *distinctio*, which is the process of dividing and subdividing categories of knowledge, is echoed in the division of subject fields today. (83-88)

The relationship between cause and effect is not just a concern of nature, but also a concern of typology, as identified by Frye. While the structure of English prose is so bound up in causality that movement must necessarily move from cause to effect (as in Frye's example of the statement "The man opened the door"), typology allows for that temporal order to work in reverse. Frye elaborates on this reversal of temporal order:

> The causal thinker is confronted with a mass of phenomena that he can understand only by thinking of them as effects, after which he searches for their prior causes. These causes are the antitypes of their effects […] Hence causality and typology are rhetorically similar in form, and typology might in fact be thought of as an analogy of causality, a development of Aristotle's formal and final causes. (81)

Further, Frye notes, the types cannot be identified until after the antitypes have appeared (82). In this "backwards" reading of causality, then, the cause is not examined until after the effect has been identified. The portrayal of nature throughout the *Bible Moralisée*, a text that relies so heavily on typological readings of the Bible, depends almost entirely on the reversal of temporal order accorded by typology. Roundels from the early chapters of Genesis are especially rich in images of nature and the interpretations of these images necessarily rely on the typological parallels of the Old and New Testaments. Elements from nature as types are identified and defined by their relationships to the corresponding antitypes. Throughout the *Bible Moralisée*, this relationship between type and antitype is one that clearly draws comparisons between the natural and human worlds. Beyond the creation narrative and throughout the entirety of Codex

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2554, images of the natural world are by and large restricted to the upper roundels where the natural world is closely identified as elements of the type. Even if elements of nature appear in the lower moralized roundels, they are dependent upon the interpretation drawn from the original Biblical narratives.

The pivotal role of typology for interpreting the natural world is most evident in the first folios of Codex 2554, particularly in the portrayal of God's creation of life on earth (see fig. 3.7). Each set of roundels demonstrates a parallel between the human and nonhuman worlds that relies on spiritual interpretation. For example, the upper left roundel of folio 1v (A) explains "that God filled the sea with different types of fish signifies Jesus Christ who filled the world with different types of people." Likewise, subsequent images of the natural world are only given meaning when interpreted backwards through a lens of Christianity; in roundels Bb, the upper roundel depicts God pulling Eve from Adam's rib with a variety of animals to their right including sheep, goats, mules, and a lion. With Adam serving as the type of Christ and Eve as the type of the Holy Church, the animals function as types of "the different religions." These religions are clearly Christian, as indicated by the tonsured friar, hooded monk (possibly Cistercian in his white hood), and crowned bishop featured in each window of the church to the right of Christ. It is as though the diversity in animals is incapable of being justified on its own; comparison to Christian faiths is an essential means of legitimating contemplation of ecological diversity. This inverted study of the natural world continues in the lower right roundels (Dd) where "the good trees signify good men, who live in good works and are crowned with flowers in Paradise. The thorns signify those who live in bad works and are crowned with the thorns of the world." A variety of plants appear in the upper roundel, including leafy green stalks, a slender yellow tree
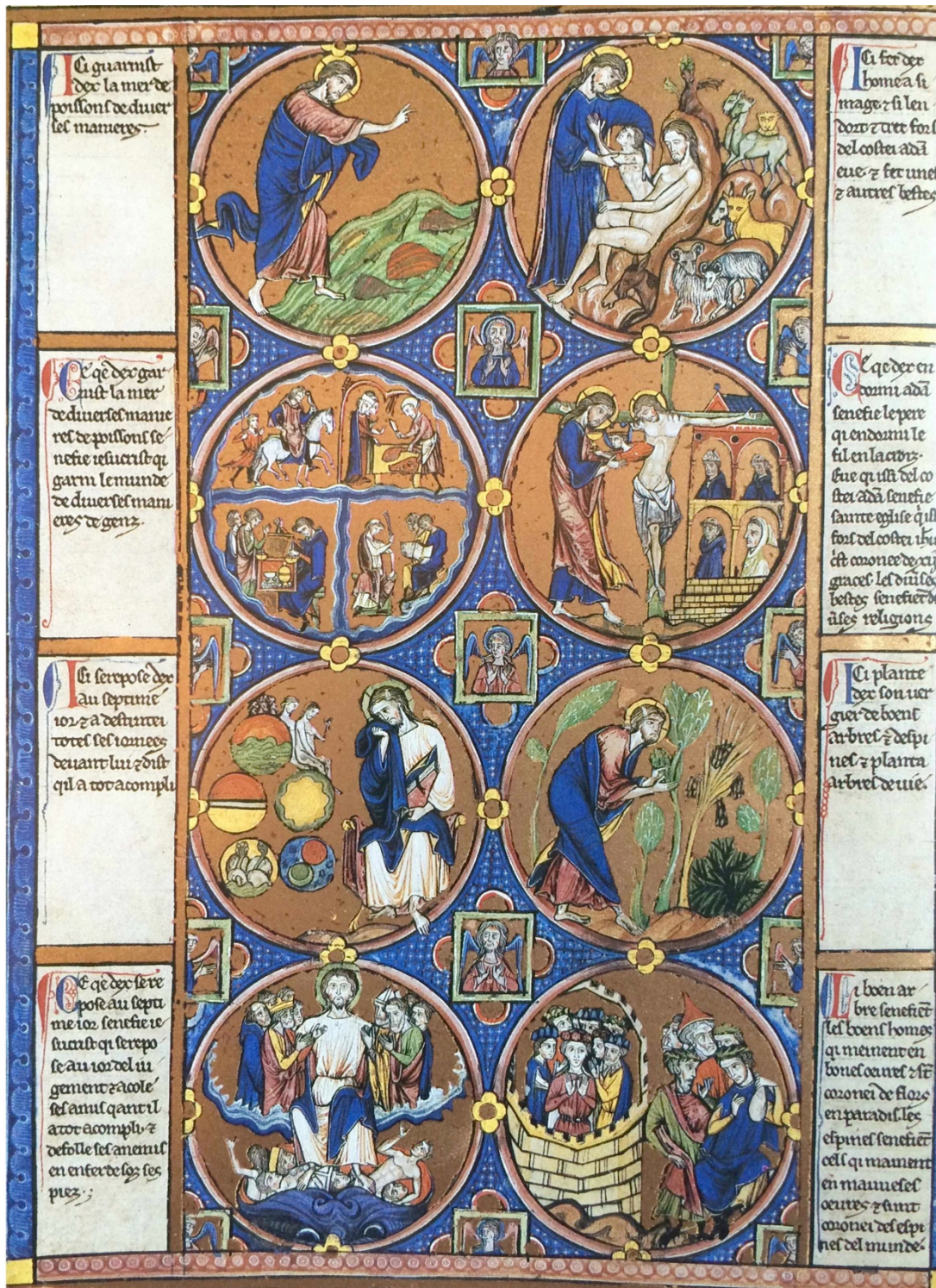
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Fig. 3.7. Genesis 1: God creates life on earth. ÖNB MS 2554, fol. 1v

bearing fruit, and a spiky green shrub. The lower roundel depicts a group of good Christians with hands raised as a sign of submission of faith within the confines of the church walls while the likes of a Saracen (identified by his pointed hat) and a usurer (identified by the bag of money in his left hand) stand outside the walls. Even vegetation is anthropomorphized such that its existence can only be validated through contemplation of human morality.

Codex 2554 demonstrates a preoccupation with the interpretive spiritual value of vegetation that exists in the exegetical space beyond basic natural philosophy, particularly in scenes depicting vines and grapes. Grapes, and their ability to be physically transformed into wine and then further transformed into the blood of Christ, function as the ideal examples of transformation borrowed from the natural world. The transformative power of the grapes in Codex 2554 forms a connection between ecology and theology that Latour identifies in the process of transubstantiation. The process is that of a "radical transformation" occurring on both physical and spiritual levels ("Will non-humans be saved" 462). Latour uses the example of the Eucharist as a model for the artificial remaking of earthly goods in "Will non-humans be saved":

> The Eucharist is a presentation not of grains and grapes but of the actively, artificially, technically (and I would add scientifically) transformed grains in bread and grapes in wine [...] Before the transubstantiation of bread and wine into flesh and blood, there is another indisputable transubstantiation of grain into bread and of grapes into wine that is no less mysterious than the other […] So, because of these two features (radical transformation and full confidence in artificial transformations in this world, or in other words, Incarnation), religion, in its

Christian instantiation at least, presents itself as a rather plausible alternative to an ecological consciousness. (463)

In Latour's earlier work, *Pandora's Hope*, he isolates the process of transubstantiation from religion, establishing that transformation or translation of observations of the natural world in science become examples of transubstantiation, where "a word replaces a thing while conserving a trait that defines it" (63). The resultant word or image is not a direct correspondence, nor is it metonymy, Latour argues. What occurs in the process is "a change of state so radical that now a sign appears in place of a thing" (63-4). What occurs on the pages of the *Bible Moralisée*, then, functions as a visual representation of the process of transubstantiation on both scientific and spiritual levels.

The first instance of the transformation of grapes occurs in the roundels depicting Genesis 9:20-21 (see fig. 3.8), where Noah appears in the upper roundel planting the vines from which he makes wine and subsequently gets drunk. Noah anchors the vine (that blends into his blue robe) with his right hand while drinking from the bowl held in his left. Grapes appear distinctly interspersed among the leaves of the vine that surround Noah. In the lower roundel, the text explains, "that Noah planted the vine and drank the wine, which he himself planted, signifies Jesus Christ, who planted the Jews and drank from the wine at the Passion." Leaves from the vines seen above remain but the grapes have transformed into human figures. Both Noah and Christ appear in the same posture wearing blue and red robes and both figures are literally surrounded by the grapes and human figures. Rather than simply serving their natural function as source of food with the transformative power of becoming wine, the creators of the *Bible*

Moralisée infuse additional significance into the fruit by typologically equating the grapes with the Jewish people. In both instances, growth of the vines is dependent upon cultivation of man. Without Noah or Christ, the vines and grapes hold very little meaning in the *Bible Moralisée*.

Fig. 3.8. Genesis 9: Noah drinking wine. ÖNB MS 2554, fol. 3v, roundels Aa

The transformative power of grapes increases in both significance and representative malleability in subsequent images throughout the *Bible Moralisée*. Not long after Noah's encounter with grapes-as-wine vines and grapes reappear in a scene depicting the butler's dream while Joseph is imprisoned (see fig. 3.9). The upper roundel shows the initial transformation of grapes into wine within a single scene; on the left side of the roundel the butler is pictured in blue and red robes tending to and collecting the three clusters of grapes in a golden cup while on

the right side of the roundel the butler is depicted presenting the cup of wine to the pharaoh seated in his palace. The vine reappears in the lower moralized roundel but now in the place of grapes there are three tonsured monks handing a cluster of grapes to Jesus. Though the grapes in the lower roundel remain in their original state, the moralized text indicates that they also represent their transformed state:

> The butler who found the three vines. The one with the grapes signifies the bud of a good beginning, the second signifies the flower of good works, the third signifies the fruit of a good end. That he brought them before his lord and he received them signifies those who bring these three things and Jesus Christ receives them and gives it to them to drink.

