Lives and Times of Great Pioneers in Chemistry

In this book Rao and Rao tell the life stories of 21 chemists—clearly their heroes—who have played central roles in the evolution of the field. They start with Lavoisier, identified as the "father" of modern chemistry by the authors (most historians would surely agree), and proceed chronologically to include many of the major figures of 19th and 20th century chemistry. The target audience for the book, as per the publisher's website, is "students and teachers of chemistry, young scientists and chemists."

As the title foretells, the authors focus on portraying the personal lives of the subjects and placing their work within the context of the times in which they lived; and indeed that is the most successful aspect of the work. While they do occasionally succumb to the common tendency to give an individual all the credit for a discovery (descriptors such as "unique" or "mindboggling" are overused), generally they do try to show the key connections and influences—both forward and backward—in each of their case studies. Some particularly well-chosen examples include the role of G. N. Lewis in establishing UC Berkeley as a leading center of chemical research; a list of followers of Henry Eyring who won Nobel Prizes for their work in dynamics (which Eyring did not—Nobel winners and losers seem to be a particular interest for the authors!); and a brief feature on Robert Mulliken and his contributions to molecular orbital theory, imbedded in the chapter on Linus Pauling (who was decidedly not a proponent). A lengthy discussion of Arrhenius' early recognition of the role of CO_2 in the greenhouse effect is most welcome, given the high current visibility of the topic.

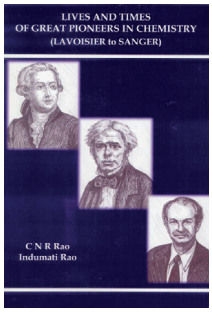
One cannot quarrel much with the choice of subjects either; many more could have been included (Pasteur, Curie, Nernst, etc. etc.), as the authors acknowledge, but that would have resulted in an overlong book. One might offer a few quibbles, such as including Richard Willstätter while omitting his colleague and friend Fritz Haber; Haber *is* discussed at some length, and his role in gas warfare research excoriated, in Willstätter's chapter, so it may be that this decision was based more on personal regard than on an assessment of relative importance of their contributions.

In addition to the main focus on lives and times, the authors devote a good deal of attention to the scientific accomplishments of their subjects. I would have to say that this aspect of the book is more uneven. Their apparent favorites—the ones who get the longest chapters and/or most over-the-top descriptors: Lavoisier ("Father of chemistry"), Davy ("The great discoverer"), Faraday ("The greatest scientist of all time"), and a few others—receive fairly thorough and reasonably accurate accounts of their contributions to chemistry; but too many of the others are cursory and/or vague. For example: "Based on his extensive observations…Dalton surmised correctly that the [atmosphere] was a mixture consisting (*sic*) approximately 80 percent nitrogen and 20 percent oxygen." What kinds of observations did he make, and how did they lead to this conclusion? A detailed explanation would have been *much* more valuable for the intended readership.

A more serious problem is the large number of confusing statements and even outright errors. Some of these are no doubt simple typos, as on the very first page (not an promising start!) where they place Mendeleev's periodic table in "the early part of the 20th century" (they do get the chronology right in the chapter on Mendeleev), or when they reverse the proportions of hydrogen and oxygen in water in the chapter on Lavoisier, but many others seem to be consequences of misreading or misunderstanding. The numeric values of combining ratios of NO and O_2 they cite to demonstrate Dalton's law of multiple proportions do not make sense in context; "oxymuric acid" was not the name by which ammonia was called in Davy's time; there was no concept of atomic number independent of atomic weight in Mendeleev's day, as a comment in that chapter implies.

The most egregious mistake is in the chapter on Alfred Werner: "Werner had to experimentally resolve a coordination compound with optical activity to support his theory. In 1911, Werner and his student V. L. King succeeded in resolving the cobalt compound they had prepared in the laboratory into cis and trans isomers." This is not just a typo, as it is accompanied by a figure showing the *cis* and *trans* isomers of $[CoCl_2(NH_3)_4]^+$, which of course are *not* optically active. Likewise, the discussion of van't Hoff's work on the asymmetry of tetrahedral carbon centers is illustrated by a diagram showing maleic and fumaric acid, another case of *cis–trans* isomerism. It appears the authors just did not recognize the difference between these crucial concepts!

In addition to problems of content, the production qualities fall far short of what should be considered acceptable for a professional publication. The English writing style is at best serviceable, with many instances of repetitive wording, awkward constructions, imperfect punctuation, and (especially) omission of articles. Typographical errors are rife; references to sources and bibliographic citation are haphazard; formatting seems random (some paragraphs are presented within boxes, for no obvious reason); figures often lack



Lives and Times of Great Pioneers in Chemistry
(Lavoisier to Sanger)
By C. N. R. Rao and Indumati Rao. World Scientific Publishing, Singapore 2016. 324 pp., hardcover, £38.00.—ISBN 978-9814689052

captions, and many appear to have been selected for convenient access rather than their ability to effectively illustrate the text.

I am sorry to have to be so negative; this book was clearly a "labor of love," as the authors proclaim in the dedication, into which they put a lot of work, and it does present a good deal of entertaining and interesting information. But the large number of technical and historical errors make it much less valuable for the students and young chemists who are its main intended readership; and there is really no excuse for the many defects of presentation, which surely could have been immensely improved by the thoroughgoing attention of a competent and dedicated copy editor. Love is not sufficient; care and understanding are also required.

Jay A. Labinger
California Institute of Technology (USA)

International Edition: DOI: 10.1002/anie.201601295
German Edition: DOI: 10.1002/ange.201601295

