The Making of the Chemist: The Social History of Chemistry in Europe 1789-1914, ed. by DAVID KNIGHT & HELGE KRAGH, Cambridge, Cambridge University Press, 1998, xxi + 353 pp. [ISBN 0-521-58351-9]

This book is one of the outcomes of a European Science Foundation initiative 'The Evolution of the Chemist, 1789-1939' which comprised a series of workshops held in Canterbury, Dublin, Delphi and Frascati. Let me say at the beginning that the major strength of the book does lie in its European dimension, particularly in discussing chemistry in some of the 'smaller' countries in Europe about which I certainly learnt a great deal. However, as KNIGHT points out in his extended preface (there not being an introduction), some countries are not discussed at length most notably the Netherlands (though briefly mentioned in KRAGH's Afterword), Switzerland and Austria-Hungary (both discussed to a limited extent in HOMBURG's chapter on Germany), none of which receives a chapter or a mention in the index (which could have been fuller), and all of which possessed a strong scientific community during the period. On the other hand, Lithuania, which did not exist during this period, has a chapter to itself.

The position of Lithuania brings me onto my major problem with this book namely its organization. It is divided into 'The big three' (France, England/Britain, and 'Germany'), 'Medium developed countries' ('Italy', Russia, Spain, Belgium, Ireland, and Sweden), and 'On the periphery' (Denmark/Norway, Portugal, Greece, Lithuania, and Poland). This typology, it seems to me, reflects the political history of Europe in very recent times rather than with how chemistry developed in Europe between 1789 and 1914, although some essays do deal with periods immediately before and after this.

I really do not see the reasoning behind letting Ireland have a chapter to itself, other than pandering to contemporary political correctness. Ireland, Scotland (which could with equal justification have had its own chapter), Wales, and England were, during the period covered by this book, part of the same political entity and possessed, though to perhaps a lesser extent, a similar academic identity. Indeed for the earlier part of the period it is not clear to me that England/Britain was one of the big three so far as chemistry is concerned. For that period, especially with Berzelius, Sweden was as productive of chemistry as England/Britain. Furthermore, the notion that Poland (which during this period was partitioned between Prussia, Austria-Hungary, and Russia) was on the periphery when Russia is in the group of 'Medium developed countries' seems ludicrous. The Russian province of Poland was, on the whole, one of the most prosperous parts of the Russian Empire. The province produced Marie Curie, née Skłodowska, who while strictly speaking was a physicist, is however best known for discovering the chemical element radium.

Similar comments could be applied to some of the other classifications. But the point is that while the conflicts and imperial dominations that occurred during the nineteenth and twentieth centuries may have been regrettable, they did, nevertheless, occur. The development of chemistry in Europe has to be viewed in the changing historical contexts of the period. To try and place them in terms of modern European political development, excellent on the whole though that is, is to be unhistorical.

In my view, instead of arranging the book in terms of size and countries, it would have been much better to view chemistry in terms of language and networks of chemists. The study of how chemistry was learnt by students from a wide range of nations at the major centers of chemical education that existed at various times and at places such as Gießen, Heidelberg, London, Paris *etc.* would have provided a much more pan-European view on the development of chemistry than is provided by this book.

For example, the case of Henry Enfield Roscoe is illustrative of the career of a chemist in Europe. He studied first under Thomas Graham (a Scot) at University College London, before going, in the early 1850s, to Heidelberg in Baden where he took his PhD under Robert Bunsen. Thereafter he returned to University College briefly before becoming Professor of Chemistry at Owens College Manchester. During the 1850s, he spent the summers in Heidelberg undertaking pioneering photochemical work with Bunsen. It is clear from his writings that Roscoe viewed himself as part of a cohort of European chemists that had been trained by Bunsen. One also forms the impression that this was how the students of Liebig saw themselves. One of his Gießen students, August Hofmann, became the first head of the Royal College of Chemistry founded in 1846 in London. There he provided German style training for British chemists which certainly ensured that Britain did become one of 'The big three' in the latter part of the nineteenth century. In the 1860s, Hofmann returned to the German speaking countries when he became Professor of Chemistry in Berlin.

Nationalism and internationalism in the nineteenth century were complex entities in the European chemical community and some chemists were not above playing the nationalist card for their own purposes. This was particularly so in some of the priority disputes that raged during the period. For example, in spectro-chemical analysis great play was made with the 'fact' that some British chemists had done some similar (but very incomplete) work before Bunsen and Kirchhoff's work of 1859-60.