There is a complex reciprocality of transformation in the moralized roundel that renders the grapes in several typological and transformative states simultaneously. Visually, the grapes have transformed into the monks who appear as though they are almost hanging from the vine. However, the text places their significance elsewhere: the bud of a good beginning, the flower of good works, and the fruit of a good end. The three monks could then be seen as also representing these qualities and thereby retroactively represent the grapes. That the grapes are also being handed to Jesus for later consumption as drink indicates that these grapes are also intended to be transformed again and returned to the monks as wine.

Fig. 3.9. Genesis 40: The butler's dream. ÖNB MS 2554, fol.10v, roundels Bb

Perhaps the most striking evidence of the transformative power of grapes appears in a scene from Numbers 13:24, where the upper right roundel shows large clusters of grapes framed by a group of men on the left side and the city of Jericho on the right (see fig. 3.10). The text identifies the man as the sons of Israel and the grapes as ones that are "larger than they had ever seen." The text indicates that the men pick as many grapes as they desire and are filled, presumably physically. In the lower roundel, the abundant grapes on the vine in the center of the image are replaced with one large book, similar to the vine in the upper roundel, bearing several smaller books to mirror the bunches of grapes above. The moralized text for the pair of roundels equates the physical sustenance of the grapes with the spiritual sustenance of Christianity:

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Fig. 3.10. Numbers 13: Fruit in Jericho. ÖNB MS 2554, fol. 32v

"That the sons of Israel came before Jericho and found the abundant vine and took it signifies the sons of God, the good students, who find the abundant divinity of the word of God, and they take so much that they are filled." The word of God, as represented by the large book (most likely the Bible) and other texts (possibly exegetical or philosophical) have emerged both literally and figuratively as a form of transubstantiation from the grapes above. The process of transubstantiation is further exemplified in the next roundels where an exceptionally large cluster of grapes is mirrored by the crucifixion of Christ below. The old son of Israel in the upper right becomes the Jews in the crucifixion scene below, blind to their faith by having their backs turned to Christ. The younger son of Israel on the left becomes the Christians below with tonsured scalps that mirror the young Israelite's cap. Visually, in the center of each roundel and hoisted on the wooden frame, the grapes have quite literally transformed into Christ on the page. The significance of this particular transformation is especially apparent in the following roundels that picture the Israelites, princes, and prelates gesturing to the previous set of roundels in joy: "That the sons of Israel received the grapes with great joy signifies the good princes and good prelates who receive the faith of the commandments of Jesus Christ with great joy."

Transformation and typology as modes of translation play significant roles in the portrayal of science and nature throughout the *Bible Moralisée*. The manuscript demonstrates how allegorical and typological readings of the Bible and nature allowed for fluid representations of eternal truths to offer a variety of ways for readers to contemplate the spiritual place of man in the physical world. This chapter demonstrates how allegory and personification function not only as conceptual tools but also as modes of thought that allow for philosophical ideas from both the study of nature and theology to exist simultaneously. Multilayered elements of cultural,

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scriptural, and natural history emerge in the religious images found in medieval texts such as the *Bible Moralisée*. Elizabeth Salter's observations of the Carolingian Utrecht Psalter apply equally well to Codex 2554 when she states that these religious images are those where

> seeming irrationality can only ever be resolved by the words of the psalms in their literal and figural senses; a picture which contains, within a single frame, and in a single space, episodes from Old and New Testament history, from contemporary life, and from religious legend clearly asks to be 'read' not as a continuous and self-sufficient narrative, but as an exploration of deeper harmonizing truths. (15)

Heavily illuminated texts like the *Bible Moralisée* have the ability to combine the literal and figural interpretations of not only the spiritual world but also the physical one. Seeing God as a scientist and men figured as fruit certainly brings the connection between religion and science into greater focus. I take this connection further in the next chapter with a study of *Piers Plowman* and the role of ecological imagery in Langland's dream vision.

Chapter 4

Piers Plowman and Ecological Cultivation of the Soul

The previous chapter explores how the relationship between humans and the natural

world could be reconciled within a medieval religious context, primarily through use of

typological and allegorical representations of science and nature in the *Bible Moralisée*. The

Bible Moralisée provides valuable insight into approaches taken by church authorities that would

have been accepted by aristocratic audiences, but what conclusions might be drawn from less

explicitly authoritative religious texts? William Langland's *Piers Plowman* offers further

examples of how allegory could be used to reconcile ecological concerns with religious ones in a

far less formal format. Of the many allegorical devices present in the poem, images of cultivation

serve as some of the most striking; cultivation of the earth throughout *Piers Plowman* functions

as both a physical means to feed life by providing sustenance and a spiritual means to feed the

soul by preparing for the afterlife. Further, because medieval agricultural wisdom relied so

heavily on Greek and Roman sources,[1] these images of cultivation bring together not only the

physical and spiritual worlds, but also ecological knowledge from both the Christian present and

the classical past. Chaucer's use of nature in *House of Fame* works similarly in his reliance on

classical sources yet stands in contrast to Langland's use of nature in *Piers Plowman* in that

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[1] For a detailed study of the classical influences on medieval agricultural practices, see Jan C. Zadoks's accounts in "Traditions in agronomy" (20-21) and her description of the classical predecessors of medieval agricultural authors (27-30).

Langland's use of nature is intimately attached to religious contemplation in introspection. For Chaucer, classical science and ecology serve literature as tools for providing metaphors to explain scientifically observed phenomena (such as wave theory) in addition to culturally observed social phenomena (such as concepts of fame and enduring literature). Yet the nature described throughout Chaucer's *House of Fame*, though rich in imagery and symbolism, is a relatively benign force that has little impact on the physical survival of Geffrey. For Langland, however, nature is a more menacing force that has the potential to threaten physical survival and is a more somber means of exploring ideals of spiritual salvation.

This chapter relies heavily on the interconnectedness of the natural material world and spiritual transcendence in medieval thought. Of primary importance, then, is a definition of the term "nature" as it is applied specifically to a text that allows for nature and religion to not just coexist but to become interdependent. This interdependence throughout *Piers Plowman* presents nature and religion in ways that are not typically recognizable by present-day audiences because, as previously outlined in the overview of the history of science, science and the arts (and by extension, science and religion) are now so frequently separated from one another. Instances of science and religion coexisting in contemporary academic institutions are few and far between. Bruno Latour goes so far as to claim that nature and religion have become mutually exclusive such that it is impossible for the two to coexist at all in the present day. In his recent work, "Will non-humans be saved? An Argument in Ecotheology," Latour asserts: "when nature enters, religion has to leave. And when it leaves, it leaves for good because it only has two equally fatal exit strategies: one is to limit itself to the inner sanctum of the soul; the other is to flee into the supernatural" (465). Such scenarios inevitably leave the world of nature to be completely

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isolated from spirituality. While Latour's identification of the mutual exclusivity of nature and religion might bear some truth in the field of modern science studies, what value can such a claim hold for a text like *Piers Plowman* where nature becomes not merely a useful metaphor but rather an essential tool for understanding of Christian doctrine?

Although Latour goes to great lengths to describe how nature and religion have become entirely isolated from one another, his ultimate goal is to reverse that process and redefine nature in such a way to make room for both nature and religion simultaneously. In an attempt to allow nature and religion to coexist, Latour identifies two modes of existence for nature that tend to be confused in modern thought. He identifies the first mode as "Reference" or "the ways in which reference chains need to be arrayed so as to work." The second mode, "Reproduction," represents "the ways in which the entities themselves manage to remain in existence" ("Will nonhumans be saved?" 466). It is in the first mode of existence, Reference, that Latour's immutable mobiles are of primary importance.[2] In the Reference mode of nature, scientists rely on complex chains of recording to access knowledge of far-away entities and minute biological processes that are invisible to the naked eye. Observations of the natural world occur via measurements and instrumentation, which are then recorded and translated or transformed into immutable mobiles through scientific literature. This first mode of existence places heavy emphasis on the role of humans in shaping the non-human environment and predominantly describes current paradigms of formal measurable study in the "hard sciences," such as subfields in physics and chemistry. Yet while human intervention is necessarily required for humans to study elements of nature such as atoms and particles that is not to say that those elements don't

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[2] For more on immutable mobiles, refer back to Chapter 2 and Chaucer's *House of Fame*.

exist in the absence of human study. It is at this point that the second mode of nature steps in. In contrast to Reference, Reproduction is primarily concerned with the self-perpetuation of non-humans in the absence of human intervention. This second mode is more closely related to theories of evolutionary biology and ecology, or the "soft sciences" that rely less on instrumentation and are nearly impossible to study in the laboratory. The absence of a laboratory is part of what Latour identifies as the most distinctive quality of Reproduction. Borrowing the term *umwelt* from the semiotic theories of Jakob von Uexküll and Thomas A. Sebeok,[3] Latour describes the independence of Reproduction from both human narratives and the natural world. Because each organism has a unique set of senses that responds to the environment uniquely, individual organisms living in a shared ecosystem experience their environments differently. In its essence, the theory describes an ecology of individuals where Reproduction exists *outside* of communal constraints that are externally imposed by nature and religion; by accepting that organisms themselves make up their own meanings, Reproduction is freed from both the creation narrative of religion and the ecological communities of science.

In freeing Reproduction from external constraints, Latour hopes that we might "secularize the world of reproduction" and enable it to "stand alone as a mature mode of existence" ("Will nonhumans be saved?" 472). Accepting the fact that any component of nature *can* be isolated from its cultural and ecological contexts does not, however, necessarily mean that

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[3] *Umwelt* effectively intertwines semiotics and biology in the absence of human intervention. Sebeok describes *umwelt* as the "biological foundations that lie at the very epicenter of the study of both communication and signification in the human (and non-human) animal" (x). Using the biological studies of various cognitive skills of animals, von Uexküll's theories go on to describe an elaborate system of biosemiotics where each organism creates its own system of mental symbols that are used to interpret the external world.

it *should*. Rather than consider nature in either form as an isolated entity, this chapter seeks to juxtapose the two modes in ways that allow them to exist simultaneously yet distinctly and therefore create a space for religion and nature to coexist. Latour asserts that nature is simultaneously composed of both Reference and Reproduction but questions how religion can be reconciled with both modes of existence – "what happens if religion is allowed to weave its highly specific form of transcendence into the fabric of the other two modes of existence, Reproduction and Reference" (473)? Latour claims that no such encounter has ever taken place because confusion between the two modes of nature – where Reference and Reproduction are indeterminable – has always existed in modern monotheistic religion.[4] According to Latour, this confusion between modes is the primary source of friction between nature and religion. I would argue that the confusion between Reference and Reproduction has not always been a source of friction, but instead had the potential to be a rich source of productive contemplation. So far, I have explored each of these modes individually in literature; Chaucer's *House of Fame* is a text primarily concerned with Reference while the *Bible moralisée* is a text largely preoccupied with Reproduction. This chapter examines possibilities for religion and nature to coexist in Langland's *Piers Plowman* even when the boundaries between Reference and Reproduction become exceedingly blurred. Particularly in the inner dreams of the poem, *Piers Plowman* proves to be an exception to Latour's rule of exclusivity for nature and religion.

