BOOK REVIEWS

The Secrets of Alchemy, Lawrence M. Principe, University of Chicago Press, London and Chicago, 2013, vi+281 pp, ISBN 978-0-226-68295-2, $25.

In his new survey of the history of alchemy, Lawrence Principe begins with the seemingly simple question, "what is alchemy?" Of course, the answer is not simple at all. As he states, Principe composed *The Secrets of Alchemy*, in part, because of the popular resurgence of interest in alchemy driven by fictional literature, television, and film. However, non-specialists who wish to dig deeper into the history of the field are often confronted by a labyrinth of contradictory sources composed by popular writers, occultists, and enthusiasts, who rely on cliché and gross historical misinterpretations. Concomitant with the growing popular interest, a scholarly resurgence of interest in alchemy, propelled by Principe and other historians, such as William Newman, Betty Jo Dobbs, Allen Debus, Bruce Moran and Pamela Smith, has overturned many of the common claims about alchemy found in popular sources. This revisionist work has recast medieval and early modern alchemy from an obtuse, obscurantist pseudo-science (which, in some interpretations, did not even attempt to study matter, but rather the psychological states of the alchemist) to a rational, experimentally-based form of natural philosophy aimed at producing and improving substances as well as understanding the principles behind these transformations. Principe's book offers the first synthetic view of this recent scholarly work and, strikingly, is the first such introductory survey of alchemy by a historian for almost sixty years.

The Secrets of Alchemy maps the history of the practices, theories, and cultural meanings of alchemy from its ancient Egyptian origins through its almost two thousand year history. The book discusses the three traditional chronological/cultural periods of alchemy—the ancient Greco-Egyptian, the medieval Arabic, and the late medieval and early modern European. To these, he adds a fourth period spanning from the eighteenth century to the present, which focuses on revivals and reinterpretations of earlier alchemy.

Principe points out that he cannot discuss every alchemist and text in a book of this sort, so he focuses on main themes and a few key persons in each chapter to discuss in detail. Thus, he devotes a large section of Chapter 1 on Greco-Egyptian alchemy to Zosimus of Panopolis; Chapter 2 on Arabic alchemy focuses on Jābir ibn-Hayyān and the Jābirian Corpus; while Chapter 3 (the most diverse chapter) on medieval Latin alchemy examines the *Summa Perfectionis*, John of Rupecissa, the Lullian Corpus, and the development of *florilegia* and early alchemical emblems. In the final three chapters of the book (5-7), Principe discusses the "golden age" of alchemy of the 16th and 17th centuries. Here, he examines topics at the core of his own research and attempts to recreate the practical and conceptual world of the early modern alchemist. For example, in Chapter 5 he describes how one might have gone about making the Philosophers' Stone: deciphering a recipe from the various available texts, developing a theory of how it worked, collecting evidence that it worked, and then undertaking the work itself. In addition to making the Stone, Principe also reveals the wide breadth of alchemical projects, including the transmutation of metals via means other than the Stone, the making of alchemical medicines, the artificial generation of living things, palingenesis (the creation of

a ghostly image from the ashes of a living thing), and the creation of the alkahest (universal solvent).

In effect, *The Secrets of Alchemy* presents a new model for the history of alchemy and establishes an interpretive framework, which explains and absorbs previous, competing depictions of alchemists and their activities. Building upon earlier work, in which he collaborated with William Newman, Principe shows that the image of alchemy as an occult art, psychological exercise, or irrational pseudo-science is largely the construction of 18th century and later reinterpretations of medieval and early modern alchemy (i.e., the work of the fourth period). In his book, he endeavors to peel away these later interpretations and place pre-modern alchemy within its proper historical context. To this end, he adroitly illustrates how changing ideas in and about alchemy and, notably, controversial practices, such as the emphasis on secrecy and use of allegorical language, were shaped by their contemporary philosophical, religious, literary, and political cultures. By taking this approach, Principe demonstrates the rationality of alchemical practices when interpreted according to culture and aims of alchemists themselves.

By historicizing modern psychological or occultist interpretations in the same way, Principe effectively subverts these approaches as viable models for understanding pre-nineteenth century alchemy. He effectively outlines the historical genesis of these approaches in Chapter 4. In the early 18th century, chemists at institutions, such as the *académie royale des sciences*, began to denounce the politically-problematic parts of their art, like the transmutation of metals, as fraudulent in order to improve their status among their peers and with their patrons. Although some chemists, including a few at the *académie*, continued to experiment with transmutation in secret, by the end of the 18th century, many authors lumped alchemy in with other "superstitious" beliefs, like magic and witchcraft. However, alchemy enjoyed a revival and reinterpretation in the hands and minds of Victorian occultists. In 1850 Mary Ann Atwood, a practitioner of Mesmeric healing and, later, Theosophy, first suggested that the true aim of alchemy was the spiritual perfection of the alchemist and not the pursuit of laboratory operations. This became a common interpretation among students of the occult and later, new age practitioners. Shaped by this view, the Swiss psychoanalyst, Carl Gustav Jung (1875-1961) argued that while some alchemists did perform experiments, the primary aim was the transformation of the psyche, and as such, the materials used in laboratory operations were of little concern; alchemical texts and emblems encoded "psychic" processes rather than chemical ones. Jung's interpretation of alchemy proved to be remarkably resilient, was adopted and expanded by a host of social scientists and other scholars, and shaped the popular perceptions of alchemy during the twentieth century.

