

Ask Pickleherring

A tour among the maths teachers, mechanics and master surgeons of Elizabethan London: what part did the 'little scientists' play in the history of knowledge?

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THE JEWEL HOUSE

Elizabethan London and the scientific revolution
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Walking down the streets of Elizabethan London, if you weren't too distracted by the clatter and stench, you might notice advertisements tacked to doorframes, walls and posts. Some offered rewards for stolen aprons or lost dogs. Some, depending on the season, posted details about the latest play at the Globe or government ordinances about how to prevent the spread of plague. And some advertised the services provided by the City's men of science. If you needed surgery, Peter "Pickleherring" van Duran, a brewer in Southwark, was your man. If you needed tuition in algebra or lessons in book-keeping, you were invited to call on Humfrey Baker at his house on the northern side of Gresham's Royal Exchange. These bills were part of the fabric of everyday life in Elizabethan London.

Deborah E. Harkness's *The Jewel House* sets out, through this sort of mundane detail, to recover the world of science in Elizabethan London. Mathias de L'Obel, a renowned botanist and supervisor of Lord Zouche's gardens in Hackney, and his son-in-law, James Cole, a wealthy silk merchant, descended from Abraham Ortelius, the famous Flemish cartographer, were at the centre of a community of natural historians based in and around Lime Street. As they swapped specimens, they exchanged letters with like-minded naturalists throughout Europe. They were internationally renowned for learning, congeniality and intellectual civility. John Gerard, known to us as the father of English botany and to his contemporaries as an ambitious barbersurgeon and avid gardener residing in Holborn, was welcomed into this community, then broke the unspoken rules by claiming collective knowledge for his own, publishing it within his monumental *Herball* (1597), and thereby blanketing the activities of the Lime Street naturalists from the historical record.

Outside the Royal Exchange, at a market stall manned by an itinerant medical practitioner from Central Europe, Valentine Russwurin, the brave medical tourist could have a kidney stone or cataract removed; the less ambitious could purchase a soothing ointment. Through a deft navigation of printed books and manuscript records, Harkness shows how the medical marketplace was constructed through the printed page and how, sparked by a controversy surrounding Russwurin, this community became polarized into pro- and anti-Paracelsian camps. What was at stake was the merits of the mineral remedies promoted by the followers of Theophrast von Hohenheim, the medical reformer known as Paracelsus, and whether learned physicians or surgeons, trained through apprenticeship and holding the status of craftsmen, had the authority to prescribe such remedies. Russwurin was one

of many practitioners who stood outside officially sanctioned medicine, threatened the medical order, and, in the eyes of the medical authorities, were motivated by money rather than by public spiritedness.

Watching people learn to count isn't very interesting, so we might pause on our imaginary tour beneath an ingenious parish clock while we're told how instrument makers and educators used printed books and paper devices to promote the mathematical arts and foster new sorts of problem-solving for merchants, craftsmen and politicians. We might learn that this marks the advent of a "broadly based, vernacular and mathematical way of

thinking about the world". We might laugh on being told that "Good Protestants could be absolved of some of the guilt associated with prosperity by mathematically contemplating their riches". Then we might follow a bunch of men to the court. In a display of mathematical literacy, they have devised grand schemes to bolster the productivity and power of the Commonwealth. They pitch their schemes to William Cecil, Secretary of State, promoter of what Harkness calls "Big Science": the pooling of technical expertise, administrative experience, and state funding for long-term, high-risk projects that would benefit the nation. Cecil sought utility, economy and novelty, and favoured ventures which exploited mineralogical resources – maritime exploration, mining techniques and alchemical assaying. Big Science had its heyday from the 1560s through the 1580s; thereafter improvers shifted to safer, smaller schemes.