As with Chaucer's *House of Fame, Piers Plowman* grants an opportunity to explore the networks between science and religion in a space where the boundaries between modes had not

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[4] Latour admits that he is relying only on his own understanding of Christianity as the exemplar for modern religion in this case. He makes an exception for early pagan and indigenous religions that include a spirituality of the earth and excuses them from his analysis.

yet been so firmly established. Latour longs to re-establish the connections between ecology and

theology from pre-Modern Christianity and *Piers Plowman* is an especially useful text to turn to

because it describes a process of transformation in religion that is problematic to present-day

Christians. In *An Inquiry into Modes of Existence*, Latour addresses these challenges of religion

faced by the Moderns when he speaks to religion partly as a way for the narrative of ownership

to define an autonomous version of the self. The process of religious autonomy, however, is a

paradoxical one that mirrors Will's journey throughout *Piers Plowman*. Like Will's journeys into

the layered dreams that are outlined later in this chapter, Latour asserts that a Modern's access to

interiority is dependent upon transactions with beings of metamorphosis in a search for a

primordial authenticity.[5] In *Pier Plowman*, these beings of metamorphosis appear within a

number of dream visions: the many allegorical figures, middle earth, the tree of charity, and Piers

himself. It is through these dream visions and encounters with beings of metamorphosis that Will

is able to access a level of interiority that seems to elude Moderns. Latour points out that such

access is extremely problematic for Moderns because "the more the 'self' wants to be full, well

rounded, and complete, the *less* it can defend itself against transformations" (301). With the

Modern insistence on recording and verifying knowledge and experience, leaving the "self"

vulnerable to multiple transformations can be too risky (Latour goes so far to say that such an

exercise is guaranteed to produce insanity). To many Moderns, the danger of religion lies in its

dependence on metamorphosis and transformation as modes of self-discovery and salvation, yet

these are the very processes that are documented throughout *Piers Plowman*. Modern

reconciliation of religion and nature is nearly impossible because the instability of religion seems

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[5] Latour identifies these beings in the religious mode as angels, as "messengers that transport
messages with no content but transformation of persons" (303).

to be in direct opposition with the stability sought through Reference, the careful recording and documentation of scientific knowledge. Representations of nature in *Piers Plowman* render Reference and Reproduction indistinguishable and inevitably free nature from the constraints of stability imposed by Reference alone.

The instability of representing nature in medieval writing is not unique to *Piers Plowman*.[6] In fact, medieval representations of nature were typically distorted and altered. In his discussion on the landscape of poetry in the Middle Ages, Ernst R. Curtius states that (unlike the immutable mobiles that make up present-day scientific studies) "medieval descriptions of nature are not meant to represent reality," rather, they are part of literary techniques borrowed from antique poetry and rhetoric (183-184). But Curtius's assertion is an over-simplification. While descriptions of nature in medieval literature might not be entirely empirical or unbiased, they must also reflect elements of medieval reality in order to convey meaning. To view components of nature simply as a set of signs and symbols for human meaning is to remove any intrinsic value of nature (Hoffman 97). That is not to say that we should disregard the signs and significations of nature in medieval literature – Latour explicitly warns against placing too much emphasis on the intrinsic value of nature in his critique of deep ecology:

> Deep ecology is not an extreme form of political ecology; *it is not a form of political ecology at all*, since the hierarchy of beings to which it lays claim is entirely composed of those modern, smooth, risk-free stratified objects in

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[6] Previous examples from this dissertation alone include the transformative power of Fame's house and the nature of sound in Chaucer's *House of Fame* and the typological conversion of humans and vegetation in the *Bible Moralisée*.

successive gradations from the cosmos to microbes by way of Mother Earth,

human societies, moneys, and so on. The producers of disputed knowledge remain

completely invisible, as do the sources of uncertainty. (*Politics of Nature* 35)

While not completely akin to Latour's politicized analysis of nature, the medieval use of nature

as a sign in literature speaks to Latour's desire for objects of nature not to stand not only for

themselves but to also reflect influences of human culture. Representations of nature in *Piers

Plowman* must be considered in a number of contexts simultaneously; while the descriptions of

nature give modern readers some insight into the physicality of the medieval natural world, they

also provide us with tremendous insight into how medieval thinkers reconciled human

spirituality and the natural world.

The categories of nature and religion in medieval Europe were not subject to the same

exclusive and alienating distinctions and boundaries that Latour describes in the present day.

Nature was not a taboo topic for religious scholars; Christian leaders and scholars commonly

discussed the role of nature in the Bible and saw study of the natural world as a means to a gain

greater understanding of spirituality and God's works.[7] While the Church did not have complete

control over the scientific content of medieval texts, it is impossible to disregard the influence of

religious thought on the study of the natural world in the Middle Ages. Christian influences on

attitudes towards the natural world in the medieval literature emerge in four conceptual views,

identified by David Herlihy as eschatological, adversarial, collaborative, and recreational. The

eschatological view, preoccupied with concerns regarding the impending apocalypse in the third

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[7] The intersections between the Church and the study of nature are discussed in more detail in
Chapters 1 and 3.

through fifth centuries, was evident in an overriding sense of ecological pessimism concerned with overpopulation of a material world and limited resources (101-107). The adversarial view, found primarily in writings from the sixth through tenth centuries, was apparent in a fear of the wilderness where humans are incapable of coping with the mysterious forces of nature.[8] Later medieval approaches to nature, collaborative and recreational, coincided with the shifting approaches to knowledge and science in the late Middle Ages (primarily after twelfth century). Collaborative views of nature become apparent as nature was seen as tools or materials for artists to use while recreational approaches to nature emerge with the natural world (both real and imagined) becoming a place for spiritual and psychological renewal. *Piers Plowman* clearly participates in what Herlihy identifies as recreational approach to nature with Will's wandering throughout the poem, but it also demonstrates Langland's awareness of other medieval anxieties regarding representations of the natural world, including eschatological, adversarial, and collaborative views toward nature. Working and wandering in nature serves as the setting for spiritual and psychological growth for Will but his journey is not always an easy one and is filled with struggle.[9]

I would like to extend Herlihy's categorization of medieval attitudes toward nature and revisit the role of symbolism in nature from the previous chapter to consider the medieval paradigm of nature as a sign that was established by religious scholars. Richard C. Hoffmann explains the importance of this paradigm, noting that nature and things of nature were viewed as

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[8] Herlihy identifies *Beowulf* as the primary example of an adversarial view of nature where human society and nature and its beasts are in direct competition with one another (108-109).
[9] Nicolette Zeeman presents an extensive examination of the internal struggles in her chapter on "Seeing and suffering in nature" (157-200).

a series of counterpoints and symbols for humankind; to the medieval scholar "nature matters because it *means* something else" (97). Hoffman traces the roots of this scientific paradigm to Augustine's 426 work, *De Doctrina Christiana,* where Augustine argues that both history and nature are tools to be used to understand God's will. Augustine identifies elements of nature that are to be read as signs in scripture in his first book and distinguishes "thing" from "sign":

> All instruction is either about things or about signs; but things are learnt by means of signs. I now use the work "thing" in a strict sense, to signify that which is never employed as a sign of anything else: for example, wood, stone, cattle, and other things of that kind. Not, however, the wood which we read Moses cast into bitter waters to make them sweet, [Ex. 15.25] nor the stone which Jacob used as a pillow, [Gen. 28.11] nor the ram which Abraham offered up instead of his son; [Gen. 22.13] for these, though they are things, are also signs of other things. (203)

Augustine makes space for two simultaneous meanings for elements of the natural world. While objects such as wood, stones, and cattle may stand for exactly what they are, they have the potential to carry additional religious significance. Further, Augustine argues that nature has the potential to be read as words are in a book, where the letters and words themselves are symbols that stand for something else. This medieval practice for reading nature as a book, as modeled after methods of reading scripture,[10] provides some context for where it is permissible (and even necessary) to reconcile nature and religion. The religious preoccupation of *Piers Plowman* allows for any images of nature to stand not only for themselves but also as allegorical tools for

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[10] Further detail on the nature as book metaphor can be found in Chapter 1 and in the works of David C. Lindberg.

religious insight. As with the complexity of the poem itself, both the actual and allegorical

relationships between religion and nature throughout *Piers Plowman* are extremely complex and

unsettled.

Piers Plowman is a text that experienced a comparatively large readership in the late

Middle Ages, as indicated by over sixty manuscripts surviving.[11] Emerging in the volatile social

climate in England during the late 1300s, Langland's composition is marked by instability and

includes allegorical and moralized readings of scripture as they applied to contemporary political

events[12] and theological concerns.[13] Medieval Europe experienced a period of economic

advancements, increasing urbanization, and unprecedented population growth leading up to the

Black Death in 1348;[14] Langland's images throughout *Piers Plowman* clearly indicate a

preoccupation with the implications of such growth for the physical and moral survival of the

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[11] A.V.C. Schmidt offers a comprehensive discussion regarding the authorship, audience, and date of composition of *Piers Plowman* and offers some speculation as to the variations between the B and C texts in his introduction to the Everyman edition. Anna Baldwin also provides an extensive discussion of the historical work done by a number of scholars, dating the B-text to the period of 1360-86 (67).

[12] Just one example of a contemporary political concern is Langland's use of the rat's fable, which provides a commentary on the Good Parliament of 1376. Gwilym Dodd describes the role of the fable is described in detail in "A parliament full of rats? *Piers Plowman* and the Good Parliament of 1376."

[13] One of the most striking concerns of the period is that of the virtuous pagan, identified in the first inner dream of *Piers Plowman* with Trajan's description of his conversion. See Frank Grady's *Representing Righteous Heathens in Late Medieval England* for more on virtuous pagans.

[14] Increasing agricultural productivity resulted in a slow but steady improvement in the living conditions for medieval Europeans that continued for four centuries. Several accounts of this shift can be found in the literature but for a concise and comprehensive account of the process see Chapter Two, "The air of towns," of French and Cunnigham's *Before Science: The Invention of the Friar's Natural Philosophy*.

human population. As "a chronicler of social change" in the fourteenth century (Baldwin 68), Langland presents a complex and destabilized framework of social commentary, scriptural exegesis, and descriptions of shifting human relationships to the earth. In addition to the complex observations and imaginings of the natural world in the inner dreams, Langland frames the entire series of visions with juxtapositions of humans and nature. The poem begins with one of these stark juxtapositions when Langland introduces Will's vision of the "fair feeld full of folk" in a scene that satirically chronicles various sections of medieval society in the prologue. Langland ultimately closes the poem with an apocalyptic scene where the antichrist appears and "al the crop of truthe / torned it [tid] up-so-doun, and overtilte the roote" in Passus XX (53-54). These framing scenes allude to the vexed human reliance on (and spiritual ambivalence of) the natural world found throughout the remainder of the poem.

