

BOOK REVIEW

A Tale of Seven Scientists and a New Philosophy of Science, Eric Scerri, Oxford University Press, New York, 2016, 228 pp, ISBN 978-0-19-023299-3, \$24.

The author, Eric Scerri, will be well known to chemists and historians of chemistry, not least for his successful *The Periodic Table* published in 2007. In a number of important publications Scerri has explored the chemical sciences in a philosophical and historical context and played a crucial role in the establishment of philosophy of chemistry as an academic discipline on par with philosophy of physics. Following his semi-popular *A Tale of Seven Elements* from 2013, in his new book he examines seven lesser known scientists whose work and place in history he uses illustratively to develop what he ambitiously calls a new philosophy of science. The book starts somewhat pompously with two forewords and a lengthy autobiographical section, after which follow descriptions of the seven scientists, namely John Nicholson, Anton Van den Broek, Richard Abegg, Charles Bury, John D. Main Smith, Edmund Stoner, and Charles Janet. The last part of the book is devoted to a more general exposition of an evolutionary philosophy of science advocated by Scerri.

One motivation for Scerri's project is, somewhat strangely, his dissatisfaction with standard histories of quantum mechanics which he suggests overrate the contributions of German-speaking physicists and underrate those belonging to the English-speaking world. He does not elaborate though, and perhaps wisely so. Whether one likes it or not, with the exception of Paul Dirac the emergence of modern quantum mechanics was almost entirely due to physicists from Germany and Austria.

The portraits of the seven scientists—some of them physicists, others chemists and even amateurs—are interesting and informative. What they have in common, according to Scerri, is that they are minor players, practically unknown and who therefore have been written out of history. Moreover, they all contributed in some way or other to atomic chemistry and physics in the period ca. 1910-1930, in particular to the understanding of the arrangement of electrons in atoms. The reason why Scerri focuses on these marginal figures is that they illustrate one of his main theses, that the contributions of the lesser, even obscure figures are no less important to the overall progress of science than those of the famous scientists. This thesis he takes quite seriously, even denying that there are any “outstanding personalities” in science. According to this view there is no reason to celebrate scientists such as Newton, Lavoisier, Maxwell, Darwin and Einstein, for they all belong to the same crowd as the thousands of scientists who have not achieved historical recognition.

The little known British astrophysicist John Nicholson was just as important in early atomic theory as Niels Bohr, and Edmund Stoner no less important than Wolfgang Pauli in explaining the periodic system in terms of quantum theory. In fact, “*everybody*, including the lesser figures involved in *any* scientific development, plays a fundamentally equal role” (p 9, my emphasis). This is a general claim as surprising as it is unconvincing. Scerri maintains the claim by arguing that the work of the seven minor scientists stimulated or catalyzed the much better known discoveries of Bohr and his likes. But he does not always document the claimed catalytic effect and in some of his case studies there is no demonstrable effect. This is clear from the chapter on the obscure

Frenchman Charles Janet, “who did not produce a piece of work that catalyzed the discoveries of others” (p 149). So why include him?

Other problems with Scerri’s historiography of science are his repeated claims that the seven portrayed scientists are undeservedly unknown and neglected in standard histories. The German chemist Richard Abegg is certainly well known in the history of chemistry and even the Dutch amateur scientist Antonius Van den Broek is not quite as unknown as Scerri suggests. He and his important introduction of the atomic number are routinely mentioned in the scholarly literature and there are a few specialist papers on him. But Scerri does not cite these secondary sources. As regards Charles Bury, Scerri notes correctly that he is not included in the authoritative *Dictionary of Scientific Biography* (1970-1976), but he conveniently overlooks or is unaware of the detailed biography appearing in the supplement volume of 1990. Scerri is of course correct that most minor players are left out in historical accounts of a more general and popular kind but fails to distinguish properly between this kind of history and the academic or scholarly history. Moreover, there are after all good reasons why these minor players are considered minor and given little attention.

The historical part of Scerri’s book, making up more than half of it, is in places deficient and does not always live up to generally accepted standards of history of science. On several occasions he cites sources without adding a reference or he fails to refer to the relevant secondary literature. On other occasions he misrepresents quotations or gives the reader a wrong impression of what they are about (for two examples, both relating to Bohr, see p 34 and p 84). The book also contains several errors and questionable statements. Commenting on an article in *Chemical News* of 1929 dealing with Janet’s work, Scerri wonders if the article, to which he gives no proper reference, were written by “the editor of the journal, William Crookes, who had a deep interest in the periodic table” (p 165). Crookes was indeed the founding editor of the journal, but he died in 1919. To mention but one more error, Scerri states that Louis de Broglie and Alexandre Dauvillier did not propose electron configurations based on X-ray spectroscopy that differed from Bohr’s. The two French scientists did in fact propose such configurations.

