

BOOK REVIEWS

A Philatelic Ramble through Chemistry. E. Heilbronner and F. A. Miller, VHCA, Verlag Helvetica Chemica Acta AG, Zürich, and WILEY-VCH GmbH & Co. KGaA, Weinheim, 2004, ix + 268 pp, paper, ISBN 3-906390-31-4, \$89.95.

There is something for everyone in this excellent book: the chemist, the historian of chemistry, and the philatelist. For the person like me, who is interested in all three areas, this book is the bible of chemical philately. This is the first book of its kind, a comprehensive review of how chemists and chemistry have been depicted on postage stamps and other philatelic items such as covers, souvenir sheets, and maximum cards. The authors, Edgar Heilbronner and Foil A. Miller, distinguished chemists and long-time philatelists, emphasize that the book is not a history of chemistry, since important parts of chemical history are missing for the simple reason that they have not found their way onto postage stamps. For example, at the time of printing, no postage stamps had been issued to honor Henry Cavendish, Joseph Black, Anders Ångström, Johann Balmer, Robert Bunsen, or Johannes Rydberg. Nonetheless, more than 1,000 stamps and other philatelic items are depicted.

This 268-page soft cover book, published in 2004, is identical in content to the hardcover version, which was published in 1998. Both were published jointly by Verlag Helvetica Chimica Acta of Switzerland and Wiley-VCH of the Federal Republic of Germany and printed in Germany. The printing and color reproduc-

tion of the philatelic material in the soft cover edition is superb, as it is in the hardcover edition. The new edition is welcomed, since the book is now more widely available compared with the limited edition hardcover version. The one drawback is the soft cover edition is about twenty-five percent smaller in size, making the notations and formula on some of the philatelic items difficult to read. The soft cover version has not been updated to include additional philatelic items of chemical interest issued since 1998.

Although each author was responsible for their individual chapters, their slightly different writing styles do not detract in any way from the readability of the book. Each thematic chapter starts with an overview of the discipline covered and follows with the chronological development of the discipline, using postage stamps and related philatelic material to illustrate the chemist or chemical topic discussed. For example, Chapter 1, entitled *The Beginnings*, contains a discussion of chemistry in Greece and the stamps illustrate the following: the elements that were known at the time; Pythagoras of Samos and his famous theorem; Democritus of Abdera who related the properties of substances to their shapes, and the classical four elements fire, air, water, and earth, as discussed by Aristotle and Plato. Chinese chemistry and alchemy are beautifully illustrated with stamps showing lacquer-ware; Chinese pottery; Tsai Lun, the inventor of paper; early papermaking; as well as fireworks and the Chinese invention of gunpowder. A beautiful souvenir sheet of six stamps issued by Gambia in 1993, each showing a different work of art, for example, illustrates Chinese pottery. A total of 44 philatelic items

illustrate this first chapter. An attempt has been made to place the text and the related illustrations on the same page. Thus it is visually easy to relate the illustration to the text, which is helpful in a book that includes many illustrations.

Chapter 2, entitled *Alchemy, the Chemistry of the Middle Ages*, includes a brief history of alchemy, which developed in Egypt and the Middle East, and independently in China and India. The stamps illustrate alchemists in literature and art as well as named alchemists who have appeared on stamps. The latter section includes stamps of Avicenna, a noted Persian physician; Albertus Magnus, a German scholar; Paracelsus, a Swiss physician and alchemist, Georgius Agricola, known as the 'father of mineralogy,' Robert Boyle, successful in transmuting alchemy into chemistry; and Joseph Priestley. There are many humorous anecdotes included in this highly readable and informative book: for example, the letter that Joseph Priestley wrote in 1777 to Benjamin Franklin indicating that he 'did not quite despair of finding the philosopher's stone,' to which Franklin is said to have replied that 'if he finds it, take care not to lose it again.'

The remainder of the book follows the same format, illustrating the fields of inorganic chemistry and the discovery of the elements, organic chemistry, physical and theoretical chemistry, spectroscopy, X-ray structure analysis, technical chemistry, and in the final chapter, miscellaneous topics.

One of the most enjoyable parts of the book I found to be "Chomical Errors on Chemical Stamps," part of Chapter 9, *Miscellaneous Topics*. The authors point out Yogi Berra's dictum 'You can observe a lot just by watching,' and illustrate their expertise in chemistry by pointing out numerous gaffes that have appeared on postage stamps and related items. The authors' first-prize worst chemical error on a stamp goes to the country of Monaco, for its 'inverted' methane molecule HC_4 . An embarrassing blunder can be found on a stamp issued by France in honor of Henri Moisson, who received the Nobel Prize for the discovery of fluorine. The stamp shows the reaction of hydrogen and fluorine to produce hydrogen fluoride, whereas the opposite reaction was intended to represent the discovery. The 'Golden Turkey' award for 'Mad Benzene Rings on Stamps' goes to a stamp issued in 1971 by Argentina. Instead of benzene we are offered the 'hexacarbenobenzene' molecule $\text{C}_6(\text{CH})_6$. Wrong names and dates are numerous on stamps of a scientific nature. A 1977 stamp from the Comoro Islands purports to show five Nobel Prize lau-

reates in chemistry, but both Banting and Hench received the prize in medicine and Perrin got his for physics. In addition, Madame Curie got her chemistry prize in 1911 instead of 1913 as indicated. Being able to catch these and numerous other errors on stamps reflects the expertise of both authors in their field.