Of primary concern to the text is the concept of salvation by the grace of God. Although the imagery of salvation is often intimately linked to Piers's relationship to the earth and cultivation of vegetation throughout the poem, there is a distinct absence of physical description of the surroundings in much of *Piers Plowman*. Mary Clemente Davlin argues that "the 'locus of action' is not a physical location but rather a symbolic place like the heart or a generalized or abstract place like nature or the church, for it is usually 'moral space' rather than 'physical space' which [...] is characteristic of allegory and which interests Langland" (2). Rather than render the natural world irrelevant, this overall lack of physical and natural description serves to bring those moments of human-nature interaction into sharper focus. Davlin goes on to argue that these symbolic spaces become the locales for intense moral contemplation, where the sparse geographical descriptions of unidentifiable physical spaces serve to bring moral dilemmas to the

forefront. But these moral spaces are also significant because they enhance the abstract

portrayals of nature that are simultaneously allegorical and symbolic. The use of dream visions

enables Langland to render the physical world allegorical, particularly in those dream visions

that occur within other dream visions. The more Will withdraws from the physical world in his

layered dreams, the further Langland immerses his readers in an interpretive textual space where

allegory and moralization are as inescapable as meaning is unstable. For Langland,

contemplation of the natural world necessitates spiritual interpretation of scripture and vice

versa.

The fragmentation of *Piers Plowman* emerges from not only the episodic nature of

multiple dream visions but also the layering of dreams within dreams. Each passus presents a

series of loosely related events filled with personification and allegory, which are held together

by Will's moral quest to find Piers Plowman in his attempt to learn how to better the Christian

soul. With each inward turn into Will's dream landscape, Langland's use of allegory becomes

more complex and episodes become more fragmented; this complexity results in Will becoming

increasingly distanced from the reality of the physical world and gives Langland the imaginative

space to transcend narrative boundaries and fully explore networks of knowledge from different

spheres (namely, science and religion). Anne Middleton notes that this fragmentation of narrative

emphasizes the importance of meaning in form that is reflected in medieval art and iconography,

and the fragmentation of images within this dream is no exception.[15] These inner dreams present

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[15] Middleton provides and extensive description of the format of the entire poem in her essay, "Narration and the Invention of Experience: Episodic Form." While she argues that it is the episodic nature of the work as a whole that creates meaning in the text, I believe her theory applies nicely to each of the dream visions individually as well.

a microcosm of the fragmented and episodic form of Langland's work as a whole. Langland uses this fissured form to explore the two types of knowledge of primary interest to medieval readers: personal experience and history (exploration of the physical world) and contemplation (exploration of spirituality and consciousness), both of which would have been essential to a full comprehension of scripture. The remainder of this chapter identifies how meaningful interpretations of nature can be extracted from that fragmented form that depends so heavily on the interconnectedness of the physical and spiritual worlds. Interpretations of Langland's images from the natural world are amplified beyond the compounded meanings of his dream vision when Latour's fragmented conception of nature is also taken into consideration. What Langland presents is not merely a model for how the natural world could serve religion, but ways in which nature and religion necessarily depend on one another.

Langland presents the natural world most descriptively and enigmatically in the two inner dreams, dreams embedded in a series of framing dreams that also describe periodic interactions with the natural world. Langland begins the first vision (Passus I-IV), with Will witnessing the panorama of human experience in the "fair feeld full of folk" followed by the exploits of Meed. Will briefly wakes and then falls asleep for his second vision (Passus V-VII), where he first encounters Piers. Langland emphasizes the interconnection between the physical and spiritual worlds in Passus VI when Piers explains the need to plow half an acre of land before heading on the pilgrimage for Truth. Will wakes following an argument between Piers and a priest regarding the nature of pardons and proceeds to ask two friars to explain Dowel (do-well) to him before falling asleep and entering the third vision. In this third vision Thought offers an analysis of Dowel, Dobet, and Dobest before asking for assistance from Wit. Dame Study, Clergy, and

Scripture later step in to (unsuccessfully) explain Dowel, Dobet, and Dobest further. It is at this point, in Passus XI, that the dreamer falls asleep within the dream. It is in this inner-most space where Will is taken by Fortune and Kynde (nature) to witness the workings of the natural world.[16] Upon waking from this inner dream, Will encounters Imaginatif in Passus XII, who comments briefly on how the mysteries of nature are to remain as such – mysteries. At this point Will fully wakes from his dreams and wanders the earth for many years.

When Will falls asleep for his fourth vision (Passus XIII-XIV), he meets Haukyn and Patience to contemplate active life and poverty. This exploration of the role of spirituality in human society is followed by Passus XV, where Will's fifth vision presents Anima and the comparison the church to a tree. Interestingly, it is at this moment where the natural world becomes central to spiritual contemplation that Langland presents another dream within a dream. Passus XVI provides an allegorically rich vision of the tree of charity that is tended by Piers himself where the tree becomes a tool for Piers to relate scenes from scripture. When Will wakes from this inner dream he relies on Abraham and Moses for further spiritual guidance. The sixth vision follows with the events of the Passion and the Harrowing of Hell, at which point Will is woken by Easter Bells. Will then falls asleep in church for his seventh vision (Passus XIX), where Piers transforms into the wounded Christ. Piers proceeds to plow, sow, and harvest the spiritual fruits of the word of God. Upon the attack of Pride and his followers, Will wakes and wanders until he meets Need and falls asleep yet again (Passus XX). Will's eighth and final

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[16] Nicolette Zeeman comments on the similarities between *kynde* and *natura*, noting that both are refer to what is innate and "defined against notions of that which is 'given', 'learned' or 'acquired from outside" (160).

vision depicts an attack on Christians by a series of sins, ending with Conscience embarking on a
pilgrimage for Piers Plowman and calling for grace.

The first interaction between Will and the natural world comes in the Prologue, where
Langland presents the image of the field as a space that exists between a dark ominous valley
and a high tower in the sunlight:

> As I biheeld into the eest an heigh to the sonne,
>
> I seigh a tour on a toft trieliche ymaked,
>
> A dee`p dale bynethe, a dongeon therinne,
>
> With depe diches and derke and dredfulle of sighte.
>
> A fair feeld ful of folk fond I ther bitwene –
>
> Of alle manere of men, the meene and the riche,
>
> Werchynge and wandrynge as the world asketh. (13-19)

The location of the field between the light and the dark, good and evil, or heaven and hell
(Wittig, *Langland Revisited* 34), establishes it as the earthly realm; what is done to the field of
Will's dream represents that which should be done during Will's life on earth. Located between
realms of the spirit worlds, the earth also represents flesh and order of the physical world as it
extends beyond the individual spiritual contemplation. The field is at once agricultural and
social, functioning as a representation of a shared environment in which each individual plays a
specific role in the social ecosystem. Langland's field echoes Phillip Descola's identification of

domus in *Beyond Nature and Culture*,[17] where order and organization of a shared living

environment is one in which all humans, animals, and plants find conditions that enable them to

realize their true natures.[18] Though there is no description of any vegetation or ecological

components of the field, Langland is laying the foundation for the intricate networks between

humans and the natural world that are to follow. Descola's description of the *domus* mirrors

Langland's field as he demonstrates an interconnectedness of humans and nature where each

member has its own niche: "laboring in the fields, raising children, training animals, and dividing

up tasks and responsibilities all combined to set humans and nonhumans under the same

hierarchical regime of subordination" (49). Though nonhumans are notably absent at this point in

Piers Plowman, it might be argued that the field itself – complete with its human members –

represents the nonhuman component of the field ecosystem. Langland identifies the humans in

this field, notes that all levels of the social hierarchy are present, and claims that each one is

fulfilling their prescribed job such that the entire social organism can function efficiently.

Likewise, Langland's use of "world" is ambiguous and points to natural, religious, and social

order.[19] The field, then, presents natural order as vital not only to the earthly physical realm but

also to social order.

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[17] Descola's description of the *domus* relies on contrasting it with the term *silva*. According to Descola, Romance languages derive words like "savage" from *silva*, an uncultivated space that stands in opposition to domesticated life (48-51). *Domus*, then, represents cultivation and decorum in a structured society.

[18] "Nature" is a loaded term in this case, referring at once to each individual's proper place in the physical world and their innate behaviors.

[19] MED definitions of "world" include: "The physical or material world, the earth; the land comprising the physical world; the natural world and its creatures; the globe, orb, sphere, etc. of the earth; also in *fig.* context"; "the world as the object or focus of God's providence, God's creation; the world as the setting for the unfolding of God's plan, the achievement of man's

Although this field of workers is not necessarily one intended for agricultural use, the

first (and perhaps most important) laborers that Langland describes are plowmen: "Somme

putten hem to the plough, pleiden ful selde,/ In settynge and sowynge swonken ful harde,/ And

wonnen that thise wastours with glotonye destruyeth" (20-23). These workers embody the

intrinsic value of physical labor and are capable of saving society from the destruction caused by

waste and gluttony. The plowmen also represent individuals who are intimately in tune with the

natural world as "tillage was the alpha and omega of pre-modern agriculture" (Zadoks 64).

Plowing a field three times per year was typical practice and was done to both prepare the soil

for planting of crops and also to control the growth of weeds.[20] Though tedious, the work was

necessary to maximize crop yields by providing seeds with optimal growing conditions as well

as deterring the invasion of unwanted plant species. Allegorically, the plowman would then be

responsible for not only instilling spiritual purity at the start of life but also deterring interference

from malevolent forces throughout that lifetime. Medieval audiences would have also recognized

the plow as a symbol of the cross, thereby associating plowmen with Christ (Hill 115). Langland

later elaborates further on the value of plowmen in society later in his vision of the field. In his

overview of societal structure in the Prologue, Will links the work of plowmen to spiritual truth,

observing that "for profit of al the peple plowmen ordeyned/ To tilie and to travaille as trewe lif

asketh" (119-120). His use of the word "ordeyned" resonates in the secular sense with

preparation and the creation of order and in the religious sense of conferring holy orders (*OED*).

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salvation, etc.; worldes ende, the ende (endinge) of the ~, þissere worldes endinge, etc., the Last
Judgment, Judgment Day; the more ~, the earth as contrasted to man"; and "the kingdoms,

[20] Zadoks provides a detailed account of medieval crop management, including digging,
plowing, harrowing, fallowing, crop rot ations, sowing, and irrigation (63-71).

Langland also associates the plowmen with honesty in this passage as they till the earth and work

to live an honest life. Hard work becomes a means of access to a "trewe lif," one that leads to

spiritual salvation. The plowmen serve not only as the source of physical needs in society, but

also as a symbolic source of spiritual fulfillment. Indeed, plowing was a common metaphor for

preaching in medieval tradition whereby agricultural labor was equated with administering

Christian truth (Barney 267). With the earth functioning also as an allegorical figure for the

body, the plowmen's work enables Will to look inward by preparing his soul for the implantation

of the seed of Christian truth.

