

Losing Touch with Nature

*Literature and the New Science in
Sixteenth-Century England*

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Introduction

In recent years, to fill in the areas of history neglected by New Historicism, a number of scholars have turned their attention to the relationship between the scientific revolution and the literary and cultural artifacts of the late sixteenth and early seventeenth centuries. Building on new developments in the history of science—especially the work of scholars like Steven Shapin, Simon Schaffer, Peter Dear, Katharine Park, Lorraine Daston, Barbara Shapiro, and Richard Westfall, who delineate the social and cultural embeddedness of scientific discovery in the period—this valuable, ground-breaking scholarship has greatly enlarged our view of the formative influence of humanist habits of thought on the development of the new science and of the contributions of literary and theatrical forms to new epistemologies and new structures of knowledge.¹ Literary scholars have also been influenced by historians of science who have newly emphasized the contributions of artisans and practitioners, rather than university-trained philosophers, to the development of the new science, and they have convincingly shown how literary “makers” participated in the construction of new forms of knowledge.² This literary scholarship has tended to look forward to the seventeenth century, to empirical methods and new ideas, and it has seen signs of these nascent in sixteenth and early seventeenth century literature.³

Historians of science are aware of the dangers of taking an overly teleological view of their subject—of writing “Whig history”—and acknowledge that they are often tempted to look for signs of progress, of movement toward new ideas, of “getting it right.” In doing so they blind themselves to the wrong ideas and lingering beliefs that, paradoxically, ended up providing a way forward toward scientific revolution.⁴ As much as they acknowledge this methodological problem and consciously avoid it, the fact remains that as historians of *science*, their project is ulti-

Aristotelian Naturalism and Its Discontents

My goal in this chapter is to determine the range of things that ordinary educated people in sixteenth-century England understood about the natural world and to trace the evolution of their thinking as radically new ideas, such as the heliocentric universe, the use of Hindu-Arabic numerals, the location of the supernova of 1572, and atomic theories of matter began to become known there. By "ordinary" and "educated," I mean literate people with a school or university education who had no particular expertise in mathematics or natural philosophy, people like the writers—Spenser, Shakespeare, and Donne—whose relation to changing ideas about the natural world are the subject of this study.¹ The orthodox answer to this question would be that their understanding of nature was mostly based on Aristotle, that it came from books and not from observation of nature itself, that it included an indiscriminate mix of actual material phenomena and superstitious magic, and that it was maintained only because the authority of ancient writers—preeminently Aristotle—could not be questioned. This understanding of nature was, as the story goes, quickly done away with once people (in the seventeenth century) turned away from reliance on the authority of books and began an empirical study of nature itself. It is also usually assumed that people in sixteenth-century England were largely ignorant of new ideas introduced by continental figures like Copernicus and Johannes Kepler. All of these ideas are actually at least partly wrong.²

In the first place, what it means to describe a body of knowledge as Aristotelian is such a complex issue that we should always imagine the term "Aristotle" as having invisible scare quotes around it.³ First, we must sort out what constituted "Aristotelianisms" in sixteenth-century England and determine what aspects of that body of knowledge were basic and widely accepted. Second, the role of ob-

Losing Touch with Nature

In chapter 2, I cited treatises published in the vernacular and in Latin, written for the most part by experts with specialized knowledge of mathematics, astronomy, and/or medicine and often designed to convey up-to-date knowledge about nature to a wider public. All these books demonstrate a concern with the relationship between sensible daily experience—the intuitive view of nature codified in popular Aristotelianism—and the increasingly counterintuitive theories emerging from the continent or from experience of nature itself. These treatises reveal four distinct stages in the evolution of attitudes toward the intelligibility of nature. Early works (written before the 1540s) are for the most part confident that ordinary experience of nature—aided, perhaps, by some instruction and the use of specialized instruments—enables access to truth. Nature reveals its causes on the surface. As the century progressed, writers became less confident about the reliability of the senses and more aware that ordinary experience of the natural world does not always provide access to truth about it. In the 1540s and 1550s, writers acknowledged that human beings often cannot have direct access to nature's truths and as a result need instruction in how to read the "signs" and "tokens" that appear on the surface.

For the members of the Dee circle who understood the implications of Copernicus's *De revolutionibus*, the discrepancy between the appearance of the universe from Earth and his theory about its true configuration eroded their confidence that they could teach people how to reach the truth about nature by interpreting its signs. In the 1550s and 1560s, these writers pursue the possibility that the study of optics might explain why the universe presented such a deceptive appearance (as a kind of optical illusion) or else might lead to the development of devices that would allow them to see past its illusory surface. However, the supernova of 1572

Spenser and the New Science

Edmund Spenser has not generally been credited with knowledge of, or interest in, the changing ideas about the natural world that were developing during his lifetime.¹ Allison Chapman has linked his *Shepherd's Calendar* with controversy over calendrical reform in the period, but she emphasizes the political rather than natural philosophical issues at stake.² His *The Faerie Queene* has long been associated with archaic modes of thought and writing, looking back to classical antiquity and the Middle Ages rather than forward to new ideas about the natural world.³ He has generally been seen as engaging most fully with moral and political philosophy, interested largely in questions of ethics, law, sovereignty, and human relationships.⁴ However, he was aware of a number of the natural philosophical and epistemological issues that arose as the Aristotelian synthesis fell apart, and *The Faerie Queene* in particular is deeply informed by his increasing concern about the intelligibility and stability of the universe at the end of the sixteenth century. While Spenser's works reflect the confusion and anxiety of his age, ultimately *The Faerie Queene* raises the threat of new ideas only to fall back on Aristotelian orthodoxy.

