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BOOK REVIEW

Shakespeare the Copernican?

Dan Falk: The science of Shakespeare: A new look at the playwright's universe. NewYork: St. Martin's Press, 2014, xviii+364pp, $27.99 HB

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Dan Falk, the author of this engaging if informal book, is a science journalist, broadcaster, and freelance writer, whose achievements merited him a Knight Science Journalism Fellowship at MIT in 2011–2012. Full disclosure imperatives require me to acknowledge having met him on an eclipse expedition to Easter Island in 2010, where I recall learning about his interests in astrophotography. I am sure, however, that should we meet again, we are unlikely to recognize one another. Thus, as an unbiased reader (though one who earned a doctorate many decades ago for a study of several dramas written in Shakespeare's time though not by Shakespeare himself), I can report that *The Science of Shakespeare* is a testament to the thoroughness with which Falk has carried out his research, both in libraries and in the offices of everyone, it would appear, who has so much as dabbled in the question of whether Shakespeare knew anything about the scientific developments of his day and how, if he did, this knowledge permeated the canon. Although the subtitle of the book, *A New Look at the Playwright's Universe,* might suggest otherwise, Falk's book is less a product of original scholarship and more what readers of *Metascience* have come to know as a "survey review" and what students of literary criticism might call a "literature review." With this in mind, I can recommend the book to *Metascience* readers less as a volume they must own in their personal libraries and more as a book to recommend to friends who are interested in an accessible summary of the interplay of science and literature in sixteenth- and seventeenth-century England.

In the preface to the book, we learn that Falk became a devotee of both Shakespeare and astronomy at about the age of ten or eleven, when his parents both took him to see *Macbeth* and presented him with a copy of H. A. Rey's *The Stars*. His subsequent independent exposure to Shakespeare on the stage and on the page made it clear to him that the Bard knew quite a lot about astronomy. The seeds of

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this book, however, were not planted until 1997, when at a meeting of the American Astronomical Society in Toronto, his home town, he heard a provocative talk by Peter Usher, now Professor Emeritus of Astronomy and Astrophysics at Penn State University, on "A New Reading of Shakespeare's *Hamlet*." Intrigued by what he heard, Falk approached the Canadian Broadcasting Company, for whom he produced a radio documentary on the broader topic of "Shakespeare and Science," the preparation for which underpins this book.

Falk quotes some of the literary critics with whom I am familiar from my days in graduate school, who dismiss the idea that Shakespeare was conversant with the new heliocentric model of the universe introduced by the 1543 publication of Nicolaus Copernicus' *De revolutionibus.* Marjorie Hope Nicholson, for example, wrote in the 1950s that "Shakespeare must have seen the new star of 1604 [which is sometimes referred to as 'Kepler's star' and which we now recognize as a supernova], must have heard of Galileo's discoveries in 1610…. Yet his poetic imagination shows no response either to new stars or to other spectacular changes in the cosmic universe." Some four decades later (by which time I had myself become a science writer and was about to embark on a career as a writer of science biographies for teenagers), other literary critics, including Thomas McAlindon, now Emeritus Professor of English at the University of Hull, were arguing that there is "no sign of [the Copernican] revolution" in Shakespeare's plays. Falk nonetheless succeeds in making a convincing case for Shakespeare's being aware both of Copernicus' heliocentric view and of Galileo's telescopic confirmation of it, even as he acknowledges that Shakespeare did not clearly incorporate cutting-edge astronomical discoveries into his work the way John Donne (1572–1631, and thus a contemporary of Shakespeare, whose dates are 1564–1616), did.

Although Falk does not limit his discussion to astronomy, he devotes the better part of the book (in both senses of the word "better"—both in terms of number of pages and of strength of argument) to what Shakespeare might plausibly have known about new work in the study of the universe. In addition to the supernova of 1604, he might have personally seen the supernova of 1572 and might have been familiar with Tycho Brahe's account of it. He might also have witnessed the comets of 1577, 1582, and 1607, as well as a solar eclipse over Europe in fall 1605. Falk draws attention to the fact that the University of Wittenberg, where Shakespeare's Hamlet and Horatio were students, was also an institution where George Joachim Rheticus, Copernicus' only student, without whose intervention *De revolutionibus* might not have been published, both studied and taught. Falk also refers to the work of "forensic astronomer" Don Olson, Professor of Astronomy and Physics at Texas State University in San Marcos, who has used planetarium software to suggest that the reference by Horatio in *Hamlet* to "yond same star that's westward from the pole" refers to Tycho's supernova of 1572.

In the course of several early chapters, Falk introduces a number of figures involved in the new science of the day in England, including John Dee, William Gilbert, Francis Bacon, Thomas Harriot, and particularly Thomas Digges, and argues that many of these men knew each other. He also suggests that even if Shakespeare knew none of them personally, there is strong evidence that he was familiar with their work. In 1576, Thomas Digges, an astronomer and

mathematician, published, in the appendix to a new edition of an almanac prepared about twenty years earlier by his father, Leonard, not only a translation of part of *De revolutionibus* but also a diagram of the Copernican system, in which the envelope of stars appears to have no limit. (I am proud to say that my husband owns one of the rare copies of the 1596 printing of the Digges book with Thomas's Copernican content; Falk reports that only 40 of Digges's book in its eight editions from 1576 through 1626 are extant.) Falk goes on to present evidence that the inclusion of the characters Rosencrantz and Guildenstern in the *dramatis personae* of *Hamlet* suggest that Shakespeare was familiar with an engraving of a portrait of Tycho that the Danish astronomer had commissioned in the 1590s, in which Tycho is surrounded by crests of several relations, including one named Rosenkrans and one named Guildenstern. Falk reports that Harvard historian of science Owen Gingerich believes that Tycho himself might have personally sent Digges his collection of astronomical letters, which included the engraving. Even if Shakespeare was not acquainted with Thomas Digges, who died in 1595 at about the time Shakespeare first arrived in London, he might have been a friend of Thomas's son, Leonard, who in 1623 wrote a verse in honor of the deceased playwright that is included in the First Folio of that year.

