

The Matter Factory

For decades, historians of chemistry have understandably focused on tales of discovery, whether it be Robert Boyle's debunking of Paracelsian principles, Antoine Lavoisier overturning the phlogiston theory, August Kekulé's dreams of benzene, Dmitrii Mendeleev sorting out the periodic table, or Linus Pauling pioneering a new vision of the chemical bond. By comparison, understanding historically what chemists actually *do* in their quotidian professional lives has been quite neglected; and entirely missing has been a systematic study of the evolution of their workplace and of the equipment therein. This desideratum has now been brilliantly satisfied by the eminent chemical historian Peter J. T. Morris, in this engaging study of the chemical laboratory across more than four centuries. The author was well equipped to tackle this subject; until his recent retirement Morris was senior curator of chemistry at the Science Museum in London, and has published widely on the history of chemistry and chemical industry. He also has had plenty of practical experience as a chemist.

Morris takes a case-study approach to the subject, and sensibly concentrates on a selection of specific laboratories that are sufficiently well documented to support his careful historical treatment. The volume is lavishly illustrated with striking images depicting of all sorts of historical laboratories, many of which are unfamiliar even to the specialist historian's eye. As a professional historian, Morris is also properly concerned to place these buildings, rooms, and equipment in their unique contexts, explaining to the reader how they "changed to meet the differing needs of chemistry" through the centuries (p.11).

We begin the tour ca. 1600, when the word "laboratory" first appears in English (referring specifically to a *chemical* workplace), and when we have the earliest reasonably detailed depiction of an actual alchemical laboratory—namely, the one in Wilhelm von Hohenlohe's castle in southern Germany. In successive chapters we proceed through Lavoisier's lab in the Paris Arsenal (1780s), Michael Faraday's Royal Institution facility in London (1820s), and Justus Liebig's famous institution in Giessen (1840s). We then tour the first of the new purpose-built German laboratory institutes, Robert Bunsen's in Heidelberg

(1855), which boasted "modern conveniences": piped-in water, steam heat, and gas for both illumination and for bench burners of the new Bunsen type.

For the 1860s we examine Wilhelm Hofmann's lavish "chemical palace" in Berlin, and for the following decade we tour the large new chemistry buildings in South Kensington and Manchester. We cross the Atlantic, and view Charles Chandler's chemical museum in New York; then back to Germany, this time for the Bayer corporate lab at Elberfeld. The last three chapters explore examples of laboratories, first in London during the 1890s; then in California's Silicon Valley during the 1960s; and finally the facilities at Oxford University in our own day, all the way down to 2013. Nor is Morris's analysis confined solely to these dozen specific examples; indeed, in every chapter we find a discussion of many other examples related to the particular case study of the chapter title.

Although the aesthetics of these constructions occasionally comes into the discussion, this is no architectural history; Morris rightly keeps his focus on the chemists' workplace as a place of daily work. We learn about the evolution of utilities (heating, water, gas, electricity), furnaces, burners, glassware, storage cabinets, lab benches, bottle racks (in U.S.: reagent shelves), and fume cupboards (in U.S.: fume hoods). We learn, among much else, that the chemical discovery stories we all know (or thought we knew) are more dependent on these material resources than we would have imagined. For instance, Heidelberg's introduction of town gas for illumination stimulated Bunsen to develop his eponymous low-illumination and high-heat bench burner for his new laboratory building; the new burner in turn proved uniquely suited for the invention of elemental analytical spectroscopy by Bunsen and Gustav Kirchhoff.

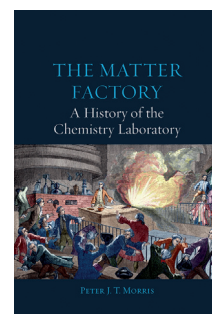
Always lively, well-informed, and beautifully organized, Morris leads his readers on a fascinating tour through material that can be found nowhere else. The book can be warmly recommended to all chemists, chemists in training, and vicarious chemists.

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