An improver who overextended himself financially risked debtors' prison. One of their number, Clement Draper, was to be found at the King's Bench in Southwark. He

had invested borrowed money in a series of mines, but was forced to relinquish his leases when he failed to meet the demands of his creditors. A decade in prison provided this busy man with an opportunity to sit down and read and write. He filled at least a dozen notebooks with information, largely alchemical, garnered from his fellow prisoners, the friends and relatives who visited him, and all sorts of reading matter, printed and in manuscript. The notebooks, and the activities they document, are evidence of the compulsion that Draper and many of his contemporaries shared to accumulate and sometimes verify information about new remedies and outlandish technologies. This process of reading and writing was Draper's objective. He did not define the pursuit of natural knowledge as the formulation of a natural philosophy.

Ultimately the book takes us where the title promises: to Hugh Plat's Jewel House. This may have been an actual shop, but in Harkness's account, like Francis Bacon's Salomon's House, it is an imagined location. Like Draper, Plat, an enterprising gentleman, filled more than a dozen notebooks with alchemical remedies and devices to improve the economy of the commonwealth. But, unlike Draper, Plat clearly noted that a true and useful understanding of nature was by definition linked to some form of practice. Moreover, when he published "tested" versions of his recipes, collected under the title *The Jewel House of Art and Nature* (1594), he transformed records of experiments garnered from local practitioners and credible texts into "authoritative reports of replicable experiments". At Bacon's Salomon's House, the utopian institute of science described in his *The New Atlantis* (1605), the study of nature was not only practical; it was conducted within a structured administration. Plat made natural knowledge purposively empirical and presented the work of many as the work of an individual; Bacon wrested it from the hands of mechanics and subjected it to systematic inquiry overseen by gentlemen.

Harkness's book succeeds in evoking a city alive with the pursuit of the natural world, a pursuit infused with objects, ideas and people from foreign lands, inscribed within the corporate structure of the City, and often geared towards the good of the Commonwealth. This is an excellent example of history as escape. Readers who liked James Shapiro's *1599: A Year in the Life of William Shakespeare* (2005) and Charles Nicholl's *The Lodger: Shakespeare on Silver Street* (2007) will find themselves at home in these pages.

But Harkness is not a tour guide and this is not just a trade book. Through these colourful episodes and gritty details Harkness has two greater objectives. The first is to offer lessons for other historians of science. Early

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modern science was messy and contingent, she explains in a coda, and the best way to understand it is through detailed studies of vernacular practitioners in urban centres. The purpose of the coda is to set out the book's methodology and to introduce its sources. Borrowing from anthropology, Harkness advocates the practice of "multi-sited ethnography": she listened to the archives, established rapport with these sources, traced the connections between practitioners, and mapped the concepts of science and community in Elizabethan London. To do this, she read all books on natural knowledge printed in English between 1550 and 1610, and through these and calendars of correspondence, wills and other manuscripts, she assembled a database of 1,800 Londoners. The result is thick description of a period, Harkness assures us, of what Thomas Kuhn would term normal science. Normal science is when practitioners do routine work within a paradigm; revolution is when the paradigm is challenged.

Shaping our understanding of the scientific revolution is Harkness's second objective. Through much of the twentieth century the scientific revolution provided a foundation myth for the history of science, legitimating both the endeavours of historians of science and describing their object of inquiry. Sometime between the fifteenth and the eighteenth centuries, how people thought about the natural world and what they did with this knowledge changed. Scholarly study of this period was essential to understanding modernity. Early studies of the scientific revolution focused on the ideas of heroic men who transformed astronomy and physics. These were answered by studies, often identified as Marxist, that framed science as a collaborative venture, rooted in technological, commercial, religious and imperial developments. Mathematics, medicine, natural history and the occult arts became part of the story. So too did place: science moved from the universities to the courts to the cities. At the same time, academics increasingly wrote about case studies instead of grand narratives, while retaining the scientific revolution as a label for undergraduate courses focusing on the early modern period. Over the past decade there has been a revived vogue for studies of practical knowledge, stripped of its political import; increasing concerns about the fragmentation of the field; and calls for a reassessment of grand narrative.

