Book Review

Manuel DeLanda: *Philosophical Chemistry: Genealogy of a Scientific Field*, London: Bloomsbury, 2015, xiv+231 pp. [ISBN 978-1-47259-183-8]

by Joachim Schummer

The English term 'chemical philosophy', which became popular in the early 19th century through book titles by John Dalton (1808ff.) and Humphry Davy (1812), might be a translation from French '*philosophie chimique*' as in Antoine-François de Fourcroy's concise treatise on the fundamentals of chemistry from 1792. However, already since the mid-16th century various Latin equivalents had appeared in titles, such as '*philosophia chymistica*' by Gerardus Dorn (1565), which was later included in the famous collection *Theatrum Chemicum* (1602); '*philosophia chymica*' by Gasto Claveus (1612); and '*philosophia chemica*' by Johannes Kunckel (1694). All these books did not only intend (or pretend) to be more profound, fundamental, or academic than a mere collection of laboratory recipes by elaborating on the (natural) philosophical aspect of chemistry, i.e. on general principles and causalities, which would have been called philosophical chemistry. They also claimed with their titles the existence of a chemical branch or type of philosophy (of nature). Rightly or not, modern historians of science neglect that when they use the term 'philosophical chemistry' to denote books that were originally entitled 'chemical philosophy'. Against that somehow confusing background one might wonder what a new book entitled *Philosophical Chemistry* is about.

The book under review is divided into 4 chapters. After a brief Introduction (6 pp.) that outlines the program and methodology, chapter 1 ('Classical Chemistry', 51 pp.) deals with 18th-century inorganic chemistry, chapter 2 focuses on the development of 19th-century 'Organic Chemistry' (42 pp.), and chapter 3 on the rise of 'Physical Chemistry' (37 pp.) during the same period. The final chapter ('Social Chemistry', 22 pp.) discusses in philosophical terms the role of social factors on the developments to be followed by extensive notes and references (64 pp.) as well as an author and subject index.

Overall the book presents a problem-focused intellectual history of chemistry from about 1700 to 1900, the kind of historiographical accounts that have become rare in favor of social histories of science. DeLanda approaches

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the matter with extraordinary conceptual clarity in chapters 1 and 2. He starts with formulating precise guiding questions for each field. Relying on numerous seminal books and papers from the historiography of chemistry as well as on the careful reading of one selected historical textbook for each period of 50 years, which is supposed to represent the consensus of the chemical community at the time, he then presents the main historical answers to that questions. For instance, the question 'Why does substance X have properties Y and Z instead of other properties?' is answered by a series of explanatory schemes that focus on the part-whole-relationship (composition). Answers to the question 'Why does the reaction of substance X with substance Y have substance Z as its product, instead of other products?' are explanatory schemes that develop around the notion of chemical affinity.

For each field, DeLanda first discusses the views of the main contemporary actors before showing that, despite various disputes and controversies, both a community consensus and a growing conceptual and experimental toolbox was reached. Cardinal cases of chemical consensus in the 19th century are the agreements on equivalent weights and on chemical structure theory, notwithstanding the diversity of ontological and methodological positions in each case. The author would certainly have benefited from Hasok Chang's *Is Water H_2O?* from 2012, with which his book sometimes overlaps regarding the historical matter under investigation as well as the conclusions drawn.

In stark contrast to the chapters on inorganic and organic chemistry, I found the chapter on physical chemistry poorly organized and frequently confusing, which might in part be due to the fact that the secondary literature, on which DeLanda relies, is still underdeveloped.

In the Introduction DeLanda describes his work as a "book of philosophy" (p. xiii) committed to a detailed understanding of the history of science. Given that the bulk of the book consists in historical narrative, it is not so obvious what the (novel) philosophical ideas are that the author wants to defend. Both the Introduction and the brief final chapter provide some glimpses.

On the one hand, DeLanda is skeptical about "reified generalities like Science, Nature and Culture" (p. xiii), following the (post)structuralist French tradition on which he had worked before. Because of that, any philosophical discussion of science must focus on individuals, their conceptual and experimental works and networks including the socio-historical context in which they lived. On the other, DeLanda rejects the social constructivist conclusion that many have drawn from the nominalist skepticism, according to which scientific generalizations and decisions on controversies are essentially shaped by social conventions and contingent authority/power structures. Most of chapter 4 is a theoretical rejection of social constructivism and positivism, both of which DeLanda considers to be based on the underde-

termination thesis (*i.e.*, that the choice between theories is underdetermined by empirical evidence). Only the final pages draw (much too brief) conclusions from the historical narrative by arguing that in the history of chemistry underdetermination was only transitory rather than definitive, and that consensus was reached in most cases by reasonable agreement rather than by arbitrary conventions, rhetorical games, or authority.

Better by far than the history of theoretical physics, with its controversies about rivaling monolithic theories, the history of chemistry, with its flexible mutual adjustments of conceptual and experimental tools, illustrates that objective scientific knowledge is not only possible but can also be augmented and improved. Moreover, because chemistry has diverged into various subfields, its history shows that improvements are achieved without striving for a final theory, "by precluding any dream of a final truth" (p. 158).

The book is a remarkable example of how chemistry can attract general philosophers. In the case of Mexico-born Manuel DeLanda, who started his career in the US as a film maker and then moved to theory of architecture and computer science before becoming a philosopher (currently Professor at the European Graduate School in Switzerland), it is even astounding. Within a short period of time he must have gone through thousands of pages from the historiography of chemistry, albeit almost none from the philosophy of chemistry, in order to write his book.

Even if one does not subscribe to his philosophical conclusions or considers them too short and less original, they present valuable arguments to historians of science why an intellectual history is still worth pursuing. The conceptual clarity and in-depth understanding of the historical problems at stake make the main chapters on inorganic and organic chemistry ideal reading for courses in the history of chemistry.

Joachim Schummer, Editor of HYLE, editor@hyle.org