When Will asks the allegorical figure of Holy Church for an interpretation of the "fair

feeld ful of folk," Langland again addresses the implication that truth is located within both the

earth and the human soul. Like Will's soul, the field in the Prologue is not yet cultivated and is

full of superficial worldly concerns. Holy Church informs Will that the earth is important

because it holds the greatest treasure, truth: "Whan alle tresors arn tried, Truthe is the beste./

Lereth it th[u]s lewed men, for lettred it knoweth—/ That Treuthe is tresor the Trieste on erthe"

(I. 135-137). James Simpson notes that the word "truthe" has a wide range of meanings in

Middle English, including honest and sincere speech, an existential and theological concept of

what is real or actual, and a personal characteristic of faithfulness (18). Simpson argues that

Langland's use of the word "truthe" addresses all three of these definitions. Given the

multiplicity of meaning throughout the text, I would argue that Langland's use of "truthe" also

speaks to the religious concerns identified by Latour as a Modern psychological search for

"self," a process that requires transactions with beings of metamorphosis. According to Holy

Church, Will must seek Truthe through honest words, through actions that demonstrate his faith,

and through a personal understanding of theological truth. The plowman, as an allegorical preacher of the word of God and as an embodiment of the active life, provides the ideal model of each of these actions for Will to access Truthe.

Once Will realizes that he must find Truthe, he sets out on a pilgrimage and where he (eventually) encounters Piers, a plowman who claims to be well-acquainted with the allegorical figure of Truthe:

> 'I knowe hym as kyndely as clerc doth hise bokes.
>
> Conscience and Kynde Wit kenned me to his place
>
> And diden me suren hym [siththen] sikerly to serven hym for evere,
>
> Bothe to sowe and to sette the while I swynke myghte.
>
> I have ben his folwere al this fourty winter—
>
> Bothe ysowen his seed and suwed hise beestes,
>
> Withinne and withouten waited his profit. (V. 538-44)

Here Langland makes the connection between physical labor and the inward quest for truth more explicit as he intertwines images of physical and spiritual work with the phrase "withinne and withouten" (Barney 287). The comparison of the plowman to a clerk likens the earth to a book where the illiterate plowman, uneducated in Latin, becomes the figure of the learned clerk with intimate knowledge of the book of salvation. The plowman's cultivation of the earth becomes the scribal equivalent of engraving parchment; knowing the earth through physical labor in the field is the equivalent of knowing scripture through textual analysis of the book. The work that Piers has done in Truthe's field for forty years is based on three agricultural metaphors often used by the authors of scripture: the seed represents the word of God, the field represents the soul, and

cultivation represents the act of penance (Barney 264). Piers describes how he was led to this field by his own inner search, stating that "Conscience and Kynd Wit kenned [him] to his place." Like Piers, Will requires the guidance of Conscience and Kynd Wit in his quest for spiritual truth, which ultimately leads him to the field of truth in Passus XIX. This parallel suggests that Will and Piers are, in fact, on the same pilgrimage but at different stages. The "lettred" Piers is merely at a more advanced stage of the quest for spiritual salvation than "lewed" Will, and must therefore "lereth it" to Will. Will has yet to endure the transformation required in the discovery of "self."

This passage also points to the importance of the ambiguity of the term "kynde" throughout the poem. Kynd Wit first makes an appearance in the social stratification on display in the "fair feeld full of folk," where "for profit of al the peple plowmen ordeyned / To tilie and to travaille as trewe lif asketh" (Prologue 119-20). While this first appearance of Kynd Wit is more in line with a description of the established social networks, it also hints at the reliance of those social networks on human interactions with nature, namely social productivity vis-à-vis the plowmen and their work tilling the earth. But the multiple meanings of "kynde" also resonate further; the term refers to the inherent qualities of all humans, plants, and animals, including mental, spiritual, and physical attributes or wisdom.[21] Langland's use of "kynde" works alongside the current ambiguity of the term "natural" referring to either (or both) inherent qualities or elements of the environment existing outside human intervention.[22] In his discussion

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[21] In addition to the fifteen distinct uses of "kinde" listed in the *MED*, see also Mary Clemente Davlin's "Kynde Knowinge as a Major Theme in Piers Plowman B" and Britton J. Harwood's "Langland's 'Kynde Wit.'"

[22] No fewer than eighteen distinct uses of "natural" can be found in the *OED*.

on the duality of "kynde" knowledge as derived from both lived experience and the natural world, Alastair Bennett identifies Langland's use of "kynde" in opposition to "unkynde," where "the rise of a social ethic based on 'natural' forms of affinity and reciprocality generated a particularly intense concern with covetousness as a 'violat[ion]' of the 'natural order'" (29). For Langland, the "natural order" includes a social ethic that is dependent on salvation and charity, which are in turn dependent on a physical relationship with the earth.

While Langland's puns on "kynde" link nature to charity, his use of "unkynde" is linked to the sin of covetousness,[23] a sin that would have been particularly relevant to the increasing presence of wealth and material goods in the late Middle Ages. Langland demonstrates a keen interest in how natural impulses figure into spiritual salvation with his personifications of virtues and vices within Will's inner dream.[24] *Concupiscencia-Carnis* ("Lust of the Flesh"), "Coveytyse-of-Eyes," and "Pryde-of-Parfyte-Lyvynge" all appear to Will in the mirror of Middle Earth. The women are seductive, offering Will physical pleasure and appealing to vices such as pride and lust. These women distract Will as he laments, "Coveytyse-of-Eyes cam ofter in mynde / Than Do-Wel or Do-Bet amonge my dedes alle" (XI. 50-1). Covetousness, the sin identified by Bennett as "unkynde," blocks Will's access to "kynde knowynge." The relationship with Coveytyse-of-Eyes is a dangerous one, as Bennett notes: "'unkynde' covetousness not only turns people against their best natural instincts in *Piers Plowman*, it also obscures 'kynde'

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[23] Alastair Bennett provides a thorough discussion of Langland's use of "unkynde" as an example of sin in "Covetousness, 'Unkyndeness,' and the 'Blered' Eye in *Piers Plowman* and 'The Canon's Yoeman's Tale."

[24] This personification of the virtues and vices with regard to morality is found in other medieval sources, such as the personification of virtues and vices found in the *Bible Moralisée* (folio 10v roundels Cc).

knowledge and frustrates 'kynde' relationships" (30). Further, Bennett argues that covetousness

is marked by desires for wealth and physical knowledge such that it "produces forms of behavior

that are fundamentally opposed to charity."[25] Will's access to "kyndeness" is not restored until

Kynde himself steps in, calling Will by name and summoning him to observe the natural world.

It is at this point that Langland's use of "kynde" experiences a shift from the primarily

sociological connotation of the Prologue to a distinctly physical connotation that is concerned

first and foremost with the order of nature.

Kynde comes in the last moments of Will's first inner dream; Langland displaces

"kyndeness" with the sins at the beginning of the dream and must reintroduce it before Will

wakes:

> And slepynge I seigh al this; and sithen cam Kynde
>
> And nemped me by my name, and bad me nymen hede,
>
> And thorugh the wondres of this world wit for to take.
>
> And on a mountaigne that Myddlelerthe highte, as me tho thoughte,
>
> I was fet forth by ensaumples to knowe,
>
> Thorugh ech a creature, Kynde my creator to lovye. (XI. 320-25)

What follows is one of the most detailed descriptions of nature in the poem where Langland

provides a catalogue of birds carrying out their natural duties. In the lines that follow, Will

witnesses the eating, drinking, and reproduction of animals in nature. He is in awe of the birds'

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[25] Although Bennett's discussion draws a number of associations between "kyndeness" and
charity, his argument focuses on more on the relationship between "unkyndeness" and
covetousness. This link between "kyndeness" and charity is an interesting one that I explore in
greater detail when Will encounters the Tree of Charity in his second inner dream.

abilities to make nests and to fly to great heights. He mentions that his gaze wanders to the sea

and the stars and he longs to go into greater detail but cuts himself short saying that to describe it

all would take too long. Even in excusing himself from providing more observations, Will

manages to include some specific details of the natural world:

> And sithen I loked upon the see and so forth upon the sterres;
>
> Many selkouthes I seigh, ben noght to seye nouthe.
>
> I seigh floures in the fryth and hir faire colours,
>
> And how among the grene gras grewe so manye hewes,
>
> And some soure and some swete – selkouth me thoughte:
>
> Of hir kynde and of hir colour to carpe it were to longe. (XI. 363-67)

What Langland does in this scene is characterize the Latour's mode of Reproduction, both

literally and figuratively. Before Will excuses himself from going into greater detail, the

descriptions of nature focus intently on the mating practices of animals (particularly birds) or

"engendrynge of kynde" (XI. 335). Human participation in the natural world is not just excused

but entirely dismissed when Will compares human construction abilities with those of birds

building nests: "If any mason made a molde therto, much wonder it were" (XI. 349). Taking

place in "Myddelerthe," Will's brief catalogue of the natural world mirrors the catalogue of

human society found between the "tour on a toft trieliche" and the "deep dale bynethe" in the

Prologue (14-15). Though Langland maps human social structure onto the natural world by

comparing a mason to a bird building nests, he rejects the comparison by first concluding that

humans would be incapable of similar feats and then by failing to elaborate on the vision in

further detail. It is in the absence of detail that Langland recognizes the true creative force of

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Reproduction in the natural world. This creativity of the natural world is one that exists independent of human intervention; as Latour notes: "no snail, no earthworm, no virus, no acorn ever lived in the *res extensa*,[26] which is so necessary none the less for us to access their peculiar mode of existence."[27]

While the first inner dream of *Piers Plowman* represents Langland's initial strains to unite religion and nature, the the second inner dream represents a complete amalgamation of the two. Will's first inner dream succeeds in identifying the mode of Reproduction in nature and stops just short of fully amalgamating religious imagery with that of the natural world. While Will's observations of nature are sandwiched between two sets of theological musings in the first inner dream, religion and nature are fully interwoven in the second inner dream where he encounters Piers at the Tree of Charity. The location of the Tree is described to Will before he enters this inner dream:

> 'It groweth in a gardyn,' quod he, 'that God made hymselve;
>
> Amyddes mannes body the more is of that stokke.
>
> Herte highte the herber that it inne groweth,
>
> And *Liberum Arbitrium* hath the lond to ferme,
>
> Under Piers the Plowman to piken it and to weden it.' (XVI. 13-17)

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[26] *Res extensa* is one of the three substances characterized in Cartesian ontology by René Descartes. *Res extensa* refers to corporeal substances that extend in space and is contrasted with *res cogitans*, which refers to substances that are purely mental.
[27] Latour details the disjunction between experienced by naturalists once the process of evolution became the controlling force in biology in "Will non-humans be saved?"(468). With the understanding of evolution came the realization that the natural world had existed and always would independent from human analysis.