In the preamble Harkness silently nudges her way into these debates by asking how stories about the mundane activities of unknown men and women "help us to understand the Scientific Revolution". The answer lies in technical literacies for exploring the natural world and the social organizations that facilitated these developments. "These contributions", she argues, "laid the foundations for the Scientific Revolution in England and did the groundwork that was required so that a man like Boyle knew whom to ask, and what to ask for, when he sought out a man to assist him in his air pump experiments." Harkness clearly positions her focus on Elizabethan London within the grand narrative of the scientific revolution. She presents her book as no less than a prequel to Steven Shapin and Simon Schaffer's blockbuster *Leviathan and the Airpump* (1985),



A blacksmith hammering a heated iron bar to be magnetized; a woodcut from *De Magnete* by William Gilbert (1600)

(Regrettably, Charles Webster's groundbreaking work is not mentioned.) But, at the same time, she is excusing herself from engaging with that grand narrative. This is a book about the scientific revolution that isn't a book about the scientific revolution. This is because, as Harkness states at the outset, she has relegated arguments about the scientific revolution to the coda. Those interested in academic arguments should turn there; everyone else should follow her to Lime Street.

From Lime Street to Salomon's House, the biddable reader, while entertained with strange characters and stranger enterprises, is introduced to subjects of major concern to historians of science and historians of Elizabethan London. Four subjects stand out: book history, medical history, urban history and the history of alchemy. These are major arenas of scholarly activity. Rather than engaging substantively with any of them, Harkness borrows their concepts and gestures towards their concerns. In "history lite" mode, we are told that book historians worry about the politics of publication in print and in manuscript in the production of knowledge; medical historians worry about how alchemical ideas and chemical remedies fitted into the emerging medical marketplace; and urban historians worry about something called "urban sensibility". Alchemy features in more than half the chapters, but the fact that historians of alchemy worry about the medical applications of the art and the relation between theory and practice, particularly matter theory and the rise of the experimental method, is glossed over. The book would be more satisfying if, for instance, it had asked robust questions about the apparent authority of print, the dynamics of the medical marketplace, the role of confessional and national differences in how expertise was regulated in an urban context, and the commercial and spiritual motives for the pursuit of the philosophers' stone.

Instead of engaging seriously with the fields to which her material lends itself, and

instead of being true to the ethnographic methods that she espouses, Harkness frames her analysis in terms of winners and losers. Most of her 1,800 Londoners have been lost to the historical record, not because they were not intelligent, industrious and important people, but because they did not secure their place in history through an apt use of print. The winners are remembered because, deliberately or not, they created foundation myths for the scientific revolution that obscured precisely those people who laid the foundations for modern science. Draper compiled extensive notebooks because he "believed that whoever dies with the most information wins", but he misjudged the terms of posterity. "Where the failure of Cole and his friends to publish their findings consigned them to the margins of the Scientific Revolution, Plat's decision to gather and publish London's experimental findings drove hundreds of others into the same historical oubliette." Francis Bacon is the greatest culprit: Why do we remember the orderly Salomon's House instead of the bustling Jewel House? Because "Bacon did not want us to see the rough, social foundations that lay buried in the mud and clay beneath the walls of his beautiful, orderly house of knowledge". What we learn from Harkness is that once we strip away the accretions of self-promotion and myths of progress, we can see the mechanisms of sociability, improvement and commerce that shaped how natural knowledge was accumulated and produced in Elizabethan London.

The alert reader might then reflect on whether Deborah Harkness has learnt the lessons that her book teaches. By borrowing concepts from other scholars without furthering the terms of academic debate, she, like Gerard and Plat, denigrates the contributions of the peers without whom her work would not have been possible. By trumpeting a new argument about the scientific revolution, she, like Bacon, lays claim to a place in history. This is a good book. But it's not good history of science.