Spenser's reputation for ignorance about natural philosophy stems in part from comments made by his friend (or rather frenemy) Gabriel Harvey. In his marginal comment on an English translation of a (probably third-century) Greek cosmographical poem, Dionysius Perigetes' *The Surveye of the World* (translation by Thomas Twinne, published in 1572), Harvey praises English poets like Geoffrey Chaucer and John Lydgate, whose works include "Notable Astronomical descriptions . . . much better learned than owre moderne poets"; Harvey mentions especially "Chawcers conclusions of the Astrolabie."⁵ He praises a number

Shakespeare and New Forms of Nothing

Spenser expressed his engagement with disturbing new ideas only indirectly in *The Faerie Queene*. Still, it seems that late sixteenth-century writers considered epic poetry a more suitable genre for the exploration of cosmology than lyric or dramatic works. Dramatic writers seem to have been particularly unwilling directly to represent new ideas and technologies onstage. Take, for example, the experiments in optics leading up to the invention of the telescope. Several plays do incorporate optical devices, but they show them to be a product of demonic magic (*Friar Bacon and Friar Bungay*), an analogue of the illusionistic power of the stage (*Travels of the Three English Brothers*), or a fraudulent trick (*Albumazar*).¹ If we're going to look for signs of the new science in Shakespeare's plays, we should not expect to see them dramatized explicitly.

Like all poets, Shakespeare has a basic model of the world and how it works, based in intuitive experience of nature and contemporary natural philosophy. His imagery is shaped by and reflects this mental model. Gail Kern Paster, for instance, has shown how humoral physiology was fundamental to representations of the body in early modern drama. The language and imagery of these plays is imbued with humoralism, and their representations of human behavior are inflected by this set of assumptions about the nature of embodiment.² Shakespeare's understanding of the natural world is just as clearly based on a version of Aristotelian naturalism; the four elements and the tenets of meteorology subtend his descriptions of the world and its workings.³ New ideas that challenge these basic Aristotelian assumptions, especially those related to the abstraction of Arabic numerals and corpuscular theories of matter, surface in his sonnets and in *King Lear*. The sonnets reflect the promise and danger of a newly abstract mathematics, and

Matter and Power

Critics since Marjorie Hope Nicolson and E. M. W. Tillyard have emphasized the social implications of the hierarchically ordered Aristotelian cosmos, calling attention to passages like Ulysses' speech in *Troilus and Cressida*, in which "the sun, the king, primogeniture hang together; the war of the planets is echoed by the war of the elements and by civil war on earth."¹ In this book so far, I have been suggesting that the breakdown of this world picture and the concomitant divorce of intuitive experience of nature from scientific theory carried epistemological and emotional consequences that can be seen as separate from (even if they were in many ways related to) anxiety about social disorder. People were upset about a loss of direct access to truth about the natural world regardless of whether this change also portended social chaos. However, as we saw in chapter 5, basic ideas about the nature of numbers and matter inevitably have implications for how someone like William Shakespeare thought and wrote about social relationships and political structures.

In this chapter I look more explicitly at the different ways in which Christopher Marlowe and Shakespeare imagine the projection of power and colonial domination in terms of changing ideas about the cosmos and the elements. Both writers reflect new attitudes toward meteorology that emerged at the end of the sixteenth century in England. Marlowe uses new work in cartography and astronomy to find a language adequate to convey Tamburlaine's immense ambition and will to conquest. Shakespeare's *Antony and Cleopatra*, on the other hand, represents the waning elemental physics as stubbornly resistant to conquest by a new hard-edged physics of surfaces. Both writers are less directly concerned about the hierarchical arrangement of the cosmos and more attuned to the contemporary problems in matter theory that I have been tracing throughout this book. Marlowe

What about Bacon?

Almost every early modern scholar to whom I have described the scope and argument of this book has asked, "What about Bacon?" Their assumption has been that a book about the epistemological background of the scientific revolution would necessarily have to discuss Francis Bacon, who is widely perceived as having facilitated the development of an empirical and inductive approach to scientific discovery, inspiring the foundation of the Royal Society and making possible a systematic approach to the new science. Bacon was a controversial figure during his life, and his reputation among scholars has been equally contentious. I think it is safe to say that literary scholars generally hold him in higher esteem than do historians of science and philosophy, many of whom have questioned whether his program for the advancement of science represented real innovation and whether it provided a workable scientific method.¹

Placing Bacon in the context of the sixteenth-century writers discussed thus far in this book provides new insight into his work and the nature of his achievement. On the one hand, Bacon was explicitly responding to the impasse at which English natural philosophers found themselves at the end of the sixteenth century. If intuitive knowledge of the universe based on ordinary sensory experience had proven to be unreliable in many respects, on what basis could the study of nature move forward? As we have seen, advocates of various "secrets" traditions described technologies that they hoped would provide access to the real truth hidden under deceptive appearances. Bacon's new inductive method can be seen as another one of these technologies, designed to bridge the gap between flawed observation and underlying truth. Bacon's work differs from that of writers like Thomas Digges, Thomas Harriot, and William Gilbert in a number of ways, however. His system is not arcane and secret but finds a way to make the process of attaining hidden