A key difference, which distinguishes Principe's history of alchemy from the Jungian or occultist views, hinges on how one interprets alchemical texts. Secrecy was a central trope of alchemical writings, and alchemists obscured the meaning of their texts through the use of allegorical language, *decknamen* (false names), and techniques of dispersion (placing different parts of a process in different places in a text). Principe points out, however, that not all alchemical texts were written in this manner. For example, the very influential, 12th century *Summa Perfectionis*, composed by the Italian monk, Paul of Taranto, writing under the pseudonym, "Geber," was intended as a scholastic summation of alchemical knowledge and, as such, presented its material in a clear and orderly fashion. For those authors who utilized techniques of concealment, Principe argues that their allegorical language and *decknamen* encoded recipes, the identity of materials, and other theoretical and practical clues needed to undertake chemical processes. Thus, these texts were meant to be decoded by readers who could decipher their imagery and possessed enough practical knowledge of chemical operations and materials to interpret the clues correctly. As Principe asserts, these texts "not only … *conceal* their knowledge, but also … *reveal* it in a measured way" to those who had the talent and time to decipher them (152-3). Thus, the alchemist at work is both a scholar and chemical practitioner, one who by studying the texts deciphers recipes and processes, which he then tests experimentally in the laboratory.

Principe supports this interpretation of practical alchemy by discussing his own experimental work in replicating the processes encoded in several prominent alchemical texts. In Chapter 6 he discusses his work on the first three processes encoded in Basil Valentine's "twelve keys" (c. 1599), an allegorical presentation of a stepwise processes to make the Philosophers' Stone. He describes successful efforts to decipher the processes encoded in the texts (which, in later editions, also included emblems based on the texts) and, then, to test those processes in the laboratory. Similarly, he describes his efforts to create the "Philosopher's Tree" (a crystalline structure formed from an amalgam of gold and "philosophical" mercury) as described in Eirenaeus Philalethes' *Open Entrance to the Closed Palace of the King* (1667). As a result of these

trials, Principe argues that one cannot simply discount these texts out of hand, even if the deciphered recipes seem odd from the perspective of modern chemistry. Take, for example, Valentine's third key, which coded a process to make "volatile" gold, a substance that Valentine described as "the rose of our masters ... and the red dragon's blood." Principe's deciphered recipe called for dissolving a quantity of gold in acid, which was then distilled off and used again to re-dissolve the gold dregs. This process, called cohobation by 17th century chemists, was repeated over and over. As Principe points out, this process seems pointless at first, but after several cycles, ruby red crystals of gold chloride, which is normally unstable, begin to form in the distillation apparatus due to a buildup of chlorine gas (149-52).

Overall, this is an excellent introduction to the history of alchemy that corrects popular misconceptions, makes the case for the current scholarly interpretations of the field, and also gives glimpses into the kind of contextualized work that historians of chemistry do. Principe's book provides solid and accessible ground for the novice, who seeks to navigate the labyrinthine literature on alchemy, but I must confess, it also provides a useful framework for scholars as well. As such, Principe aims for both audiences. He clearly explains technical terms and presents English translations for all titles and texts discussed, but also references all original source material in thorough footnotes and an excellent bibliography. Thus, I recommend this book for anyone with an interest in the history of alchemy or chemistry before 1800, tyro or adept.

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Dictionnaire de chimie: Une approche étymologique et historique, P. de Menten, De Boeck, Brussels, 2013, 395 pp, ISBN 978-2-8041-8175-8, $45.88.

The reason for bringing this new foreign language chemical dictionary to the attention of historians of chemistry lies in its subtitle, since its author, Pierre de Menten, not only provides the usual definition of each chemical term but also attempts to trace both its linguistic etymology and, more importantly for historians of chemistry, the approximate date of its first appearance in the chemical literature. I can testify to the author's familiarity with early European chemical literature as I often corresponded with him concerning my bimonthly column "Ask the Historian" in the *Journal of Chemical Education,* and for which he would often provide highly relevant references I had overlooked.

The dictionary is richly illustrated with period woodcuts and historical diagrams, and also contains appendices devoted to synoptic historical charts and a list of chemical synonyms for the various entries. Though the formal entries themselves deal strictly with chemical terminology and apparatus and not with individual chemists, there is also an extensive index cross-referencing the names of important chemists with the various entries in which they are mentioned in passing.

About the only drawback to this ambitious project is the fact that de Menten's extensive historical footnotes, presumably referencing the various papers and books in which the terms are first used, are not included in the book itself but rather must be accessed via a supplementary website.

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