

problem because many of the wells delivered water high in arsenic.

Parascandola's final chapter turns to the area for which he is best known, history of pharmacy and medicine. Thomas Fowler, an 18th-century Englishman and Edinburgh-trained physician attempted to duplicate and then modify a patent medicine of the day. He called the resulting potion *Solutio Mineralis*. Under the name Fowler's solution, it found its way into many pharmacopoeias in the 19th century, and it became a widely used remedy for a variety of ailments. Paul Ehrlich's research into chemotherapeutic agents, including some containing arsenic, is also described. Ehrlich's "compound 606," patented under the name of Salversan, was an effective treatment against syphilis and trypanosomal diseases. A section of this chapter is devoted to the arsenic-eaters of Styria (a region now part of Austria). Reports of rural inhabitants of the area who deliberately consumed and tolerated arsenic in quantities that are generally harmful circulated widely in the middle of the 19th century. Such reports caused considerable debate in medical circles about their accuracy and plausibility—debate that continued into the 20th century. Meanwhile, the reports were so widely diffused that they appear to have influenced

the use of arsenic in 19th-century cosmetics and inspired a key plot point in Dorothy Sayers's 1930 novel *Strong Poison*. Arsenic in homeopathy is also mentioned in this chapter. Arsenicum album is a homeopathic remedy based on arsenic trioxide (albeit diluted to submolecular concentrations).

Parascandola refers rather frequently to two other recent books in which arsenic figures prominently. John Emsley devotes one of the five major sections of *The Elements of Murder* (Oxford, 2005) to arsenic. As one might gather from Emsley's title, perhaps the greatest overlap of his material is with the first chapter of Parascandola's book, but Emsley treats a great variety of other applications of arsenic as well, at least in overview. James Whorton's, *The Arsenic Century* (Oxford, 2010) touches on the toxicity of the element as both a deliberate and inadvertent poison. Its subtitle, "How Victorian Britain was Poisoned at Home, Work, and Play" suggests the breadth of the applications of arsenic it considers and the limitations to its geographic and temporal scope. A reader of more than one of these volumes should not be surprised to find quite a bit of material in common.

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*Early Russian Organic Chemists and their Legacy*, David E. Lewis, Springer, Heidelberg and New York, xii + 136 pp, ISBN 978-3-642-28218-8, \$49.95, softcover (978-3-642-28219-5, \$39.95, eBook).

When one considers the history of organic chemistry in the nineteenth century, the names that most quickly come to mind are those of German chemists like Liebig, Wöhler, and Hofmann. In this excellent book, Professor Lewis (University of Wisconsin-Eau Claire) makes a strong case for the inclusion of the significant and sometimes overlooked contributions of Russian chemists. As an example the rules of Markovnikov and Zaitsev are introduced in most organic chemistry courses during the study of alkenes. Professor Lewis is well known to readers of the Bulletin. This book is based in part on a series of thoroughly researched and well written articles that have appeared in its pages.

The initial chapters cover concisely the evolution of higher education in Russia particularly after the reforms

introduced by Peter the Great. In 1725 he established the Russian Academy of Sciences and his work of modernization and secularization of Russian higher education was continued by the rulers who immediately followed him. New universities were established in Moscow, and at the start of the nineteenth century at Dorpat, Vilna, Khar'kov, Kazan, Warsaw (at that time part of the Russian empire) and St. Petersburg. Later universities were opened in Kiev, Odessa, and Tomsk. All these universities were charged with developing advanced studies and research.

The first great figure in Russian science, including chemistry, was Lomonosov (1727-1797), a founder of Moscow University, and an anti-phlogistonist before Lavoisier. Many Russian university posts were initially occupied by German scientists but by 1830 there was a nationalist movement towards Russification of the universities, and more and more Russian professors were appointed during the nineteenth century. The principal loci of Russian organic chemistry in that period were the

universities of Kazan and St. Petersburg. Zinin was an important early figure in the Kazan school of chemistry. Trained initially in physics and mathematics he was instructed, for such was the autocratic nature of Russian universities at that period, to become a teacher of chemistry. He was given three years to study in Western Europe, and attended courses in Germany, France, and England. He spent a year doing research with Liebig, and then returned to take up his duties in Kazan. Major contributions made by Zinin to organic chemistry included the discovery of the benzoin condensation and the preparation of aniline from nitrobenzene.

Lewis writes in similar depth about the lives and careers of many other Russian organic chemists including

Butlerov, Menshutkin, Borodin, Beilstein, Markovnikov, Zaitsev, Zelinskii, and Favorskii, bringing his story up to the early twentieth century.

Springer Verlag has made an admirable choice in starting its series "Springer Briefs in Molecular Science: History of Chemistry" with David Lewis's book. It is nicely illustrated and has a full index and bibliography. This important work sheds light on a relatively little studied area of the history of organic chemistry in an easily read and authoritative manner.

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*Inventing Chemistry. Herman Boerhaave and the Reform of the Chemical Arts*, John C. Powers, The University of Chicago Press, Chicago and London, 2012, viii + 260 pp, ISBN 978-0-226-67760-6, \$40.

Herman Boerhaave (1668-1738) received his degree in Philosophy at the University of Leiden (1689) and a degree in Medicine at Haderwijk (1693). He was appointed lecturer at Leiden in 1701 and Professor of Botany and Medicine in 1709. In 1714 he became Rector and introduced a system of clinical medicine to advance the experiential education of medical students. In 1718 Boerhaave was appointed Chair in Chemistry. In 1729, in ill health, he resigned the Chairs of Botany and Chemistry and suffered declining health until his death.

The impact of Herman Boerhaave (1668-1738) on the history of chemistry is all too commonly considered to derive solely from his masterwork, *Elementa Chymiae*, the first authorized edition appearing in 1732. In a very limited sense that book can be considered the bridge between the important series of seventeenth-century chemistry textbooks, especially those published by the French chemists beginning with Jean Beguin, then Nicaise le Fèvre, Chistolphe Glaser and Nicolas Lemery and textbooks in the middle-to-late eighteenth century that provided more discussion of theory. Indeed while the first edition of Lemery's *Cours de Chimie* appeared in 1675,

the final printing of the final edition was published in 1757. Still, Lemery's text book was in a classical tradition that discussed chemical operations (e.g. distillations, crystallizations) before providing specific preparations of reagents, useful substances and medications.

The author of the present monograph, John Powers, is a faculty member in the Department of History and Assistant Director of the Science, Technology and Society Program at Virginia Commonwealth University. He assesses Boerhaave's pioneering work in formulating a powerful didactic approach in his teaching, providing standing for chemistry in the university curriculum and contributing to the application of experimentation to test chemical theory.

Chapter one ("Medicine as a Calling") provides background relevant to appreciating medical education in late seventeenth century Europe and young Boerhaave's early intellectual development. The section "Path to Professorship" in this chapter has a familiar ring to it for twenty-first century university faculty: a university's appointments swayed by powerful public officials; a university suffering financial distress and failing in attempts to hire academic "stars," filling diminishing ranks with part-time lecturers and facing diminishing matriculations. Boerhaave barely held onto his lecturer's appointment at this time but was kept on because he had a three-year