A TALE OF SEVEN SCIENTISTS

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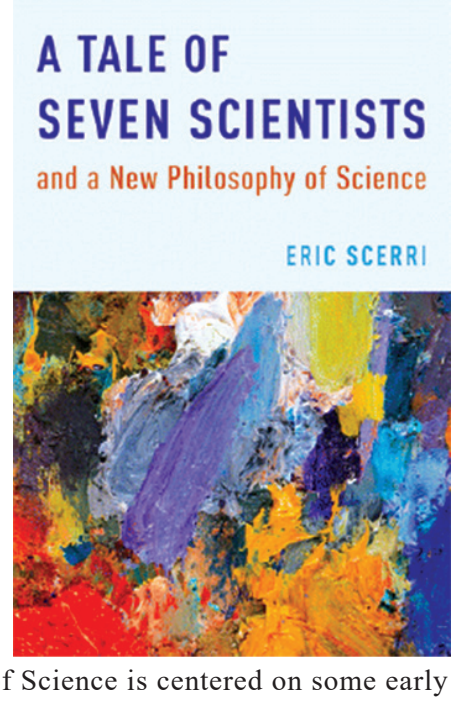
Savina Kirilova
University of Sofia (Bulgaria)



The author Eric R. Scerri is a leading philosopher of science, especially in the field of history and philosophy of chemistry. He is an author of the books *From Mendeleev to Oganesson* (2018), *Essays in the Philosophy of Chemistry* (2016), *Philosophy of Chemistry: Growth of a New Discipline* (2015), *A tale of seven elements* (2013) and he is the founder of the journal *Foundations of Chemistry*.

"A Tale of Seven Scientists and a New Philosophy of Science" is a story that could be of interest to "educators as well as philosophers, historians, and practitioners of the hard sciences" (p. xxxi). The book contains extensive notes, a bibliography, author index and subject index to help readers locate information quickly and easily.

The science covered in A Tale of Seven Scientists and a New Philosophy of Science is centered on some early 20th century atomic physics and chemistry and in particular to the work of Niels Bohr, Dimitri Mendeleev and Wolfgang Pauli. A great deal of the action is also centered around the concept of electronic configurations of atoms and their relationship to the periodic table of the elements. The purpose of the book is to argue against the current widely-accepted view of science as a series of revolutionary discoveries by great scholars, ignoring the lesser known scholars whose work contributes to and enables the breakthroughs

that rise to historical recognition. Scerri's book continues the debate about the nature of scientific progress reviewed in the Karl Popper's *The Logic of Scientific Discovery* (1959), Thomas Kuhn's *The Structure of Scientific Revolutions* (1962) and Imre Lakatos' *Methodology of scientific research programmes* (1970).

The book begins with two forewords written by Peter Atkins, an English chemist and an author of popular chemistry textbooks and James Arthur Marcum, professor of philosophy and history of science. For Scerri, as the Atkins writes (*in the first foreword*), science is evolution, not revolution featuring exceptionally gifted individuals. *In the second foreword* Marcum defines the Scerri's book as a spirited alternative to both traditional analytical and historical philosophy of science.

The book continues with *biographical background* in which Scerri talks about his scientific path from theoretical chemistry to the history and philosophy of chemistry. He advocates an evolutionary philosophy of science, which challenges Karl Popper's and especially Thomas Kuhn's earlier revolutionary philosophy of science. Scerri focuses on forgotten "little people" who are just as significant as the heroic personalities in that they constitute the missing gaps in a gradual evolutionary and organic growth in the body of scientific knowledge.

In *introduction* (Chapter 1) Scerri suggest that scientific progress can be regarded as something of a unified giant organism that is constantly evolving and in so doing is experimenting with new ideas and theories. Scerri argues that two leading 20th-century philosophers of science, Popper and Kuhn, have done harm to the history of science by emphasizing discontinuity and swift revolutions. Scerri is pushing that scientific discovery is like biological evolution - a gradual development based on lots of small changes, where it isn't meaningful to identify a single owner of a theory.