In Chapter 8, "Reading Shakespeare, and Reading Into Shakespeare," Falk, by summarizing some of the findings presented by astronomer Peter Usher's 2010 book, *Shakespeare and the Dawn of Modern Science,* demonstrates that it is possible to get too carried away with the conviction that Shakespeare was an early adherent of Copernicanism. Usher's attempt to transform *Hamlet* into an allegory of Shakespeare's belief in the triumph of the Copernican view over the Ptolemaic stretches credulity. Are we really to believe that Hamlet's murderous Uncle Claudius is a stand-in for Claudius Ptolemy? That Rosencrantz and Guildenstern represent the Tychonic hybrid model of the cosmos, in which the planets revolve around the sun, which in turn revolves around Earth, and that those characters' deaths signal the overcoming of that picture of the universe? Or that the return of Fortinbras from Poland at the end of the play represents the triumph of Polish astronomer Copernicus' heliocentric view? Nonetheless, I am interested in Usher's reading of Claudius' objection to Hamlet's decision to return to Wittenberg as "most retrograde to our desire." Might it really be a sly reference both to the retrograde motion of the planets and to the objection of the character who represents Claudius Ptolemy to the Copernican system taught at that university? (It is interesting to read that Usher notes that astrophysicist Cecilia Payne-Gaposchkin, the first woman to be promoted to full professor at Harvard's Faculty of Arts and Sciences, where she also became the first woman to head a department, herself suggested that reading of the word "retrograde" in the 1970s.) I am also intrigued by Usher's reading of Hamlet's famous line about being mad "only north by northwest." Might "north by northwest" refer to Elsinore, where the Ptolemaic view has usurped the throne, while to the south lies Wittenberg, bastion of Copernicanism and therefore sanity? In summary, even though I agree with those critics who argue that a rigid allegorical reading of *Hamlet,* such as that presented by Usher, is too reductive, clearly one can accept the view that Shakespeare's plays demonstrate, however slyly sometimes, his interest in science.

Perhaps of greater interest is what Falk's book tells us about the possible, even likely, connection between Galileo and Shakespeare, well beyond the fact that both men, born in 1564, had the 450th anniversary of their births celebrated in 2014. The publication of Galileo's *Sidereus Nuncius* in Venice on March 13, 1610, overlapped with a visit to that city of English diplomat Sir Henry Wotton, who had a copy sent to King James I, along with a cover letter reporting to the monarch that Galileo's telescopic discoveries sounded the death knell of the old view of the universe. When the book arrived in England, Shakespeare still had some plays in him, and Falk draws our attention to Shakespeare's *Cymbeline,* which is widely believed to date from summer or fall 1610. In Act V of the play, the god Jupiter descends onto the stage, with four ghosts moving around him in a circle. No less an expert than Oxford University's John Pitcher argues in his preface to the 2005 Penguin edition of *Cymbeline* that "the Jupiter scene is almost certainly a reference to the discoveries newly announced by Galileo." Meeting privately in his office with Falk, Pitcher asserted that the fact that Shakespeare famously had "small Latin," would have been no impediment to the playwright's reading of the slim treatise, which was written in "schoolboy Latin." According to Pitcher, even if Shakespeare did not personally read the revolutionary work, its contents were the "stuff that would have been talked about in alehouses."

The most interesting part for me of the final third of the book, where Falk discusses Shakespeare's possible knowledge of other sciences, is his discussion of the playwright's familiarity with the work of French essayist Michel de Montaigne (1533–1592), whose work was published over a 22-year span beginning in the 1570s and was translated into English by John Florio, a possible friend of Shakespeare. Reading Montaigne would have introduced Shakespeare to the theory of atoms presented by Lucretius in *De rerum natura* and would have presented another opportunity for the playwright to read about Copernicanism. Strong traces of Montaigne have been discovered in many passages not only in *King Lear,* dating from 1606, and in *The Tempest,* probably written in 1610–1611, but also in *Hamlet,* which was most likely written between 1599 and 1602. So although Florio's translation was not published until 1603, Shakespeare probably had the opportunity to read it earlier in manuscript form.

As apt a way as any to conclude this review is with a comment on the penultimate page of the book by Harvard Shakespeare scholar Stephen Greenblatt, who also happens to have written *The Swerve: How the World Became Modern,* on Lucretius' *De rerum natura* (winner of the 2011 National Book Award for Nonfiction and the 2012 Pulitzer Prize for General Non-Fiction), which links together the scientist and playwright whose 450th birthdays we celebrated in 2014: "In the case of Galileo, we have a scientist of stupendous power and intelligence who also has a startlingly literary sensibility. In Shakespeare you have an artist of stupendous and incredible power, who has an oddly interesting scientific sensibility," who "is actually surprisingly alert to and interested in what we could call the 'scientific naturalism' of his time." If Harvard and Oxford can agree that Shakespeare knew more than a little science, who can say nay?