This description places the location of the Tree in God's garden, which can be found in the heart of man and is under the care of Piers Plowman. According to Simpson, this image of the Tree is a psychological one, one found in the inmost recesses of the soul that "suggests a much more intimate perception of the self" (186). This "intimate perception of the self" is what Latour identifies as the most uncomfortable space for Moderns in religious transformation; this is a space devoid of stable meaning where a character can "access her own interiority only by entering into transactions with the beings of metamorphosis that had formed her" (*Inquiry* Latour 301). Beyond the location, Will's vision of the Tree within his inner dream provides further allegorical significance: "thre piles" (XVI. 23), corresponding to the trinity, brace the tree; the "fruyt that so faire hangeth" (XVI. 66) symbolizing charity, chastity, as well as holy men; and Piers, representing both Adam and the cause of the Fall, signified later by his shaking the Tree and ultimately causing the fruit to die, as well as Christ, "as man that Christ the great Tree of Charity became incarnate" (Troyer 380). This inner dream serves to reinforce Piers's association with Christ through the metonymical relationship between the tree and the cross, where the *felix culpa* occurring in Paradise ends in redemption (Ladner 237). Further, this particular tree is not just any tree. This is the Tree of *Charity*, the virtue most closely associated with "kyndeness" via contradistinction to covetousness and sin in the first inner dream. The Tree of Charity functions also as the Tree of Kyndeness, embodying both the natural and spiritual worlds in the second inner dream.

The second inner dream, and particularly the episode surrounding the Tree, presents a set of images dense in meaning and has intrigued numerous critics. The Tree at once represents the Tree of Charity (as Haukyn and Piers explain) as well as the *lignum vitae* of Genesis and

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therefore also the *lignum crucis*. In addition to these typical interpretations, D. W. Robertson and B. F. Huppé hypothesize the Tree and its fruit function as allegorical representations of the just and tropological representations of the individual, as "the life of Christ on earth" and salvation (191-2). Ben Smith argues that the Tree, as a medieval symbol, would have additional associations with other trees, such as that of Jesse, of virtues, and the descent of mankind from Adam (59). David Aers, on the other hand, shuns these traditional allegorical models and relies solely on intertextual evidence to relate the Tree of Charity to Christ and introspection, as Anima suggests to Will in Passus XV in accordance to Augustine's view of the role of self-understanding (83). In the context of an inner dream and with the instability of meaning, laying claim to a single theory of interpretation of the tree would be folly. Many interpretations of the Tree have been based on ideas of traditional medieval symbolism in text and rely heavily on Langland's use of language and intertextuality. However, given the interconnectedness of religion and nature in this second dream, Latour's approach might be used to argue that for modern readers the Tree is also *just a tree*, existing in the natural world outside of human modes of Reference. The Tree is, was, and always will be a tree with its own creative forces of Reproduction that exist *res extensa*.

The dichotomy of the Tree's existence in both the physical and spiritual worlds is confounded throughout the remainder of the inner dream. When Will asks Piers about the poles surrounding the Tree, Piers explains that it is propped up by three posts representing the Trinity to protect the fruit from the physical world and the vices of the flesh, particularly "Coveitise" or covetousness that happened to distract Will for more than forty years in the first inner dream.

Although Piers carefully explains the significance of each prop, Will is remains primarily

interested in their physical source:

> Ac I have thoughtes a threve of thise thre piles –
>
> In what wode thei woxen, and where that thei growed,
>
> For alle are thei aliche longe, noon lasse than oother,
>
> And to my mynde, as me thynketh, on o more thei growed,
>
> And of o greetnesse and grene of greyn thei semen. (XVI. 55-59)

While Piers has just given elaborate allegorical explanations of the first two props as *Potentia*

Dei Partis, *Sapientia Dei Patris*, and the third prop lifted by *Liberum Arbitrium*,[28] Will is most

concerned with the physical makeup of the props. He asks what kind of wood they came from

and hypothesizes that they were fashioned from a single tree given that they are all of the same

size and hue. The scene effectively inverts the typical medieval approach to interpretation of the

Book of Nature, where religious significance is mapped onto observations of the natural world.

Given the religious significance first, Will is most concerned with the environmental sources of

the props and seeks to map the natural world onto the religious allegory. The inversion is a brief

one as Piers replies with some annoyance that he has already told Will what tree the props came

from: "the Trinite" (XVI. 64). Yet, knowing that the allegorical props came from a tree that is the

Trinity acts as yet another form of inversion. In *The Sacred Tree: Ancient and Medieval*

Manifestations, Carole M. Cusack notes that "the wood of sacred trees may be used to produce

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[28] Piers's depiction of the three piles is *Potentia Dei Patris* as "Power of God the Father,"
Sapientia Dei Patris as "Wisdom of God the Father, and *Liberum Arbitrium* as "Free Will."
Langland's use of *Liberum Arbitrium* emphasizes the pun on Will's name that runs through the
entirety of poem.

ritual objects" (8); Piers uses the props as ritual objects in systematic ways to ward off all that is wicked in the world. Though the props are allegorical, Will's inquiry into their physical source serves as a reminder that the allegorical world is dependent upon interpretation of the natural world. This movement back and forth between literal and allegorical meaning of the natural world occurs quickly and constantly throughout the remainder of the scene.

Next, Will asks Piers to pull an apple off of the Tree so that he might taste it, initially drawing obvious comparisons to Adam and the Tree of Knowledge. The result, however, deviates from what might be expected. Piers shakes the Tree only to have the transformative fruit fall into the waiting arms of the devil:

> For evere as thei dropped adoun the devel was redy,
>
> And gadrede hem alle togideres, bothe grete and smale –
>
> Adam and Abraham and Ysaye the prophete,
>
> Sampson and Samuel, and Seint Johan the Baptist;
>
> Bar hem forth boldely – nobody hym lette –
>
> And made of holy men his hoord *in Limbo Inferni*,
>
> There is derknesse and drede and the devel maister. (79-85)

In a fit of rage, Piers uses one of the posts to beat the devil and "go robbe that Raggeman and reve the fruit fro hym" (89). From there Will witnesses a historical sequence of the life of Christ, where the fruit come to represent the souls of all mankind in Gabriel's prophecy to Mary: "Jhesus juste therefore bi juggement of armes / Whether shulde fonde the fruit, the Fende of

hymselve" (95-6). Will then witnesses the crucifixion of Christ and a second battle with the devil before he wakes and returns to the outer dream:

> On a Thoresday in thesternesse thus was he taken –
>
> Thorw Judas and Jewes Jhesus was [y-nome]
>
> That on the Fryday folwynge, for mankynde sake,
>
> Justed in Jerusalem, a joye to us alle.
>
> On Crosse upon Calvarye Cryst toke the bataille
>
> Ayeines Deth and the Devel; detruyed her brotheres myghts,
>
> Deyde and Deth fordid, and daye of nyghte made. (160-66)

Beginning with the *lignum vitae* and ending with the *lignum crucis*, this final image of the cross creates a frame for the inner dream as Will (and the reader) is undoubtedly reminded of the Tree of Charity from the beginning of the inner dream.

The dream vision provides an ideal framework to fully integrate nature and religion in ways that Latour characterizes. The transformative power of dreams grants a freedom from the constraints of science in the Reference mode of nature. It is in the dream vision that the Reproduction mode of nature and religion can truly coexist as they move back and forth allegorically into one another. Langland's transformative use of allegory in these scenes is quite visually literal in terms of his use of imagery – Will initially sees fruit on the tree, which then morph into righteous pagan figures once the devil claims them. The fruit do not merely *represent* the righteous pagans, they actually *transform* into the righteous pagans before Will's eyes. When

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Piers later reclaims the early Church fathers from the arms of the devil, they are once again in the form of fruit:

> And Piers, for pure tene, that a pil he laughter,
>
> And hitte after hym, happe how it myghte,
>
> *Filius* by the Faderes wille and frenesse of *Spiritus Sancti*,
>
> To go robe that rageman and reve the fruyt fro hym. (XVI. 86-89)

The process might be likened to that of transmutation, "the transfiguration and mutation of one plant into another" as characterized by Piero Crescentio, who borrowed the material from Albertus Magnus.[29] Zadoks provides an account of how transmutation is recorded in medieval agriculture manuals:

> One 'mutation' refers to the succession following the cutting of oak forest. Less noble trees appear, and sometimes mushrooms, grasses, and so on. A second 'mutation' refers to the change of wild plants into cultivated plants and vice versa. Wild trees have more fruits than cultivated trees but the fruits are smaller and less tasty, and cultivated trees have fewer but sweeter and larger fruits. In a third 'mutation', wheat changes into rye and, sometimes, rye into wheat; the main reason being the cultivation method, and the location. --- Of course, none of these effects are 'mutation' in the modern genetic sense. (56-7)

Transformation of the fruit in Will's inner dream, then, might be also be considered fully within the realm of nature (in both the Reproduction and Reference modes) as well as religion such that

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[29] Zadoks quotes Crescentio's *De agricultura* Book V, Chapter VII, § 54ff (56).

the two are indistinguishable from one another. Perhaps the most poignant form of mutation in the case of *Piers Plowman* is that of the changes that occur when wild plants are cultivated. Under the care of Piers, fruit from the Tree of Charity are naturally the larger and sweeter righteous pagans who are worthy of rescue from hell.

Throughout these inner dreams we have seen processes that blur the distinction between human and nonhuman to create hybrids that represent nature and spirituality simultaneously. The transformative properties of the second inner dream in particular are reminiscent of Aboriginal Dreamtime. This animist framework creates a space that defies the typical categorizations of spirituality and the natural world.[30] The collapse of time and subsequent blending of human with vegetation in Will's second inner dream echoes the description of Dreamtime provided by Descola:

> Dreamtime is thus neither a remembered past nor a retroactive present. Rather, it is an expression of the eternity that is confirmed in space, an invisible framework for the cosmos that guarantees the permanence of its ontological subdivisions. (147)

It is in this timeless dream space that "the identity of the human individual is often sunk in that of the animal or plant from which he is supposed to have originated" (Descola quotes Spencer and Gillen, 147). The human figures that were typologically related to grapes in the *Bible Moralisée* become even more indistinguishable from the fruits of the Tree of Charity in *Piers*

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[30] For more on Aboriginal Dreamtime, see Robert Lawlor's *Voices of the First Day* and Hans Peter Duerr's *Dreamtime: Concerning the Boundary Between Wilderness and Civilization*. The connection between Australian Aboriginal Dreamtime and medieval dream poetry is certainly worthy of further study but is, unfortunately, beyond the scope of this dissertation.

Plowman. As in Aboriginal Dreamtime, the innermost dream space of *Piers Plowman* completely destroys any distinction between nature and culture:

> But that mixed identity itself combines behavioral features, ritual instruments and objects, taxonomies at once sociological and biological, names and stories, and sites and journeys. All are elements that it would be hard to distribute to one side or the other of an imaginary line drawn between nature and culture. (Descola 147-148)

Thus, Latour's hopes might be realized as religion and nature become free to fully inhabit the same space within the realm of dreams.

