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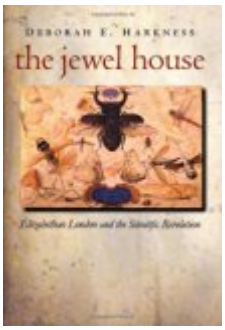
Deborah E. Harkness. *The Jewel House: Elizabethan London and the Scientific Revolution.* New Haven: Yale University Press, 2007. xviii + 349 pp. $32.50, cloth, ISBN 978-0-300-11196-5.



Reviewed by Jan Golinski

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Deborah E. Harkness's new book opens up the world of what she calls "vernacular science" in late sixteenth-century London. She has energetically tracked down hundreds of individuals in the Elizabethan capital who were pursuing natural history, medicine, alchemy, and mathematical arts. These were the people who traded plant and insect specimens, examined exotic minerals, peddled herbal and chemical remedies for Londoners' ailments, sold almanacs and surveying instruments, worked with metals to try to make gold, and promoted voyages to the New World. Harkness unashamedly calls these activities "science," well aware that the term will seem anachronistic to some readers. The word was in use at the time, she points out, and is preferable to the alternatives generally favored by historians. These individuals were not pursuing "natural philosophy," a discipline known only to those with a university education. Nor did they identify with the "mechanical philosophy" that emerged in the mid-seventeenth century. Harkness's claim is that the disciplines that later rose to prominence had their roots in the activities of the merchants, tradesmen, midwives, instrument makers, and projectors who thronged the streets of London in the late 1500s. From this bustling world of natives and immigrants, men and women, the multilingual and the barely literate, what was later recognized as science can be seen to have emerged.

Harkness's community of practitioners was a heterogeneous one, concentrated in some cases in very specific neighborhoods, but connected by links of trade, migration, and exploration to the world beyond England's shores. Her monograph exemplifies the value of the recent preoccupation among historians of science with the dual themes of locality and circulation. In crucial respects, scientific knowledge has been shown to be rooted in local circumstances, in intense interactions between individuals who share a particular social space. But, it also depends on movement, on the motion of people, texts, specimens, and artifacts from place to place; and it only becomes general knowledge to the extent that it transcends its point of origin by these means. Harkness has managed to keep in view the details both of locality and of the networks by which places are connected to one another. She achieves a depth of

ethnographic "thick description" in her invocations of London streets and neighborhoods, taking the reader on a virtual stroll down Lime Street, for example, and introducing the craftsmen and tradesmen who worked there. At the same time, she describes the origins of the continental immigrants who populated the street and the locations of their distant correspondents. She traces the routes by which printed books and maps were circulated, pharmaceutical remedies traded, and plants and minerals shipped from as far afield as East Asia and the Americas.

Underlying her reconstruction of scientific communities is the substantial biographical database that Harkness has compiled. Her references and bibliography reveal the impressive volume of sources she has used, going well beyond printed texts to include manuscripts and letters, patent rolls, government papers, and reports on aliens. Her massive research effort allows her to tell the stories of medical empirics and mathematical artisans, and also to shed fresh light on some of the leading scientific texts of the era. John Gerard's ***Herball*** (1597), for example, seems to have appropriated the work of dozens of unsung naturalists who never authored printed books. The pamphlets attacking the German empiric Valentine Russwurin can be seen to present only one side of a vigorous contest with physicians and surgeons over medical authority. Henry Billingsley's English translation of ***Euclid*** (1570) both reflected and nurtured the growth of a substantial community of mathematical educators and instrument makers. Similarly, Harkness shows that important archival sources can be interpreted afresh once more is known about their context. William Cecil's papers reveal a lot about those seeking patronage for "big science" projects, such as making gold for coinage or launching voyages of exploration. The notebooks of Clement Draper, imprisoned for debt in the King's Bench in the 1580s and 1590s, reflect the circulation of medical and alchemical information. Draper not only retained connections with his numerous correspondents and suppliers of books, but also was even able to conduct experiments while in prison. The published text that most accurately reflected the rich diversity of London science in this era was Hugh Plat's ***Jewell House of Art and Nature*** (1594). Appropriating Plat's title for her own, Harkness argues that his work faithfully mirrored the eclectic wealth of the sources available to him, including the compilations of techniques from many arts known as "books of secrets." Plat conferred the authority of publication on knowledge that had previously circulated in oral or manuscript form; he showed a particular interest in facts known by women and immigrants. According to Harkness, Plat's book deserves a more prominent place in historians' narratives than the later utopian fantasy of Francis Bacon, ***The New Atlantis*** (1627). Bacon was much less knowledgeable about vernacular science than Plat, but he has been celebrated for his vision of how all this activity could be organized and turned to philosophical account, a vision that inspired the subsequent formation of the Royal Society of London in 1660.