As one who is interested in postal history, I was particularly fascinated with the excellent array of covers displayed throughout the book. Many of these covers, borrowed from private collections, were autographed by famous chemists, and many had gone through the mails, and hence included a dated cancellation, which commemorated some historical event in the history of chemistry. One cover, for example, was a first-day cover from Sweden with an early stamp honoring Nobel and signed by members of the 1994 Chemistry Nobel committee. Another interesting cover, commemorating the centenary in 1971 of the birth of Victor Grignard, was addressed to Professor Vladimir Prelog, who went on to win the Nobel in chemistry in 1975. The discovery of crown ethers seems to have been anticipated by a cancel on a 1960 cover, which shows the formula of a cyclic polyformaldehyde molecule consisting of six formaldehyde units. The cover is autographed by Jean-Marie Pierre Lehn and Donald Cram, who shared the Nobel Prize in 1987 with Charles Pedersen.

The book is loaded with interesting facts, each illustrated with a stamp or related material. For example, the authors illustrate maximum card (a post card illustrated with the same image as the postage stamp affixed), showing a mandarin-duck-shaped lacquer box dated 433 B.C. and to explain how lacquer works as it does. This reviewer was not aware that Isaac Newton, depicted on numerous stamps, devoted thirty years to the study of alchemy, beginning in the mid 1660s; or that Dmitri Mendeleev, depicted on a 1969 Russian stamp, was the youngest of seventeen children and created his periodic system in one day. Another interesting fact is that the early aniline dyes, the first of which was discovered by William Henry Perkin in 1856, were dear to philatelists because they were used for printing later versions (of different denominations and color) of the first stamp ever issued, the British 'Penny Black.'

The authors' efforts to document all text and the numerous illustrations are to be commended and make the book a particularly good reference for both chemical philately and the history of chemistry. For example, Chapter 5, *Physical and Theoretical Chemistry*, includes 69 references and the history is illustrated by 166 stamps and related material. Chapter 4, *Organic Chemistry*,

takes the prize for the largest number of illustrations, with 218 items. Although not mentioned by the authors, it becomes clear on reading the book that the United States has not done a particularly good job in documenting its chemical heritage philatelically. This is not to say that chemists have never been depicted on stamps of the U. S. Joseph Priestley, Percy Julian, and George Washington Carver have been so honored. However, to date, no American Nobel Prize winner in chemistry has appeared on a U. S. postage stamp. To make matters worse, other countries have so honored American chemists, for example John H. Northrop on a stamp from Gabon, Linus Pauling on a stamp from Upper Volta, and Glenn Seaborg on a stamp from Malagasy. Great Britain and Sweden have done a particularly good job in depicting their chemical heritage and particularly the Noble Prize with postage stamps and related material.

Another strength of the book, especially to the chemical philatelist, is the excellent stamp identifica-

tion list at the end of the book. For each illustration in the entire book, the number, country, date of issue, the denomination, the Scott number, and the subject matter are clearly itemized by chapter. It is unfortunate that publishers other than Scott (the United States) were unwilling to have their numbers used in combination with those of another system, since excellent catalogs exist such as Gibbons, Michel, and Yvert.

In conclusion, this book has served its purpose in documenting, in the highest quality, our chemical heritage as depicted on philatelic material. Although the title of the book only refers to chemistry, there is much included to interest the physicist, and rightfully so because of its impact on chemistry. The chapters on spectroscopy and X-ray structure analysis are particularly good examples of this. There is much here for the scientist and the nonscientist who is interested in chemistry, and the book is a thoroughly enjoyable read. *John B. Sharkey, Pace University, New York, NY 10038.*

Gay-Lussac: Scientist and Bourgeois. Maurice Crosland, Cambridge University Press, New York and Cambridge, 1978; new paperback edition 2000, xvi + 262 pp; appendix, notes and bibliography.