The images of cultivation intensify further as the boundary between nature and religion grows increasingly thin in the final apocalyptic scenes of Will's dream visions. Grace, the personification of salvation through Christ, announces that Piers will be his procurator and reeve as well as his purveyor and plowman:

> For I make Piers the Plowman my procurator and my reve,
>
> And registrer to receyve *Redde quod debes*.
>
> My prowor and my plowman Piers shal ben on erthe,
>
> And for to tilie truthe a teeme shal he have. (XIX. 260-63)

The figure of Piers comes full circle in this passage when he must once again physically "tilie truthe." However, rather than working for Truthe as he did on the half-acre of Passus VI, Piers now works on behalf of Grace. He proceeds to work towards spiritual salvation by sowing the seeds of the four cardinal virtues with the assistance of the oxen of the four gospels, followed by

harrowing the field with the Old and New Testaments. The scene is rich in imagery borrowed from the natural world as Langland makes use of the cultivation metaphor that harkens back to the imagery used with the Tree of Charity. In it, we see Piers sow the seeds of virtue "in mannes soule" (XIX. 278) where they might grow fruitfully as the Tree of Charity did in the "herte" (XVI. 15). The resulting crops are simultaneously representative of virtues and grain:

> Thise foure sedes Piers sew, and siththe he dide hem harewe
>
> With Olde Lawe and Newe Lawe, that love myghte wexe
>
> Among thise foure vertues, and vices destruye.
>
> For comunliche in contrees commokes and wedes
>
> Foulen the fruyt in the feld ther thei growen togideres;
>
> And so doon vices vertues (XIX. 312-317)

Again, Langland uses practical agricultural knowledge as a metaphor for religious processes; he states that vices must be destroyed so that virtues might thrive, just as grasses and weeds must be held at bay so that they do not overtake the intended crops. Though "fruyt" in this case likely refers to grain, the word resonates heavily with the fruit that fell from the Tree of Charity in the second inner dream.

The image of vegetation makes one final appearance just after Will falls asleep again in the final Passus, though at this point it is all uprooted and destroyed by Antichrist, only to be replaced by guile:

> anoon I fil aslepe,
>
> And mette ful merveillously that in mannes forme

Anticrist cam thane, and al the crop of truthe

Torned it [tid] up-so-doun, and overtilte the roote,

And made fals sprynge and sprede and sprede mennes nedes.

In ech a contree ther he cam kutte awey truthe,

And gerte gile growe there as he a god weere. (XX. 51-57)

The situation is exactly what Piers warned against in the previous passus – without vigilance and careful cultivation, vegetation is prone to transmutation. And just as the natural world deteriorates, so too does the imagery itself. It is unclear whether the vegetation being destroyed is the branches and roots of trees or crops being upturned. Will only perceives truth being cut away and replaced by the overpowering weedy growth of guile. As chaos ensues in this final vision, images of the natural world completely disappear. Without the physical support of nature, religion ceases to provide the spiritual nourishment required for salvation.

In conclusion, I would like to address to Latour's assertion regarding the distance between nature and religion: "when nature enters, religion has to leave. And when it leaves, it leaves for good because it only has two equally fatal exit strategies: one is to limit itself to the inner sanctum of the soul; the other is to flee into the supernatural" ("Will nonhumans be saved" 465). *Piers Plowman* demonstrates that religion and nature need not always be mutually exclusive. Using Latour's differentiation between Reproduction and Reference in nature, we have traced how the creative forces of Reproduction in nature become indispensable to religion for Langland. Rather than fleeing from nature, it is, in fact, possible for religion and nature to inhabit the same space. As representations of "the inner sanctum of the soul," Will's inner

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dreams demonstrate how nature and religion do not just coexist but become completely

interdependent. Using the imaginative space of dreams to envisage the relationship between

nature and religion, Langland dismantles the boundaries between the two completely and

establishes a symbiotic relationship between Reproduction and religion.

Chapter 5

Conclusion: A Brief Discussion of Hutchinson's Medieval Ecological Imagination

I would like to return briefly to the work of G. Evelyn Hutchinson, father of ecology, whose careful observations of the natural world led him to conclude that the imagination is most excited by "familiar things" which could be "taken apart, reconstructed and redesigned" in the mind. I would like to hold Hutchinson up as a model for the creative potential of literature that is all too frequently disregarded in modern science. Between his more strictly scientific observations[1] of Goa and India, Hutchinson applies his gift for attention to detail that serves him so well in science to cultural and religious settings. He begins an account of his research in India and Tibet with his claims on the roles of imagination in discovery followed by an example of the processes at work as he sits in a café:

> Sit in a café in Paris and look at the reflections of familiar objects from which
>
> whole new worlds can be constructed. The mirrors on the walls return a simple,
>
> left-handed version of the right-handed world. From the shiny surfaces of the

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[1] By "strictly scientific observations," I mean those that are in accordance with the modern paradigms of scientific knowledge and established methods of writing in contemporary scientific literature. Hutchinson consistently pushes the boundaries of modern science in terms of both subject matter and use of language.

cylinders of the coffee engines a silver vertical world emerges, balanced by a

horizontal world in gold on the brass rails of the bar. Along the beveled edges of

the window panes small transverse sections of passers-by run ahead or lag behind

their possessors; while a final decomposition of the scene is achieved in the

glasses and bottles on the shelves at the side, so that the world of appearances

now consists of nothing but fragmentary spots of light. With these things the

imagination may play undisturbed until it is shocked away from thought to

perception by some unwonted thing. (*Clear Mirror* 4)

The ecologist's analysis of a cultural space demonstrates the types of deconstruction, translation,

and movement that occur with natural spaces in medieval literature. Like Chaucer's work,

Hutchinson's cultural analysis is infused with the methodological observations and language

borrowed from the sciences. The "transverse sections," "final decomposition," and restructuring

of the physical environment echo the language in Chaucer's *House of Fame*, the juxtaposed

images of the *Bible Moralisée*, and the imaginative dreamscape found in *Piers Plowman*. For

Hutchinson, it is the reexamination of familiar objects as they are disassembled and reassembled

in the mind is precisely the purpose of imagination. As Hutchinson proves, this restructuring of

the world is by no means limited to the sciences or the humanities. In fact, it is through this

restructuring that writers, both literary and scientific, use language and images to communicate

extremely complex concepts to the widest audiences possible. By creating a space where the

humanities and sciences can overlap, writers and artists gain access to new levels of meaning and

communication.

On the overlap between human culture and the natural world, Hutchinson observes that there are moments when the two are indistinguishable. During his time exploring the lakes in the deserts of India, he notes that there are moments when what is man-made and what has been created by nature seemingly blend into one:

> Seen through the rain-bearing air, the bright details of the landscape disappear; only the boundaries between water and air and earth remain, and they become suddenly sharpened. The fountains and trees of the gardens of the Moslem emperors cease to be distinguishable from all the other water and vegetation of the earth. Man is now represented, in this sharp and simplified landscape, only by great patches of vermillion paint which glow on a distant hillside, floating between the green of the swamp and the black of the rain clouds. (*Clear Mirror* 101-102)

The rain creates a paradoxical and simultaneous blurring and sharpening of vision in the scene, where the details of the landscape disappear yet the distinction between earth, air, and waters becomes stronger. The only evidence of human presence is the glowing patches of vermillion paint, presumably used on buildings or fences that dot the hillside. Even the man-made structures lose their connection to human culture and enter the realm of the natural world when Hutchinson describes them as "floating" between the swamp and the clouds. His use of color as his main descriptors suggests that if not for the vermillion paint, even the buildings would blend into their surroundings to render any human presence completely invisible. Hutchinson's shift in focus reduces the details of the landscape into one of three categories – water, air, and earth – to simplify the scene as much as possible. Fountains and landscaped gardens simply blend into the

earth and water to become meaningless in terms of evidence of human presence on the landscape. The elements of nature that have been altered by human intervention have been restored to their former states, effectively erasing evidence of human creativity.

This reduction of human creativity to elemental components of nature is one we have seen before. Chaucer's reduction of all sound to "air y-broken" in his *House of Fame* functions in a similar fashion, where any human action that mimics what is already found in nature has the potential to become completely lost in nature. While the man-made fountains and gardens are reduced to the elemental components of their surroundings for Hutchinson, the human voices on earth are reduced to the same wave theories that apply to light. In both cases, evidence of human activity has the potential to be engulfed by the natural world. When nature and culture collide in these instances, nature emerges victorious. Yet by recording the presence of the fountains and man-made gardens, Hutchinson grants them eternal presence in the form of immutable mobiles. We have also seen that Chaucer's use of immutable mobiles creates a space for human culture in the natural world. Both Chaucer and Hutchinson make use of Latour's immutable mobiles to create an optical consistency by rendering all observations two-dimensional on pages that are capable of displacing cities and landscapes alike. Just as the evidence of human creativity is etched into the icy walls of Fame's house in Chaucer's writing, so, too, is evidence of human creativity painted into the landscape of Goa as described by Hutchinson. These flattened inscriptions allow for a movement back and forth between nature and culture (or fiction) that has proven to be a productive means of bridging the gap between science and the humanities.

In addition to the relationship between nature and culture in medieval literature, this dissertation also addressed the relationship between nature and religion. On the intimacy of

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religion and nature, Hutchinson is inspired in Goa as he wanders among the many churches that litter the landscape. His scientific observations reveal a keen interest in the power of language and the significance of religious miracles:

> To-day the church is deserted, but once a year the miraculous crucifix has power to fill it, though the nuns have gone and their garden in the cloister court is no longer fruitful. But, under the quiet shades of lemon and orange trees, in groves of papaya, banana and mango, from the fruits of which the inmates of the convent prepared once celebrated preserves, not only crucifixes were miraculous, for a dying nun, Sister Maria de Jesus, herself displayed the bleeding stigmata of the cross. (*Clear Mirror* 21-22)

Hutchinson draws a parallel between the church and the garden of the cloister, juxtaposing the religious significance of the church itself with that of the fruit trees. His comment on how deserted the church is creates a fitting pun on his use of the word "fruitful." Both the garden and the church fail to be fruitful in Hutchinson's present day, the church fails to bring in worshippers while the garden fails to be fruitful quite literally. There was a time, however, when both the church and the garden were incredibly fruitful. Hutchinson sets up a scene that would not be out of place in the *Bible Moralisée*, one where clear parallels are drawn between religious miracles and the creative power of nature. The abundance of fruit and the bleeding stigmata become inseparable from each other; both the spiritual and natural worlds are completely in sync in terms of productivity. To further emphasize the interconnectedness of the physical and spiritual worlds, it is not entirely clear whether the trees stopped producing fruit or the church lost its significance

first. This connection between religion and nature is one that is also apparent in the *Bible Moralisée.*

Hutchinson's observations in the churchyard in Goa are reminiscent of the allegorical and typological transformations of grapes throughout the *Bible Moralisée*. Typological and allegorical representations of the fruit and Biblical figures such as Noah and Jesus demonstrate a direct correlation between spiritual and natural productivity in the *Bible Moralisée* that seems to be echoed in Hutchinson's description of the church garden in Goa. Throughout the *Bible Moralisée*, images of gardens and vineyards are simultaneously representative of not only the Old and New Testaments but also the natural and spiritual worlds. These images of gardens and fruits function as representatives of both physical survival and spiritual salvation. Such images found in the *Bible Moralisée* serve as prime examples of "intermediaries, mediators of all shapes and forms" that Latour claims are "the only way to access God, Nature, Truth, and Science" (*Modern Cult* 68). Latour's amalgamation of religion, nature, and science is apparent in both Hutchinson's work as well as the images of the *Bible Moralisée*, though the *Bible Moralisée* demonstrates an acute apprehension of separating the three elements. The transformation of human forms into fruit and the portrayal of science in the *Bible Moralisée* do not celebrate the role of human intervention in the natural world; rather, it is the lack of human intervention in the process of transformation that the *Bible Moralisée* seems to be most interested in. This shared disdain for evidence of the human intervention opens a space for religion and nature to coexist, according to Latour. By eliminating the errors of human intervention, nature and religion are both capable of providing access to ultimate truths. By establishing God as the primary scientist in the manuscript, particularly in the frontispiece and the opening folios depicting Genesis, the

Bible Moralisée establishes a firm connection between science, nature, and miracles that mirrors what Hutchinson observes in the garden in Goa.