This point leads Harkness to deliberate on the final term of her title, the "Scientific Revolution"; though she largely confines her historiographical remarks to a brief coda at the end of the book. As she notes, the Scientific Revolution is no longer recognized by historians as a well-defined entity. The term has been stretched in its application in several respects: chronologically, it now covers much of the sixteenth and seventeenth centuries; socially, it embraces a much larger cast of actors than the once-celebrated great men; and conceptually, it has widened from crucial developments in astronomy and natural philosophy to take in all kinds of natural knowledge. In all these ways, Harkness's study is in sympathy with current historiographical trends. She seeks to redirect scholars' attention to the period before Bacon began to promote himself as the man who could turn vernacular science into an organized enterprise. She wants to rescue from obscurity the men and women who forged the knowledge later appropri-

ated by Bacon and other authors. And, she endorses a broad conception of science that includes such fields as herbalism, practical pharmacy, natural history, alchemy, and astrology.

Harkness wants to retain the term "Scientific Revolution," but her work will not necessarily make it easier to tie down its meaning. Each chapter in her book tells a vivid and engaging story, but there is relatively little discussion of what it all means. The different activities she discusses seem to have remained quite separate from each other before Bacon's program emerged to try to organize them, and this is one of the drawbacks of using the singular term "science" to cover them all. It does seem clear that the model of a purely intellectual transformation in the minds of a few great thinkers--which was what scholars like Herbert Butterfield and Alexandre Koyré meant by the Scientific Revolution--is long gone.[1] Harkness joins such historians as Charles Webster, James A. Bennett, Adrian Johns, and Larry Stewart in revealing the diversity of the early modern scientific movement and the complexity of its engagement with all domains of natural knowledge.[2] If there is a common conceptual shift here, it may have to do with a changing understanding of the relations between art and nature, as Pamela H. Smith and William R. Newman have recently suggested.[3] The underlying preoccupation was with knowledge in practice, with the close connections between knowing nature intellectually and mastering it through the technical arts. The burgeoning scientific movement was concerned above all to put to use the huge quantity of new information that flooded in as Europe turned outward to the wider world. Harkness's painstakingly researched and elegantly written book gives a striking account of how new knowledge was made at the time of that epochal transformation.

Notes

[1]. On the traditional conception of the Scientific Revolution, see Roy Porter, "The Scientific Revolution: A Spoke in the Wheel?" in ***Revolution in History***, ed. Roy Porter and Mikuláš Teich (Cambridge: Cambridge University Press, 1986), 290-316.

[2]. Charles Webster, ***The Great Instauration: Science, Medicine and Reform, 1626-1660*** (London: Duckworth, 1975); James A. Bennett, "The Mechanics' Philosophy and the Mechanical Philosophy," ***History of Science*** 24 (1986): 1-28; Adrian Johns, ***The Nature of the Book: Print and Knowledge in the Making*** (Chicago: University of Chicago Press, 1998); and Larry Stewart, ***The Rise of Public Science: Rhetoric, Technology, and Natural Philosophy in Newtonian Britain, 1660-1750*** (Cambridge: Cambridge University Press, 1992).

[3]. Pamela H. Smith, ***The Body of the Artisan: Art and Experience in the Scientific Revolution*** (Chicago: University of Chicago Press, 2004); and William R. Newman, ***Promethean Ambitions: Alchemy and the Quest to Perfect Nature*** (Chicago: University of Chicago Press, 2004).

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