

## BOOKS: HISTORY OF SCIENCE

## Instruments of the Revolution

Steven Shapin

Every academic generation gets the Scientific Revolution it wants, needs, and thinks actually happened. From about the 1930s to the 1980s, the Scientific Revolution was not only an event but the definitive event in making the modern world. It was a decisive break with past intellectual tradition—in Herbert Butter-

field's phrase, like "putting on a new pair of spectacles." Talking about the essence of this revolution made sense, and that essence was taken to be mathematical physics and astronomy. The Revolution was an adventure in pure thought, not in grub-

tainly incorrect. And, although historians these days mainly reject the role of cheerleading for the past, there is much to admire in these achievements and much point in seeing some of them as seeds of the modern condition.

*Ingenious Pursuits* is very much in this revisionist mode. But, rather than making esoteric academic points, it offers an accessible and lively account for nonspecialists. It synthesizes much recent writing by pro-

**Ingenious Pursuits**  
Building the Scientific  
Revolution  
by Lisa Jardine

Nan A. Talese (Doubleday), New York, 1999. 464 pp. \$35, C\$55. ISBN 0-385-49325-8. Little, Brown, London, 1999. 464 pp. £25. ISBN 0-316-64752-7.

by practice, nor was there any embarrassment in identifying it with the ideas of a pantheon of individual geniuses. It was to be described, but it was also to be celebrated.

Many historians of science and culture are now increasingly skeptical about that version of the Scientific Revolution, and that way of writing about it. In place of radical discontinuities with the past, they increasingly see 17th-century practices and beliefs as untidy assemblages of the new and the old. Much changed in 17th-century physics and astronomy, but much also remained the same. Scientific practices rarely thought of as "revolutionized" at the time—botany, entomology, and pharmacology, for example—nevertheless experienced important changes in the ways that factual evidence was gathered, evaluated, represented, and communicated. Many different kinds of people were involved in scientific change: some were professors and independent gentlemen, but others were artisans, mechanics, and administrators whose concerns were more with profit, pay, and power than with pure thought. This Scientific Revolution is no less real or consequential for the making of modernity. But it is much more difficult to describe concisely, and even thinking of it as a single coherent event is almost cer-



**Fortune's foundation.** Cocoa plant specimen from the collection of Hans Sloane, who made a substantial fortune marketing chocolate. His will established his collections as the foundation for the British Museum.

fessional historians of science without overburdening the general reader with detailed acknowledgments of their work. It is richly illustrated (often in color), and, although it rambles and repeats itself at times, it has a nice, open narrative texture. The book begins and closes with several friendly, if ultimately unconvincing, gestures at topicality: Dolly the cloned sheep gets the show on the road; James Watson's rough treatment of Rosalind Franklin brings down the curtain. But Lisa Jardine, a well-known English cultural historian, has a real talent for finding the telling anecdote and the pithy quotation. Her subjects come colorfully to life with passions and interests, jealousies and loves. They get seasick when they travel. They take

rhubarb for constipation and opium for "clear thinking." They have wives and, very occasionally, husbands. Their experiments sometimes don't work. And quite often they seriously entertain thoughts that modern scientists will find ridiculous.

The heroes of Jardine's story are not the titans of abstract thought—Descartes is mentioned only twice and Galileo, about a dozen times—but the tinkers, gardeners, engravers, surveyors, instrument-makers, navigators, collectors, and the "invisible assistants" (as she calls them) who rarely appear in traditional accounts of the Scientific Revolution. Science, in her story, was indeed an "ingenious pursuit," and she perceptively points out that the words "ingenious" and "engineer" derive from the same Latin root: *ingenium* (cleverness). There are probably more references to the "ingenious Mr. Robert Hooke" than to any other practitioner in the book—he is mentioned at least twice as many times as Isaac Newton—and much of the narrative is organized not around individuals but around the instruments and practical processes deployed by ingenious people.

While the Cold War was raging, it was very hard for historians so minded to argue for the responsiveness of 17th-century science to society's technical concerns. The Marxists tended to own that argument, and, in the main, Anglo-American historians worried that such "externalism" was not only historically improper but a denigration of science that would pave the way to centralized state planning. Ten years after the fall of the Berlin Wall, one wonders what the fuss was all about, and the "argument-formerly-known-as-Marx-

ist" seems, in Jardine's emollient version, wholly unexceptional. She documents in vivid detail the agenda set for "ingenious pursuers" by such economically and militarily important concerns as the problem of the longitude, the making of accurate land and sea maps, the search for effective drugs, and the massive rebuilding of London after the Great Fire of 1666.