As an ecologist, Hutchinson's interest in gardens is inevitable. Hutchinson compresses a description of a large valley into that of a small garden as he creates an imagined microcosm of the vast ecosystem before him. When confronted with the mountains of India and reflecting on the events of the day at sunset, Hutchinson seems to enter a dream-like state where he allows the landscape before his eyes to transform in his imagination:

> Thus, as that day is imagined, the scenes of tasting, seeing, touching, hearing, smelling and apotheosis, transfer themselves from the tapestries to the dark storm-swept valley, transforming it into a garden on a summer afternoon, the mountains closing round to become sun-baked, fruit-laden walls, within which sit the Unicorn and the Lady.
>
> > "*Je la regarday une pose*
> >
> > *Elle estoit blanche comme let*
> >
> > *Et doulce comme ung aignelet*
> >
> > *Vermeilette comme une rose.*"[2]
>
> The mythology and the drama of senses fade, remaining in the memory like the end of a dream. (*Clear Mirror* 138-139)

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[2] Loosely translated from the erroneous French:
  "I saw her in that instant
   She was as white as milk
   And soft as a lamb
   Bright red like a rose."

Hutchinson quotes from *L'amour de moi*, a fifteenth-century love song that describes a (fruitful) garden housing a beautiful woman and/or a nightingale. His choice of song reflects his interest in the *hortus conclusus*, or enclosed garden, a symbol that held a tremendous amount of allegorical significance in medieval art. The enclosed garden is at once representative of the Garden of Eden and an imaginative dream space where a young girl and antelope, observed in a more objective tone earlier in the text,[3] are transformed into "the Unicorn and the Lady."[4] All physical interactions with the natural world throughout the day that have been taken in through the senses are transferred – or translated, to borrow Latour's terminology – to the mind where fantasy and reality mix. The transformations that occur in the passage are multi-layered. First, the original scene of the Indian valley evokes memories of a tapestry that Hutchinson had seen earlier and "reconstructs itself in the mind as a series of scenes" (*Clear Mirror* 135). The scene of the girl and the antelope in the valley transforms into that of the tapestry with a woman and unicorn, establishing a valley-tapestry hybrid that effectively melds the natural world with the process of human creativity. The hybrid image of nature and mythology, in turn, reminds Hutchinson of the

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[3] Before describing the dream-like trance, Hutchinson had observed a man and a young girl as they emerge from their camp to cross a stream and enter a valley where a group of *Pantholops* (Tibetan antelope) is feeding. The man leaves the girl, who remains seated and watches the animals. Hutchinson's unicorn and lady seem to refer to this particular image that he describes: "hitherto [the antelope] have looked at the girl only to keep at a safe distance while feeding; now a magnificent buck, well fed and having satisfied the delight of his palate, lets his eyes turn to the girl and take pleasure in her. He wanders from the rest of the beasts, hesitantly moving towards the girl […] He walks on further, stops again, turns, hesitates for a moment, and then bolts straight to her and sticks his nose into the rough wool of the dress that covers her lap. A small cloud drifts across the sun. The girl gasps, recovers her self-possession, and starts feeling the soft wet nose of the antelope" (*Clear Mirror* 136-137).

[4] Hutchinson notes that in regions of Tibet where the antelope are rare, the antelope is frequently confused with the unicorn in drawings as an antelope appears to have only one horn in profile. Even in areas where the antelope are common it shares some of the mythology of the unicorn found in oriental medieval mythology and *Physiologus*, where an antelope that is delighted by the sight of a virgin will place its nose in her lap (*Clear Mirror* 135).

medieval love song, adding a historical component to the hybrid. The layered transformative

properties of nature and the stream of consciousness described by Hutchinson are strikingly

similar to the layered transformations and associations found in the inner dreams of *Piers*

Plowman.

Like Hutchinson's valley-garden, Langland's inner dreams defy conventional scientific

descriptions of the natural world. While Hutchinson explicitly begins with external observations

that he then transposes onto the imagination, Langland's incorporation of the natural world

seems to emerge only from the most interior of spaces, in Will's dreams within dreams. Though

their starting points vary drastically, both Hutchinson and Langland rely on the fluidity of

dreaming along with the transformative and Reproductive properties of nature to explore the

connection between the physical and spiritual worlds. It is in this imaginative dreamspace that

interior and exterior converge and Reproduction applies to both nature and spirituality in *Piers*

Plowman. Although cultivated vegetation takes on different forms in *Piers Plowman*, namely the

half-acre followed by Piers's care of the Tree of Charity, Langland's use of the dream functions

similarly to Hutchinson's. It is in perhaps one of the most enigmatic scenes, where the fruit on

the Tree of Charity transform into pagan figures and back into fruit, that Langland makes the

same connection that Hutchinson does in the garden in Goa with his metaphorical representation

of spirituality as fruit. The natural world and Biblical mythology intertwine on a number of

levels in the inner dream. First, the tree itself represents both the natural world and a number of

cultural references that would have been familiar to the medieval imagination: the Tree of

Knowledge, the Tree of Virtues, the tree of Adam's descendants, and the cross of Christ.[5]

Further, the subsequent fusion of medieval Christian mythology with natural processes when the

fruit falls from the tree relies on the creation of hybrids and mental associations found in

Hutchinson's work. The complexity of the scene speaks to the multifaceted interconnections

between science, nature, and religion in *Piers Plowman.*

Care for and study of the natural world have emerged in each of these texts as being

intimately connected with human culture. The overlap between the sciences and the humanities

that results from these connections has the potential to create images that borrow simultaneously

from the natural world and human culture. In the concluding pages of his account of observations

made in Indian Tibet, Hutchinson returns to his initial claim that "the imagination is most

accurately excited by familiar things" (*Clear Mirror* 3):

> The imagination is most accurately stimulated by familiar things. As the sun beats
>
> down between the dry cliffs of the Indus, where the fishes so curiously proclaim
>
> the history of the river, a horse slowly swings along a rocky path, and the mind
>
> floats like a boat borne from the mountains on the glitter of the river, through a
>
> world of light, and so carries the now familiar memories of all that has been seen,
>
> as its cargo […] These memories and these images are borne down on the
>
> glittering water from lakes and mountains, worlds of form replacing ill-spelt

---

[5] Hanne Bewernick identifies each of these trees in an examination of how memory functions in recreating and restructuring images in the imagination. Her argument states that much of the meaning in *Piers Plowman* is lost on modern readers because we no longer hold each of those trees in our memories the same way medieval readers would have (81). I would go further to argue that it is not only the absence of material stored in our memories but also a disregard for imaginative transformation inherently found in modern science that contributes to the difficulty of *Piers Plowman* for the modern reader.

names on a map; all this is carried down the river to be recreated in written words and speech and pictures, so that from these places, for a brief time in this life, the spirit may be made flesh. (*Clear Mirror* 152-153)

Again, there is a striking combination of observations of the natural world with elements of human culture that points to the value Hutchinson seems to place on the creative role of language and literature in ecology. The anthropomorphized fish that "proclaim the history of the river" and the mind that "floats like a boat borne from the mountains" so explicitly combine the creative forces of human culture with those of the natural environment that it is virtually impossible to separate the two. Memory and the imagination exist in a cyclical, reciprocal relationship with the natural world, where the "worlds of form" emerge from the place names on the map which were initially recorded as flattened inscriptions of those physical worlds. Hutchinson elaborates on the process of scientific observation of the natural world, noting that the memories of images of physical forms endure a period of transition and translation as they move "down the river" (via the imagination) to be not just recorded but *recreated* as "written words and speech and pictures." Hutchinson's use of the word "recreated" suggests a creative power of the human mind that mirrors the creative forces of nature but must first be inspired by those elements of nature through observation. Unlike the conventions of modern science that restrict observation to flattened inscriptions and immutable mobiles, Hutchinson's exploration of the natural world transports those flattened inscriptions to the imagination.

This dissertation has explored some of the ways that the medieval ecological imagination functions when we move beyond the formal boundaries of modern scientific paradigms. The permeability of subject matter in medieval literature demonstrates how literary rhetoric can be

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used to not only transmit scientific knowledge through images and metaphors, but also borrow from images and metaphors of science to create additional layers of literary meaning. While Latour's theories provide solid analytical models for the examination of scientific literature, his analysis is largely one-sided in that he approaches culture through the lens of science but rarely examines science through the lens of literature as it exists outside the field of science. The works of Chaucer, Langland, and the creators of the *Bible Moralisée* have demonstrated some of the ways that ecological models can function outside the paradigms of science. By applying Latour's modes of analysis to literary texts, the traditional binaries of sciences-humanities, physical-spiritual, and nature-culture have the potential to disappear and open texts up to imaginative spaces that transcend categorization. And while medieval literature proves to be an especially hospitable environment for such imaginative movement between categories, more modern scientists such as Hutchinson demonstrate that the very same environment can exist in scientific literature. Hutchinson taps into the interstitial space that we've seen emerge in the scientific explorations in *The House of Fame*, the *Bible Moralisée*, and *Piers Plowman*. By reading modern science more than rhetorically, we invite the sciences to participate in the creativity of imagination that have seemingly become restricted to the humanities. This imaginative space is rich in pedagogical potential; scientific concepts can transcend the boundaries of scientific literature to reach audiences outside of the sciences. In turn, by reading medieval rhetoric more scientifically, we open the literature to new layers of meaning. Rather than becoming restricted by the ever-increasing boundaries placed on paradigms of knowledge in modern academia, it is my hope that we can continue to make use of openly reciprocal methods of interpretation of literature in both the humanities and the sciences.

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