Acta Crystallographica Section B
Structural Science
ISSN 0108-7681

book reviews

Works intended for this column should be sent direct to the Book-Review Editor, whose address appears in this issue. All reviews are also available from **Crystallography Journals Online**, supplemented where possible with direct links to the publisher's information.

The Periodic Table: Its Story and Its Significance. By Eric R. Scerri. New York: Oxford University Press 2007. Pp. xxii + 346. Price (hardback) £19.99. ISBN-13: 978-0-19-530573-9.

Ever since I first became acquainted with the periodic table of the elements, I have not stopped being fascinated by it. I have never felt bored in its company. Eric Scerri's book enhances this fascination. When Michael Polanyi taught his doctoral student Eugene P. Wigner about what science was, he told him 'that science begins when a body of phenomena is available which shows some coherence and regularities, that science consists in assimilating these regularities and in creating concepts which permit expressing these regularities in a natural way' [Wigner, City Hall Speech – Stockholm, 1963; Wigner, E. P. (1967). *Symmetries and Reflections: Scientific Essays*, pp. 262–263. Bloomington & London: Indiana University Press]. He could not have described Mendeleev's discovery of the periodic table better. Polanyi even added 'that it is this method of science rather than the concepts themselves (such as energy) which should be applied to other fields of learning'. This approach of transdisciplinarity resonates well with Scerri's book and his concluding message implies that the periodic system has relevance to a much broader community than just to chemists (p. 286).

Scerri takes a very broad view of the story of the periodic system and it is instructive to follow the development from the platonic solids representing the five elements, the tetrahedron – fire; the cube – earth; the octahedron – air; the dodecahedron – cosmos; the icosahedron – water. There are lesser known attempts, though no less sophisticated for their time: the Italian crystallographer Aldo Domenicano and I discovered a system of elements in Anagni, Italy, at the Cathedral built between 1072 and 1104 [Hargittai, I. & Domenicano, A. (1996). *Chem. Intell.* **2**, 56]. One of the frescos in the crypt depicts the four elements (earth, water, air and fire) so the assembly is one short, but it lists, in addition, six properties of the elements (immobile, corpulent, obtuse, mobile, subtle and acute) and even their correspondence!

There are few aspects of the story of the periodic system that Scerri would not tackle and would not make exciting. A separate section discusses the names and symbols of the elements. There is a captivating story of naming element 105 and the rivalry between the names of hahnium after Otto Hahn, the co-discoverer of nuclear fission, and dubnium after Dubna the nuclear research center in Russia where considerable work on newly discovered elements has been progressing. The official name now is dubnium. As element 109 has been named meitnerium after Lise Meitner, the other discoverer of nuclear fission who was omitted from the Nobel Prize for the discovery, this can be seen as a belated administration of justice. Of course, Hahn could enjoy the benefits of the Nobel Prize while he was still alive, whereas Meitner's honor came posthumously. It is another question then which is the greater honor. Glenn T. Seaborg told me at the time (in 1995) when the officials deciding on the new names of elements were still reluctant to name element 106 after him that he would gladly exchange his Nobel Prize for the naming of the element. To Scerri's instructive stories about naming the elements, another can be added that has become a no-naming story. In 1934, Fermi and his associates carried out neutron bombardment experiments of elements. The discovery of slow neutrons was the most important result of these experiments. However, at the time they also thought – erroneously, as it turned out later – that they produced new elements, heavier than uranium. Fermi was a careful scientist, but his former mentor boldly announced the discovery and the fascist and international press gave it ample exposure as a sign of the success of Mussolini's reign. The new elements were given the ancient names of Italy, 'Ausenium' and 'Hesperium'. Fermi mentioned these names in his Nobel lecture in December 1938, but in its printed version a footnote already issues a caveat [Fermi, E. (1998). *Nobel Lectures in Physics* 1922–1941, pp. 414–421. Singapore: World Scientific].