The outbreak of war in August 1914 left Roscoe devastated that Britain and Germany were fighting each other. He was not alone in such feelings which were also shared by chemists of a younger generation such as Roscoe's and Bunsen's one time student Arthur Smithells; but this did not prevent them from putting their scientific knowledge to help defeat Germany and likewise the German chemists to help the war effort of the Central Powers. The issue of chemistry and war receives very little attention in this book, apart from a brief discussion in KNIGHT's preface. However, it does seem to me to be one of the key areas in nineteenth century Europe where chemists came to play a major role in society. In 1813, after twenty years of almost continuous warfare, the Emperor Napoleon invited Humphry Davy to visit the chemical laboratories in the French Empire with no objection raised by the British government. By the end of 1914 one cannot imagine Kaiser Wilhelm II inviting James Dewar, say, to visit German laboratories or the British government not making a fuss. During the nineteenth century chemists came to play an ever greater role in warfare. One only has to think of Michael Faraday teaching chemistry at the Royal Military Academy Woolwich to generations of Royal Artillery and Royal Engineer cadets or, during the Anglo-French war against Russia of the mid-1850s, advising on naval operations in the Baltic Sea or of Dewar developing new explosives to realize how in England alone the armed forces came to rely ever more on chemical knowledge. It was not for nothing that the first general war in Europe to be fought for nearly a century was called the 'Chemists' War'.

Enough of complaining about the overall structure of the book. There are some very good and useful individual essays here. MAURICE CROSLAND and ULRIKE FELL provide accounts of the development of the chemical community in France while ERIC HOMBURG and WALTER WETZEL do likewise for the German speaking world. GERRYLYNN ROBERTS undertakes a similar exercise for England between 1841 and 1914 while DAVID KNIGHT deals with the period before but in his own admirable style which I am sure reflects the state of chemistry in England compared with France and the German speaking world discussed above. KNIGHT and ROBERTS later jointly contribute the piece on chemistry in Ireland, but, as they acknowledge, the attractions of the capital in London meant that it

was impossible for Ireland to maintain a strong chemical community. LUIGI CERRUTI and EUGENIO TORRACCA's study of Italian chemistry is particularly useful. There is not a large literature on nineteenth century Italian science as such, yet it is clear that there was a lot going on there (one only has to think of Avogadro and Cannizzaro for instance) and this essay should, I hope, encourage further study. Of the 'smaller' countries KRAGH's on Denmark/Norway is excellent.

As I have indicated, and despite the excellence and usefulness of some of the papers, the volume does not quite come off as a book. But this does not mean that the attempt should not have been made. With the growth of the European Union, there is certainly a need for a strong European perspective to replace the various national histories of science. While it is important to emphasize the commonalties of Europe, this should not be done at the expense of unduly playing down past divisions and nor should we project back current boundaries and political arrangements to a time when they did not exist.

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KANT'S RECEPTION OF LAVOISIER'S 'NEW CHEMISTRY'

PAOLA VASCONI, *Sistema delle scienze naturali e unità della conoscenza nell'ultimo Kant*, Firenze, Olschki, 1999 (Biblioteca di Storia della Scienza, vol. 42), xix + 146 pp., (ISBN 88-222-4729-9).

That there exists a relationship between scientific knowledge and philosophical thought is well known. Unfortunately, however, this relationship is often characterized by contrasting interpretations. Scientific knowledge is interpreted in the context of philosophical thought and *vice versa*.

We must therefore be grateful to Paola Vasconi for offering us a book that concerns both the history of science and the history of philosophy. It is impossible, in a brief review such as this, to do justice to all the suggestions Vasconi puts forward in this work. I will, therefore, confine myself to one point that particularly captured my attention.

Paola Vasconi is very successful not only in demonstrating the close relationship between chemistry and the philosophy of Immanuel Kant, but also in analyzing Kant's conversion to Lavoisier's '*nouvelle chimie*'.

Vasconi criticizes the interpretation of von Engelhardt, according to which the role of science in Kant's philosophy only represented a passage to *Naturphilosophie* (p. 8). It is widely known that Kant developed an interest in chemistry following his activity as *Privatdozent* (p. 24). For many years Kant thought that physics, or, more accurately, mechanics, represented a comprehensive explanatory model for all sciences. He maintained that the Newtonian law of gravity was the expression of the only force existing in nature, a force that controlled not only the movements of the planets, but also the process of chemical reactions. In the *Metaphysische Anfangsgründe der Naturwissenschaft* (*Metaphysical Foundations of Natural Science*), Kant did not yet regard chemistry, and particularly the chemistry