LABORATORY HISTORY

The chemistry chronicles

Derek Lowe relishes a celebration of the lab on its long march through time.

Ask non-scientists to picture a laboratory, and the odds are that they will imagine the kind of space that a contemporary chemist would work in, complete with lab bench, fume cupboard, sink and shelves of glassware. Chemistry was probably the first of the sciences to get a room of its own, and in *The Matter Factory*, Peter Morris, keeper of research projects at London's Science Museum, offers the first book-length treatment of how this happened and what has changed in labs over the years.

Antoine Lavoisier was central to the eighteenth-century chemical revolution.

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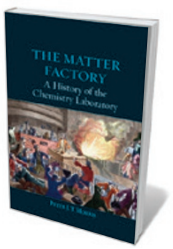
Laboratory history is inseparable from the history of chemistry. It takes us from scientific instrumentation to teaching, from the discipline's beginnings as the hidden art of alchemy to its modern status as a required course in science. It also takes in the rise of industrial research, the gradual raising of consciousness about safety and the personal impact of famous chemists. No discipline is immune to fashion, and a luminary — such as Robert Bunsen, who co-discovered spectroscopic analysis, or organic-chemistry pioneer Justus von Liebig — could set the tone for years by building a laboratory to his personal specifications.

As Morris shows, over all this stretches culture. Chemistry moved from a broadly French and English occupation during the Enlightenment, an era of experiments on gases and chemical compositions, to a German one in the mid-nineteenth century, with the Americans eventually beginning to take notes and draw up plans of their own in the twentieth century. Each nation had its own style, which blended with the practical aspects of a workplace to create distinctive looks. The most useful features (such as benches with drawers, and dedicated lines for gases and steam) are still to be found today.

Morris deftly keeps all these threads from getting too tangled. *The Matter Factory* starts in the alchemist's lair of the medieval era, dominated by the largest, hottest furnace available. The book makes clear that many engravings and paintings of alchemists at work must be inaccurate, because they were drawn by people suspicious of the whole enterprise. (Alchemists' own drawings, such as those in the seventeenth-century text *Mutus Liber*, tended toward the wildly allegorical and the wilfully obscure.) The German scientist Georgius Agricola's 1556 *De Re Metallica* (*On the Nature of Metals*) is probably the first reliable guide to early lab technique such as the handling of strong acids. In later illustrations, the furnace shrinks, then disappears entirely, and tables and benches appear.

Fume hoods began to take on a modern look by the 1920s, but separate cupboard-like spaces for experimentation (at first unventilated) go back to at least the mid-nineteenth century. Photographs from that time show benches and shelving progressively stretching across the floors and walls, and lines for water, gas, steam and (by the early twentieth century) electricity threading into the picture. Teaching labs gradually separate themselves from research labs, and industrial labs begin to stand on their own. Along the way, we chemists lose such amenities as the chemical museum, which displayed interesting specimens, compounds and lab equipment — a once common annex to many large laboratories, now completely forgotten.



The Matter Factory: A History of the Chemistry Laboratory
PETER J. T. MORRIS
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The nineteenth century saw perhaps the greatest number of changes in laboratory layout, as new instruments such as Bunsen burners and new styles of working, including team research, proliferated. Much of the book focuses on this era. The pace speeds up noticeably in the twentieth century, probably because the major features of the modern lab were already largely in place, down to the pegboard over the sink for drying glassware.

Today, one chemistry lab tends to look very much like another. In my own career, I have 'lived' in at least 14 labs, and their similarities are much more numerous than their differences, which largely come down to how instruments such as high-performance-liquid-chromatography equipment are arranged around the walls. If a chemist from, say, the early nineteenth century entered one, the glassware would be familiar, as would the bench and fume cupboard, although there might be a few cries of "Luxury!" at the sight of disposable pipettes and electronic balances. (The humming boxes around the periphery would, of course, be harder to place.)

The changes to labs of the future will probably come down to variations in the number and capacity of automated instruments. But the space will probably look broadly similar to what we have now, which will no doubt disappoint some industrial designers looking to make a big splash. *The Matter Factory*, however, is the story of the years (and centuries) during which such splashes could be made, when chemistry was finding out what it could do. It covers a lot of ground, and brings together many old drawings, plans and photographs that are otherwise scattered through a bewildering literature trail. It should remain the definitive history of the chemistry lab for many years. ■

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