Cambridge University Press has done the history of science community a fine service by republishing in paperback Maurice Crosland's landmark biography of Joseph Louis Gay-Lussac (1778-1850), which has long been out of print. As historians of chemistry well know, Gay-Lussac's significance extends far beyond the establishment of his eponymous law of combining gas volumes (1809)—although that discovery alone would have been sufficient to immortalize his name. A provincial student educated at the Ecole Polytechnique in Paris soon after its founding, Gay-Lussac became assistant to Berthollet, quickly proving his brilliance in precise physical and chemical research, particularly in volumetric studies of gases. Elected to the Académie des Sciences at the extraordinary age of 28, he was appointed to simultaneous professorships in the Paris Faculty of

Science (the Sorbonne) and the Ecole Polytechnique; in 1832 he gave up the former post to accept a position at the Muséum d'Histoire Naturelle. By the 1830s these posts, as well as additional lucrative bureaucratic and consulting work, made Gay-Lussac both very wealthy and politically influential.

In the first decade of the century, Gay-Lussac had been a member of the Société d'Arcueil, the informal group of young chemists and physicists around Berthollet and Laplace. No one in history, except perhaps Robert Bunsen in the next generation, could compare to the precision and artistry with which Gay-Lussac handled and studied gases, but he was also a superb "wet" chemist, as well. Together with his friend L. J. Thenard, he virtually controlled Parisian academic chemistry in the 1820s and 1830s, before he became sidetracked by consulting and government work. He was also one of the most brilliant teachers of the century, his mentorship of the young Justus Liebig being the most obvious example.

Crosland's biography is not only one of the best scientific biographies of the last generation, it is also one of the earliest modern monographic biographies of an important nineteenth-century French chemist. Using an extraordinary range of the sources, including masses of surviving letters and other manuscripts, Crosland builds a compelling picture of Gay-Lussac's life, both in scientific and personal terms. One of the great

strengths of the work is its analysis of the political and social context of science in Restoration and Orleanist France. It is also beautifully written, providing an appealing account of Gay-Lussac's attractive personality. All in all, the book marks a milestone that has lost none of its significance twenty-six years after its first appearance in print. *Alan J. Rocke, Department of History, Case Western Reserve University.*

DuPont: From the Banks of the Brandywine to Miracles of Science. Adrian Kinnane, Johns Hopkins University Press, Baltimore, MD, 2002, distributed for the DuPont Co., 272 pp, 598 illustrations, ISBN 0-8018-7059-3, \$29.95.

This 11" x 11" 4-lb. coffee-table book was commissioned by DuPont on the occasion of its 200th birthday. The author is affiliated with History Associates Inc, which also provided research and editing services from several other staff members. The photographs are largely from the collection of Hagley Museum and Library. Although DuPont's founding and early development have been the subject of earlier accounts, historians of chemistry will find the first six chapters of primary interest. The more recent history of the company covering the last three decades is detailed for the first time in this book.

In Chapter 1, "A Vision and Product," the author presents the fairly familiar story but with an eye to detail of the founding of the US company by Eleuthère Irénée du Pont (E. I.), who visualized its successful future in the manufacture of gun powder. The original powder works on the Brandywine River near Wilmington, DE, were called "Eleuthère Mills." Considerable detail is presented about the financing and operation in the early days and of the frustrations and challenges E. I. faced up to his death in 1834. After a three-year transition in management, Alfred, one of E. I.'s sons, took over the company. He was succeeded in 1850 by another son Henry, a graduate of West Point.

The transformation of the growing company from the Civil War to the end of the 19th century is covered

in Chapter 2, "Family Firm, Growing Nation." The reader is informed about expansion of products to include guncotton ("smokeless powder") and dynamite; but we also learn about the du Pont family: those who distinguished themselves by service in the Civil War, a diarist daughter of E.I., marriages, births, and personal tragedies.

Chapter 3, "The 'Big Company,'" covers continued expansion and diversity of DuPont, partially prompted by the demands of World War I. By 1919 the company's assets had skyrocketed, and new directions were sought. The investment into General Motors and development of new product lines such as dyestuffs, plastics, and paint are described in Chapter 4, "Serving the New Customer." The company was organized into departments; the Buffalo plant was opened for production of rayon and cellophane; and DuPont began supplying the auto and film industries.

Charles Stine is credited with the vision for developing a solid commitment to basic research in the 1920s, as we learn in Chapter 5, "Discovery." He called investment into research "patient money," whose dividends might not materialize for a long time. Once the executives were convinced, DuPont went forward with an aggressive program of basic investigations in five areas—catalysis, colloids, polymerization, chemical engineering, and chemical synthesis—each headed by a distinguished research chemist. Indeed, in that 'golden era' of discovery, DuPont came forth with highly successful products such as neoprene and nylon. It was in 1935 when, under severe public criticism for its undue profiteering at the expense of the public, DuPont coined the famous—now, in some minds, politically incorrect—motto, "Better Things for Better Living..Through Chemistry."