The major aim of Scerri’s book is not so much to contribute to the history of chemistry and physics as it is, much more ambitiously, to suggest a new philosophy of science in agreement with and to some extent based on the historical record. He places his work “in the grand tradition of attempting to explain what science really

is” (p xx). So what is science, really? Scerri advocates a thoroughly evolutionary view of science which he describes as holistic and organic, the minor figures being the missing links in the seamless evolutionary chain that gradually and cumulatively leads to epistemic progress. Contrary to Thomas Kuhn, but in agreement with many later philosophers and historians, he rejects discontinuities and revolutions in the development of science and instead speaks of “the scientific enterprise ... as a unified and single organic ‘entity’ with a life of its own” (p xxv). The claim that science evolves organically, unconsciously and almost spontaneously does not, in my view, amount to an explanation of scientific progress and does not explain why science developed more dramatically in some periods than in others. Chemistry experienced a drastic change in the era of Lavoisier, if not perhaps a revolution in the strong sense used by Kuhn, but there is no need to distinguish sharply between evolution and revolution or to identify the latter with abrupt changes à la Kuhn. Scientific change may be and often is both evolutionary and revolutionary.

With Scerri’s emphasis on science as a collective enterprise evolving as “one social entity” one might expect that he would be sympathetic to sociological approaches, but this is not the case. He deliberately disregards social factors and institutional structures in his description of the seven scientists and dissociates his own “literally social approach” from the approach followed by sociologically oriented philosophers and historians of science. Scerri wants to pay more attention to the numerous “worker-bee-like scientists” who contribute to the progress of science, but he has nothing to say about the even more numerous technicians, laboratory assistants, administrators and students whose work is no less important in the world of modern science.

While mostly criticizing Kuhn’s views as expounded in his *Structure* of 1962, Scerri agrees with Kuhn that science does not develop toward fixed and external truths. “Scientific knowledge is never right or wrong, because it is not proceeding toward an external truth” (p 196). This is a belief for which, as far as I know, there is no solid justification. Even if we admit that scientific knowledge is largely driven from within it does not preclude that some views about nature are right and others wrong. Surely, the view that water is a composite body belongs to the first category while the belief that water is elemental belongs to the second.

Scerri’s belief that it is pointless to speak of right or wrong scientific views is complemented by his belief that what matters in science is only progress as a whole. But

how can one speak about progress and at the same time deny the distinction between right and wrong theories or at least between more or less correct theories? Scerri seems to be aware of the problem but tries to avoid it by referring to the close analogy between the development of science and evolutionary biology. The theories that lead to most progress, he says, are those that have superior empirical support and provide the most satisfactory explanation of facts. But isn't this just another way of saying that these theories are more right? It follows from what Scerri calls the essentially organic nature of scientific progress that issues of priority and the credit apportioned to individual scientists are of no importance. And yet Scerri, in his historical portraits of the seven minor scientists, is preoccupied with just that, to bring them back onto the stage of history of science and to credit them for insights that traditionally, but unjustly, are ascribed to the heroic figures of science. It is obviously important for Scerri to credit Van den Broek with the discovery of the atomic number and to secure his priority over physicists like Bohr and Moseley.

Perhaps the most serious problem in Scerri's book lies in the relationship between history and philosophy of science. His philosophy is historically oriented and inspired, but the historical evidence behind it is curiously scant given that his philosophical claims are of a broad and completely general nature. What he is suggesting is not a philosophical perspective on chemical atomic theory in the early part of the twentieth century but a new philosophy of what science really is and how it progresses. Now science is a many-faced phenomenon, consisting of many separate disciplines and with a history that stretches back at least to the renaissance and in some areas to ancient Greece. When Scerri is speaking about science in general, what has he in mind and which

periods is he referring to? Probably not astronomy in the Copernican era or neuroscience in the twenty-first century, and yet these two areas belong as much to science as the problem of atomic electron configurations at the time of Bohr. As a philosopher Scerri is concerned with "science as a whole," but it is doubtful whether the phrase is more than just an abstract label. Nowhere does he comment on the question but seems to presuppose that all sciences in all periods can be understood in the same terms as his chosen case-studies.

Although Scerri does not derive his philosophy from the cases of Nicholson and the six other unappreciated scientists it is to some extent generalized or extrapolated from these case studies, which is obviously problematic. After all, it is a very small and arbitrary selection with respect to chronology and research area. Had other cases based on different scientific fields and historical periods been chosen, the philosophical lessons would presumably have been different. Although Scerri is strongly opposed to physical reductionism, one may object that his philosophy of science implicitly rests on the reductionist view that all of science evolves in the same way as chemistry and physics and is basically of the same nature as these two sciences.

To summarize, *A Tale of Seven Scientists* is a well-written, provocative and stimulating book, a bold attempt to base an evolutionary view of science on fragments of the modern history of chemistry and physics. But there are serious flaws in it, both as regards the historical sections and, not least, the way these sections are used to justify Scerri's general ideas of a philosophy of science. This book needs to be read with critical eyes.

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