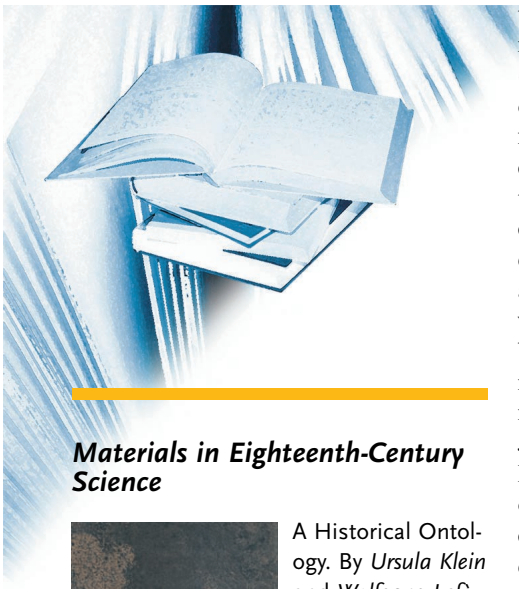
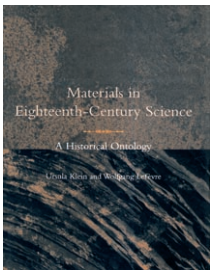


Materials in Eighteenth-Century Science



A Historical Ontology. By *Ursula Klein* and *Wolfgang Lefèvre*. MIT Press, London 2007. 345 pp., hardcover £ 24.95.—ISBN 978-0-262-11306-9

Classification is an essential part of the development of many sciences, but it is hardly the sexiest part. Classification is fussy, fuzzy. Nevertheless, the way in which we choose to classify a set of objects is important because it determines how we think about them, prejudicing our imaginations. Take the contemporary university organic chemistry course, typically a parade of functional groups: alkanes, alkenes, alkynes, aldhehydes, ketones, carboxylic acids, and so on. This type of survey is widely viewed as a pedagogical advance over earlier 20th century classification schemes based on compound provenance. However, those things called "esters" have an enormous range of chemical and physical properties; the labeling of compounds by the identification of a common group of connected atoms can serve to camouflage a wolf in sheep's clothing. Meanwhile, today's students can spot a chalkboard ester at 20 paces, but they presume that all such compounds come from Sigma–Aldrich. Any and every classification has its virtues, but no one classification scheme can be all things to all people.

Taxonomic distinctions between provenance and chemical constitution first came into being at the very end of the period tackled by Klein and Lefèvre in their history of chemical classification (1700–1830). It was during this time that ordinary stuff came to be distinguished from bona fide chemical substances or compounds, an important transformation in the history of chemical classification that deserves scrutiny. During the early part of the 18th century, dyestuffs, alcoholic beverages, ceramics, and soaps were produced by artisans but studied by scientists. However, prior to the introduction of constitution as an organizing principle in organic chemistry by Jean-Baptiste Dumas and Polydore Boullay, which is the subject of the last of the 16 chapters by Klein and Lefèvre, composition was the attribute that scientists used to beat the unruly world of tangible, colorful, smelly commodities into categories based on imperceptible features.

The high point of compositional classification, which is discussed in the middle third of *Materials in Eighteenth-Century Science*, was the publication of *Méthode de nomenclature chimique* (1787), a collaboration between Louis-Bernard Guyton de Morveau, Antoine-Laurent Lavoisier, Claude Louis Berthollet, and Antoine François Fourcroy. This crew was dubbed by the historian Henry Guerlac as "the antiphlogistic task force" for having abandoned the suspect substance, phlogiston, in their classification scheme. Lavoisier and his gang emphasized the elements and pure inorganic substances in their taxonomy, but they struggled with organic compounds, whose compositions were not sorted out until the arrival of the improved methods of C/H analysis by Justus von Liebig. Despite its limitations, the system of the Lavoisier group, by emphasizing atomic composition in names, stimulated the determination of molecular structures in the 19th century.

Materials in Eighteenth-Century Science has a loosely chronological organization, but Klein and Lefèvre have not presented a simple narrative history of classification. Their work is encumbered with theoretical considerations. Because chemical objects existed within both the academic and proto-industrial worlds, the authors refer to them as "multidimensional objects of inquiry", and defend this characterization as their "concept", which they claim necessitates revisions in our understanding of the emergence of the natural sciences. This is a long way to go, merely to make the point that some bits of matter meant different things to different people. This is not so much a "concept", but rather a self-evident observation that hardly deserves a special name. The first third of the book wrestles with these ontological questions. Thus, we stumble from the outset.

In this fitful journey, we are not buoyed by the prose, which is either banal or difficult to understand. The first two sentences announce a high-school term paper: "Materials are essential to our life. It is hard to imagine how human civilization would have developed without stone, wood, clay, bronze, iron, brass, copper, and other kinds of stuff our tools and instruments are made of". This off-putting language quickly transforms into that of scholars who are so enmeshed in their private discussions that they spin off woolly sentences in which the uninitiated must dig for meaning. For example: "Our goal is ambitious .. we want to philosophically analyze conditions of the constitution of these scientific objects [chemical substances] and changes in their materiality and meaning". In summing up the introduction, the authors leave us with the knowledge that: "Studies of classification thus contribute to a historical ontology of the past that takes into account the actors' material culture and their ways of making and knowing". I leave open the possibility that I am not sophisticated enough to divine the meaning of such sentences. Equally likely is that their intent is hopelessly obscured. In my view, the writing casts shadows on the substantial bits of history that the authors have dragged into the light, thus limiting access to their work for the general reader. The book addresses professional historians of science and will likely frustrate readers of *Angewandte Chemie*. Instead, I would recommend to those interested in the history of chemical classification the book *Historical Studies in the Language of Chemistry* by Maurice Crosland (Dover, 1978). It is clearer and cheaper. Klein and Lefèvre should adopt the spirit of Lavoisier who, according to Crosland, "always sought for a logical clarity of thought and exposition, such

as was finally expressed in his *Traité élémentaire de Chimie* of 1789, in which he emphasized the importance of clear language to clear thinking".

In the last sentences of the book, the authors look back from the 19th century: "Like their predecessors in the eighteenth century and the early modern period, the stoichiometric chemical substances of the nineteenth century were applicable or potentially applicable materials in industry and society. In this respect they were multidimensional objects too". A reader just slightly familiar with the history of chemistry has effortlessly acquired the understanding that the pragmatist and the theorist have shared materials. In the 18th century, the extraction of indigo from woad enriched some and enslaved others; in the 19th century the dye was given a composition ($C_{16}H_{10}N_2O_2$), a constitution, and a *synthesis*, which in turn led to a billion-dollar blue-jeans industry in the 20th century. Even though I am wearing blue jeans as I write this review, I am not sitting on a multidimensional object of inquiry.

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