There is much to admire in *Ingenious Pursuits*. Despite the book being perhaps too long as an entry-level text for nonhistorians, its sumptuous production, its human-interest approach, and its judicious side-stepping of contentious conceptual and methodological issues should enhance its broader appeal. Some professional historians might object to the "scepter'd isle"

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parochialism. The book is overwhelmingly centered on England and particularly on the City of London. Although there is a potentially persuasive case for making London the focus of an "ingenuity-based" account of the Scientific Revolution, that case is never explicitly presented. I can also see some physical scientists taking umbrage at an account of the Scientific Revolution that puts natural history on a par with the "harder" sciences. But Jardine notes that, in the Royal Society of the early 18th century (that is, Newton's Royal Society), "the physics, astronomy and mathematics we as-

sociate with the birth of modern science was a minor, specialist interest." She is just right about that, and if you want to approach the Scientific Revolution—warts and all—as the "rich mix" of practices in which "ingenious pursuers" actually engaged, then her position



**Reflector reconstructed.** A reproduction of Newton's telescope from his original design.

is unassailable. If you are not interested in seeing the Scientific Revolution in those terms, there are many alternative accounts available. Few, however, are as attractively produced as Lisa Jardine's.

#### BOOKS: HISTORY OF MEDICINE

## Sainthood Confirmed

Ronald L. Numbers

In the pantheon of North American doctors, William Osler stands with Benjamin Rush and the Mayo brothers on the highest pedestal of the clinical wing. Although Osler contributed little to medical science in terms of major discoveries, he helped revolutionize the teaching and practice of internal medicine, particularly by emphasizing the importance of training aspiring physicians at the bedsides of patients. He co-founded the Johns Hopkins University Medical School, served as its first professor of medicine, and inspired the creation of the Rockefeller Institute for Medical Research. His immensely successful textbook, *The Principles and Practice of Medicine* (1892), became the clas-

sic text of modern medicine. By the time of his death he had achieved medical sainthood. Sober men described him as "the greatest doctor in the history of world."

The son of an Anglican missionary to the wilds of Upper Canada, young Osler briefly flirted with a ministerial career before turning to medicine. After completing his formal medical education in Toronto and Montreal and subsequently visiting London, Berlin, and Vienna, he taught successively at the medical schools affiliated with McGill, Pennsylvania, Johns Hopkins, and Oxford universities. Oxford appointed him regius professor of medicine, and in 1911, eight years before his death, the British crown dubbed him Sir William.

Michael Bliss, the leading medical historian of Canada, discloses few surprises in this skillful biography—not because of his own sloth but because so much has already been written about his subject. Shortly after Osler's death, the neurosurgeon Harvey Cushing brought out a monumental, Pulitzer Prize-winning 1400-page hagiography, *A Life of Sir William Osler* (1925). Since then, hundreds of acolytes have delved into seemingly every facet of Osler's life, leaving few facts unknown and few stories untold. Bliss's achievement consists primarily of a judicious, contextualized retelling of the Osler story in fewer than 600 pages. I particularly like his discussion of the contentious debate at Johns Hopkins over making clinicians salaried full-time employees.

A dutiful social historian, Bliss inquires into Osler's sensitivity to issues of ethnicity, class, and gender, but occasionally he tosses in annoying asides about what Osler might do if he were living today. Although Bliss steadfastly avoids psycho-biography, he convincingly lays to rest rumors of Osler's youthful "sexual romping and bonking" with a cousin. After meticulously examining Osler's long life through untinted lenses, Bliss reaches the historiographically courageous conclusion that the Oslerians were right all along: Sir William was a truly great man, in private as well as in public.



**Canonized in his lifetime.** In Max Brödel's *The Saint* (1896), Osler strolls above the fleeing microbes.

**William Osler**  
*A Life in Medicine*  
by Michael Bliss

Oxford University Press,  
New York, 1999. 595 pp.  
\$35, £27.50. ISBN 0-19-512346-8.

By far the most controversial of Bliss's interpretations is his characterization of Osler's famous Hopkins colleagues as a bunch of misfits and misogynists. Of the other "big four" professors, the dean-pathologist William H. Welch comes across as lazy, disorganized, irresponsible, and distant from students; Bliss suspects that he was gay. The pious, street-preaching gynecologist,

Howard Atwood Kelly, took more interest in his students' souls and his own exorbitant fees than in his professorial duties. The innovative surgeon William Stewart Halsted was a "sarcastic and mean-spirited" drug addict. Among the lesser lights, Bliss portrays physiologist H. Newell Martin as "a hopeless alcoholic," the anatomist Franklin Mall as "a lazy son-of-a-bitch," the obstetrician J. Whitridge Williams as a male chauvinist, and the pharmacologist John J. Abel as a brilliant eccentric. Not surprisingly, Bliss credits Osler, a very, very good man, with contributing much more than any of his dysfunctional colleagues toward making "Johns Hopkins a very, very good medical school."

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