The main text of Scerri's book consists of a series of concise chapters (Chapters 2 − 8) outlining the biographies and principal intellectual contributions of seven intermediate and less-know scientists who contributed to the development of atomic theory and the periodic table during the first decades of the twentieth century: John Nicholson, Anton Van den Broek, Richard Abegg, Charles Bury, John D. Main Smith, Edmund Stoner, and Charles Janet. Each of these scientists built upon previous research and laid the groundwork for the discoveries of Bohr, Rutherford, Moseley and Mendeleev.

What do we know about the above-mentioned scientists? *John Nicholson* (1881 – 1955) is an English mathematician, who is virtually unknown and yet was the first to propose the notion of quantization of angular momentum that was put to good use by Niels Bohr. The second figure is an amateur physicist *Anton van den Broek* (1870 – 1926), who realized that the number of an element in the periodic table corresponds to the charge of its atomic nucleus. The third

example is German chemist *Richard Abegg* (1869 – 1910), who furnished the missing links between Mendeleev's work on valence and G. N. Lewis' ideas on chemical bonding in terms of the number of electrons. The following are the tales about the chemist chemist *Charles Bury* (1890 – 1968), who provided a detailed explanation of the periodic table of the elements in terms of the electronic configurations of their atoms. British chemist *John D. Main Smith*, who proposed some improved electronic arrangements for the atoms of many elements. British theoretical physicist *Edmund Stoner* (1899 – 1968), who independently arrived at the same ideas as Main Smith. The last figure is a French engineer, and biologist *Charles Janet* (1849 – 1932), known for his innovative "left-step periodic table".

In his final chapter "*Bringing things together*" Scerri elevates the role of multiple discovery and moves beyond the notion of science development and repeatedly criticizes of the Kuhn''s revolutionary theory. Scerri historical claim about recovery of attribution is subordinate to his philosophical claim that science develops by incremental progress, in very strong analogy to evolution by natural selection, and that an emphasis on "revolutions" is deeply misguided. Scerri "claimed that scientific progress does not consist in theories being right or wrong, just as biological evoluation is neither right nor wrong" (p. 191).

Thomas Kuhn's work on the philosophy of science, there has been the idea of sudden revolutionary changes in science which Scerri suggests don't exist, but Scerri's picture of incremental contributions to science is extraordinarily close to Kuhn's arguments about "normal science". While I'm not sure Scerri is right in entirely dismissing revolutions, he surely has an important point in the evolutionary model, which could have been more interestingly developed at greater depth in the book. Clearly no scientist works in isolation and constantly influenced by what he or she learns of the work of others. There's no doubt that popular science, tends to pick out a handful of individuals as the greats of science. But I'm not sure this is a bad thing or not.

I expected the Scerri's book mostly to be a historical account of the lives and scientific contributions of seven scientists, but it focused too heavily on his philosophical stance on the evolution of scientific ideas differs from the Kuhn's "paradigm shift" theory, as discussed in his book *The structure of scientific revolutions* (1962). There is repeatedly interrupting the scientists' tales and somewhat the author detracting from the scientists' contributions to modern atomic theory. Although, his examples do not adhere to any particular typology of intermediate figures in science, they are all similar in one important respect, namely in contributing to the overall development of different branches of physical science and in being largely forgotten. Their importance lies in the fact that their contributions stimulated the work of others and that

they made up important parts of the body-science. “Whereas the image of scientist is one of the disinterested pursuit of scientific knowledge for the sake of humanity, the reality is frequently one of harsh disputes, accusations of plagiarism, and all-out wars between leading scientists” (p. 179) as the author very accurately notes.

As a non-specialist I can say that the Scerri‘s book interestingly written, provoking questions for the nature of science and scientific progress, and will likely be of interest to a broader spectrum of audiences.

✉ **Ms. Savina Kirilova**
University Library: Chemistry & Pharmacy
1, James Bourchier Blvd.
1164 Sofia, Bulgaria
E-mail: S.Kirilova@chem.uni-sofia.bg