Above, the Nobel Prize has been mentioned repeatedly. Mendeleev's name is conspicuously missing from the roster of the Nobel laureates. He was still alive when the Nobel prizes commenced in 1901, but his discovery had been made over 30 years before (Lothar Meyer had died by then). However, the 1904 Nobel Prizes in both physics and chemistry went for the discovery of the inert gases, thereby having completed the periodic table. This event turned attention to Mendeleev's discovery and it could be argued that it gained new importance. In both 1905 and 1906, his name figured prominently among the strongest candidates. In 1905, the organic chemist Adolf von Baeyer was selected, and 'his work on organic dyes and hydroaromatic compounds' was especially emphasized. In 1906, the Nobel Committee of Chemistry favored Mendeleev, but there was one dissenter who pushed for the inorganic chemist Henri Moissan to receive the award. He made a strong point about the fact that Mendeleev's work relied to a great extent on Cannizzaro's accurate atomic weights and Cannizzaro had not been awarded the Nobel Prize. A natural solution might have been to share the prize between Mendeleev and Cannizzaro. However, in that particular year no nomination had arrived for Cannizzaro and, according to the Nobel Prize rules, without a nomination he could not have been considered. Nonetheless, the Nobel Committee of Chemistry recommended Mendeleev to the chemistry section of the Royal Swedish Academy of Sciences, which, however, reversed the decision, and Moisson got the prize. As it turned

out, this was the last chance to award Mendeleev as he died in February 1907. In a rare admission of error, a book produced by the Nobel Foundation had these words about Mendeleev's missing prize: 'It is to be regretted that the Academy felt unable on formal grounds to offer its prize to the author of the most important advances in chemical theory during the latter part of the nineteenth century' [Westgren, A. (1950). *Nobel: The Man and His Prize*, edited by the Nobel Foundation, pp. 317–396. Stockholm: Sohlmans Förlag]. A detailed account of the Russian Nobel Prizes and missing prizes for Russians laments the complete lack of nominations on behalf of Mendeleev by his compatriots. All his nominations in the period 1905–1907 came from western European scientists [Blokh, A. M. (2005). *Sovietskii Soyuz v inter'ere nobelevskikh premii: Fakty; dokumenty; razmyshleniya; kommentarii* (in Russian, The Soviet Union in the internal dealings of the Nobel Prizes: Facts; documents; considerations; commentaries), 2nd ed., pp. 34–39. Moscow: Fizmatlit].

Scerri wrote a comprehensive account of the periodic system extending his considerations to many topics and including even such questions as the difference between the meaning of periodic table and periodic system: the former is more restrictive. Incidentally, a beautifully produced compilation of Mendeleev's works with many facsimiles carries the title *The Periodic Law* [Kedrov, B. M. (1958). Editor. *D. I. Mendeleev Periodic Law*. Moscow: Izdatel'stvo Akademii nauk SSSR]. Perhaps in the efforts of saving space, in places the information in Scerri's book appears somewhat incomplete or a little sketchy. A few examples will suffice here: Although it is generally assumed that Primo Levi committed suicide (Note 9, p. 290), his British doctor friend and his Nobel laureate scientist friend Rita Levi Montalcini always refused to believe that he took his own life [See, *e.g.*, Anissimov, M. & Levi, P. (1998). *Tragedy of an Optimist.* Translated by Steve Cox, p. 406. London: Aurum Press]. Then it is even more suspect to suppose what might have been the reason for it. There is at least one more full-size book of Lise Meitner's biography in addition to the one by Ruth Sime, mentioned in Note 17, p. 290 [Rife, P. (1999). *Lise Meitner and the Dawn of the Nuclear Age*. Boston: Birkhäuser]. Parallel to Davisson and Germer's first electron scattering experiments (p. 230), G. P. Thomson carried out similar experiments about the same time, and both were published in 1927 [Davisson, C. J. & Germer, L. H. (1927). *Nature*, **119**, 558; Thomson, G. P. (1927). *Nature*, **119**, 890]. G. P. Thomson was J. J. Thomson's son, who figures a lot in the book. Davisson and G. P. Thomson shared the physics Nobel Prize in 1937. There is a host of simpler fullerenes than C_{60} (Note 27, p. 291). It may warm the heart of the Hungarian readers to see Hevesy's first name as György in the book, but he is known internationally more as Georg von Hevesy and George de Hevesy because these are the names he used in his publications. The correct name for the journal appearing in the notes is Computers (rather than Computation) and Mathematics with Applications. There are slight inconsistencies in the orthography of the German names of journals. My last comment is on the transliteration of Russian names: Mendeleev's first name is more often given as Dmitrii or Dmitri (rather than Dimitri) and there are slight errors in other transliterations from the Russian (journal names, book titles, for example).

To summarize, Eric Scerri enriched the literature about the periodic system of the elements with a valuable and readable book, and I recommend it for a broad readership.

István Hargittai

Budapest University of Technology and Economics and Materials Structure and Modeling Research Group of the Hungarian Academy of Sciences, PO Box 91, H-1521 Budapest, Hungary
E-mail: istvan.hargittai@gmail.com