The era of World War II, covered in Chapter 6, “Science and the Affluent Society,” provided the challenge of contributing to the war effort, which DuPont did under the supervision of Crawford H. Greenewalt, who later headed the company. DuPont collaborated in construction of the nuclear reactor at Oak Ridge as part of the Manhattan Project, with the understanding that the company would be remunerated in the amount of \$1 above the cost. (In the final settlement, the government auditors insisted DuPont return 33 cents because the war ended before their contract did.) At the end of the war, Greenewalt oversaw the adjustment to peacetime manufacturing and the appearance of products such as Dacron[®], Orlon[®], and Teflon[®].

The more recent evolution of DuPont, described in detail in Chapters 7-9, includes the prosperity of the 1960s superimposed on social and economic pressures brought on by concerns for the environment; the inevitable tension between basic and applied research; new directions toward pharmaceuticals, agricultural chemistry, and biotechnology; discontinuation of the manufacture of explosives in the 1970s; and response to the energy crisis.

Although the book clearly sends a message of pride in the DuPont Company, it is presented in a highly objective style and enriched with myriad photographs and reproductions of archival documents, aside from the promotional materials (The reader is told that the dust cover is made of Tyvek[®] and given a web site for further information.) In this reviewer’s opinion, the author has effectively presented a detailed, honest account of the founding, growth, and evolution of DuPont. It includes not only the major successes but also misjudgments, financial failures, and family squabbles. The ample Endnotes for each chapter are particularly appreciated by the historian. Especially helpful for an overview of DuPont’s hierarchy is a partial “family tree” on p 9, depicting members of the du Pont family (and spouses) who have played a role in the company’s founding and management. It would have been even more useful had it included dates of service. The index appears to be extensive and accurate. The book will be attractive on the coffee table, but it is far more than a decoration—a source book of a chapter in the history of American industry. *Paul R. Jones, University of Michigan*

The Last Alchemist: Count Cagliostro, Master of Magic in the Age of Reason. Iain McCalman, HarperCollins, New York, 2003, xii + 246 pp, ISBN 0-06-000690-0, \$25.95.

Giuseppe Balsamo, alias Count Alessandro di Cagliostro, among several other pseudonyms (1743-1795) gained fame and infamy in France, Russia, and England in the latter half of the 18th century for his reputed skills in alchemy, mysticism, and necromancy. Yet his names are far less familiar than those of his alchemical predecessors of the previous century or his contemporaries with more formal education than he possessed. He warrants no mention in the chemical histories of Partington or Ihde, and an internet search under “cagliostro” yields only four hits, provided by *Theosophy*, *Encyclopedia Britannica*, Google, and Alpha Chi

Sigma. Author McCalman, Director of the Humanities Research Centre, Australian National University, provides a highly readable rendition of the man, warts and all. We are told how the author was motivated to write this account in the very last paragraph of the book:

Of all the real and mythic lives of Giuseppe Balsamo—Alessandro Cagliostro, the one, finally, that attracts me most is the one I encountered first outside the house of Balsamo in Palermo—the one that launched my project of writing this book.

In stating this, McCalman has chosen to accept some “facts” of Cagliostro’s life over others, for the account of this character in the *Theosophy* source indicates mystery and uncertainty about the location of his birth. The sources for this book are numerous, however, including archival material from libraries in Australia, Paris, Strasbourg, London, Oxford, Italy, Basel, and California. The reader is reassured that many of the letters,

statements, and sometimes gory details are based upon original documents, listed at the end as Notes. These have been examined with the help of several translators. The result is a hybrid between a scholarly biography and an historical novel that is revealing and informative, yet presented by means of an amusing and palatable narrative.

We are taken on a journey of this controversial but incredibly resourceful character from birth to death. The prologue, chapter headings, and epilogue reveal the course of that journey: House of Balsamo, Freemason, Necromancer, Shaman, Copt, Prophet, Rejuvenator, Heretic, Immortal. On the way we learn of Cagliostro's direct encounters with individuals in high stations in several countries, many of whom had direct access to kings, queens, cardinals, and the pope. Essentially self taught, he is reputed to have carried out alchemical trans-

formations, cured the sick, predicted coming events, and communed with the dead. To call him simply an "alchemist" understates his reputation. As a dedicated Freemason, he made contacts with other initiates wherever he traveled, along with his long suffering but conniving wife Lorenza Seraphina Feliciani, whom he married when she was 14. It was eventually she who was responsible for his terminal imprisonment in Italy, after she reported his active role in Freemasonry, a crime in the eyes of the Roman Catholic Church.

A reader acquires a very tangible sense of the way in which the Count and Countess seized every conceivable opportunity to gain fame and fortune in clever, albeit often unscrupulous ways, thanks to McCalman's ability to weave archival "facts" into a smooth, lively narrative. *Paul R. Jones, University of Michigan.*

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