Book Reviews

ROUSSEAU AND CHEMISTRY

Jean-Jacques Rousseau et la chimie (*Corpus, a journal devoted to philosophical works in the French language*, no. 36), ed. by BERNADETTE BENSAUDE-VINCENT & BRUNO BERNARDI, Centre d'Etudes d'Histoire de la Philosophie Moderne et Contemporaine, Université Paris X, 1999, 206 pp.

A scientist who takes philosophical thinking seriously must certainly find it difficult to decide what to make of Jean-Jacques Rousseau (Geneva 1712 - Ermenonville 1778), a philosopher who was proud to claim that he had gained all his knowledge of men (which was his main philosophical interest) from the study of himself; which is a way to knowledge not exactly conforming to the objectivity protocol of science.

Whatever one may think of his main source of knowledge, however, there is no doubt that Rousseau had such a personality that he cannot be simply ignored by philosophers and historians of science. His life and work was so significant for the culture of the West that Napoleon, on visiting his grave, remarked that it would perhaps have been better for France if Rousseau had not existed; for he had prepared the French Revolution. Maybe the author of *Le contrat social* had only contributed to an inexorable process, but surely he was an extremely intelligent, acute and versatile, and therefore influential man of his age. As is well known, he also contributed to the theory of education with his book *Émile*, and, one way or the other, his name is particularly well known in that connection; the influence of his fascinating ideas, though never intended for application in a modern classroom, is often made guilty (although the English tradition and John Dewey are far more to blame) of the present plight of education in the USA and elsewhere.

That is not the end of the story. Rousseau was also a theorist of music and opera composer. And he was led to look at science and technology (*La science et les arts*) when he wrote a widely approved philosophical essay for a prize offered by the Académie de Dijon to deny that the bloom of science and technology of his time had contributed to improve the morals of society.

Perhaps the chapter devoted to him by Weischedel in his *Back Stairs of Philosophy*[1] is the best short introduction to his personality and thought for those who have a minimum of familiarity with the history of the European culture in the 18th century. Suffice it here to mention that his was one of those personalities which appear to the men of our age so contradictory that they cannot be easily understood. Perhaps the best way to define Rousseau is to say that, as a genius in *omni historia curiosus*, he was a precious witness: a witness of the century that prepared, among other things, the birth of modern chemistry and the resulting transformation of everyday life in western society. It would have been quite limiting to that role, if Rousseau had had no contact with science as such, particularly chemistry.

This is why the discovery that it was not so, presented and discussed in the issue of *Corpus* we are reviewing, is very important. Rousseau had studied chemistry, not just by listening to lectures, but by attempting to make what he had heard into a treatise – which is the best method to make a body of knowledge a part of one's personal heritage of ideas and concepts. He even had at least one

pupil, M. de Varenne, to whom he dispensed what he had learned from M. Rouelle, one of the great professors of his time.

Against such a background, this issue of Corpus takes a particular significance, indeed opens new perspectives on the history and the foundations of chemistry. Although he did not contribute creatively to chemistry, Rousseau was greatly interested in alchemy and chemistry; the more so as Mme de Warens, his teacher and partner of fourteen years, was greatly familiar with alchemy, though in a somewhat superficial way. But the main point is that he had written 1260 pages of notes on chemistry – the *Institutions de chimie* – whose discovery was announced in 1905 by T. Dufour. These notes were collected and ordered, as mentioned, in the form of a treatise, based on the lectures of Guillaume-François Rouelle (1703-1740), a renowned professor of chemistry at the Jardin des Plantes of Paris who had among his pupils most of the great men of the Enlightenment, from Diderot to Lavoisier.

The issue of *Corpus* we are reviewing confirms the supposition that the form of a treatise was mainly a way to assimilate the information received: no claim is made that Rousseau was trying to become a reputed chemist, indeed he left his treatise unfinished. But it has been right to bring it to light, because, as mentioned, such a serious proof of interest in 'chemical philosophy' is very important for a study of the man Rousseau and the science of his time.

The volume contains an introductory essay by BERNADETTE BENSAUDE-VINCENT et BRUNO BERNARDI whose purpose is "to situate the Institutions chimiques", four essays on "Rousseau in the eighteenth century chemistry," three essays on "chemistry in the thought of Rousseau," and an appendix with historical and bibliographical information.

The introduction fulfills its promise, and is a detailed analysis of the network of relations that constituted the French culture of the *Siècle des Lumières*; an analysis needed, for one thing, to discuss the time and purpose of the writing of the manuscript on chemistry.

The first part contains a review by BERNARD JOLY of the great problem of the nature of fire, associated in 1700 with phlogiston and the names of Stahl and Boerhaave. Rousseau's work is a significant source of information about the largely unpublished ideas of Rouelle about fire, which differed somewhat from those of Stahl.

Joly's paper is followed by two very interesting studies, which throw light on the uncertain transition from alchemy to chemistry. JONATHAN SIMON, in a reflection on Rousseau's standpoint on the subdivision of nature into the three kingdoms, recalls that in the first half of the eighteenth century, although it placed emphasis on observation and 'facts', chemistry still accepted the theoretical foundations of alchemy, and Rouelle based his rationalization of experimental data on the belief in three fluid elements (fire, air, water) and three solid ones (the three alchemical principles sulphur, mercury, and salt). Salt was still considered as a sort of life principle, and this is why vitrification (glass being considered akin to salt) was somehow treated as a connection between the mineral and the living world.

BERNADETTE BENSAUDE-VINCENT follows suit by trying to answer essentially two questions: What was the status of chemistry with respect to physics in the time of Rousseau? Did Rousseau take a stand on Rouelle's views about the nature of chemistry? By recalling, for example, that Rouelle's lectures were one of the main sources of Venel's article on chemistry in the *Encyclopédie*, she shows how the idea came into being that chemistry is the science of analysis and synthesis, having as its aim knowledge of the constituting principles of nature. Bensaude-Vincent's very readable and well-documented article is full of interesting references to the debates in this connection. On one occasion, however, she is probably unjust to Rousseau. With reference to critical re-

marks by Boyle about the notion of principle, she qualifies as circular the following comment by Rousseau: "…while fire, by new combinations, can divide and unite again in different ways the principles of bodies, obviously it cannot alter them in themselves, otherwise they would not be true principles." The argument is not very clearly presented, but it is not circular, for it merely emphasizes that the term 'principle' refers to what in matter is invariant under transformations by fire; as is well known, Lavoisier called elements precisely those principles. The passage quoted actually shows what a fine scientific mind our versatile thinker was.

The last paper of this part, by MARCO BERETTA, goes beyond the author's declared intentions by stimulating a reflection on the analogies between the transition in philosophical views that took place in Rousseau's time and the transition taking place under our eyes. Beretta presents an excellent examination of the troubles Cartesian science had in the eighteenth century because of its contradictory nature: on the one side it was a reduction to mechanics that supported a rationalistic-materialistic view of the sensible world, on the other it insisted on the Democritean postulate that matter and light consisted of non-observable particles. Beretta shows that Rousseau did not accept this state of matters, and was favored in his refusal by his belief that human pride was at the origin of scientific curiosity. That was certainly a pessimistic view, partly inspired by Calvinism, but – although Beretta does not pronounce himself on this matter – was it really so unrealistic? On seeing on one side today's cynical tampering with nature, made possible, directly or through molecular biology, precisely by the great achievements of chemistry, and on the other side the questionable power of lobbies defending nature on their own terms, one is tempted to think that it was not. Besides, the information given in the volume we are reviewing proves that Rousseau was not speaking because of lack of familiarity with science; he had simply correctly judged the potential development of an approach to knowledge that was feeling more and more self-sufficient and above ethical concerns.[2]

The second part of this issue of *Corpus* is perhaps less close to the interests of a philosopher of science, and, in the reviewer's opinion, conforms a little too much to the tenets of hitherto prevailing intellectual circles. It opens with FLORENT GUÉNARD's typically French article, giving perhaps a disproportionate room to *l'amour* and *le couple*, but interesting for the attempt to extend to Rousseau's *La nouvelle Héloïse* the scope of the concepts of affinity and correspondence that the eighteenth century had inherited from the alchemical traditions. The subsequent article, by MARTIN RUEFF, is an attempt to read chemical ideas in Rousseau's theory of man; the underlying philosophy is revealed by its main references, F. Abbri, G. Bachelard, and Karl Marx. The third paper, by BRUNO BERNARDI, makes the same attempt with Rousseau's political ideas, but references to classical culture give it a wider breadth. Also this part, at any rate, is worth reading, for the idea that certain conceptual patterns of science, particularly chemistry and biology, also apply to human sciences is liable to become a winning strategy, as the pioneering work of L. von Bertalanffy on the general theory of systems has shown.

In conclusion, the reviewer considers this volume a valuable contribution to the historiography of that turning point of culture that was the eighteenth century, and recommends it in particular to those scholars who are led by their research to study the transition from alchemy to chemistry.

Notes

[1] Weischedel, W: 1977, *Die Philosophische Hintertreppe: die großen Philosophen im Alltag und Denken*, Deutscher Taschenbuch Verlag, München.

[2] An update on this disturbing side of science, which at first sight concerns mainly genetic research but of course involves chemistry as an all-important "accomplice", can be found in: "The politics of genes", *The Economist*, April 14th 2001, p. 19ff.

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Communicating Chemistry. Textbooks and their Audiences, 1789-1939, ed. by ANDERS LUNDGREN & BERNADETTE BENSAUDE-VINCENT, Science History Publications, Canton, MA, 2000, vii + 465 pp. (ISBN 0-88135-274-8)

"Boring, dogmatic, conservative […] textbooks have a bad reputation, at least in science studies. They are considered to be useful only insofar as they provide a window on the 'normal science' of a specific period. […] How did textbooks differ from other forms of chemical literature? Under what conditions did they become established as a genre?" Thus the editors introduce this collection of 18 essays by a wide variety of authors from many different countries but all now rendered into English.

It would indeed have been tedious if the reader had been confronted simply with lists of successive editions of textbooks from different European countries, together with a detailed description of their contents. Happily most of the authors manage to provide much more than this. But how should the contents of a chemistry textbook of the early 1800s have been arranged? Apart from a few obviously similar substances, like chlorine, bromine, and iodine, there was no obvious order in which to present inorganic chemistry before Mendeleev (1869). With the Russian chemist, however, the importance of the textbook is clear, since it is well known that it was above all the problem of organizing his textbook that helped lead Mendeleev to the Periodic Table. Perhaps his innovation takes us beyond the 'normal science' mentioned by the editors, but it is certainly an illustration that the textbook may be a useful focus for study. For some, like the impoverished Mendeleev, writing a textbook was a way to earn money. For others, as in the French and German systems, it was a path to a professorship. But it was also a means of consolidating the authority of the professor, whose views came to in-