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Fumie Kawamura, *Diderot et la chimie: science, pensée et écriture*. Paris: Classiques Garnier, series « L'Europe des Lumières », vol. 27, 2014. 585 p. 83.00 € (cl.). 58.00 € (pb.) ISBN 978-2-8124-1792-4.

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This book, originating as a PhD thesis defended in 2009 (and prefaced now by the author's supervisor), appeared from Garnier just a little over a year after another book on the same topic from the same publisher, but in a "history and philosophy of science" series: François Pépin's *La Philosophie expérimentale de Diderot et la chimie*.^[1] They thus invite comparison, in addition to being evidence, along with the work of some other scholars including Christine Lehman, Rémi Franckowiack and Luc Peterschmitt, of serious interest in chemistry in eighteenth-century France.^[2] Is Kawamura's book simply more literary? At first one gets this impression: "I will study the relation between chemistry and literature in Diderot's two dialogue works, the *Rêve de D'Alembert* and the *Neveu de Rameau*" (p. 27). And indeed, we are presented with a portrait of Diderot familiar from a variety of literary studies of this author (from Saint-Amand to Lojkin and Maurseth, with G. Stenger's book at a close distance, because it is not a literary study): Diderot as a thinker of flows, non-linearity, affectivity, dynamism, and therefore also of a kind of self-destruction of ordinary forms of narrative and genre distinctions, which arguably goes back to Michel Serres' study of Lucretius (indeed cited here).^[3]

Kawamura's overall thesis is that Diderot stages a model of the "contamination" or "cross-fertilization" of ideas (these are not her terms) between characters such as those in the two "dialogues" she studies (the *Rêve* and the *Neveu*) according to notions of affinity and fermentation developed in chemistry (p. 117). It is, so to speak, a chemistry of ideas, although not in the more literal sense elaborated by earlier authors such as Gassendi.^[4] Kawamura's idea is also quite reminiscent of Bakhtinian polyphony (which she mentions briefly; she also at one point relates this idea to Freudian latency, p. 228). She speaks of "fermentative thought," a type of thought (and writing, one might add) that follows the "self-producing motion of the universe," according to the "complex and hidden connections between diverse matters," according to chemical affinities (p. 381).

Instead of being content to trace out this idea in metaphorological terms, however, Kawamura provides considerable historical information. For instance, the first part is a detailed reconstruction of the intellectual context of chemistry in the early modern period, leading up to Diderot and the French chemists Guillaume-François Rouelle and Gabriel-François Venel, with a notable focus on Étienne-François Geoffroy's notion of a "table of affinities," as distinct from a Newtonian-driven chemistry based on attraction (p. 62f.). It is primarily a "history of ideas" approach, without any details of scientific or instrumental context: no "material culture," in other words. But it is a careful, *micro*-history of ideas approach, not especially Lovejoyian and macroscopic, even if Lovejoy is quoted favorably. One might wish that in the long analysis of the concept of fermentation, more attention was paid to works by chemists and practitioners of various sorts, instead of the massive reliance on period dictionaries and encyclopedias (particularly the Jesuit *Dictionnaire de Trévoux* and, of course, Diderot and D'Alembert's *Encyclopédie*), but it is undeniable that some of the major texts at issue *are* encyclopedia entries, such as Venel's virtuoso contribution on "Chymie" to the *Encyclopédie*. Where does Kawamura's book fit with

regard to the history of chemistry? As I mentioned, she is one of a group of scholars who have turned away from the more common focal points in the history of that discipline—chemistry/alchemy in early modern England and Lavoisier’s “chemical Revolution” in late eighteenth-century France—at two opposite ends of the period. Instead, given her starting-point (and telos) in Diderot, she focuses on figures such as Rouelle and Venel, given that Diderot was an active presence at Rouelle’s lectures at the Jardin du Roi for three years, 1754-1757.[5]

Kawamura’s analysis repeatedly returns to the idea that Diderot does not just treat chemistry as an “object of knowledge,” but also as an “instrument of knowledge”: a model of thought, a metaphysics of “fermentative” matter, and also a kind of higher-level metaphor for the functioning of his experimental literary and conceptual works. Again, chemistry functions as a metaphor for mental processes (fermentation, ebullition, etc.) because “the process of thought is not the analytic and demonstrative interlinking of concepts” (p. 30) for social processes (for example, action and reaction, studied in Jean Starobinski’s famous book of that name, which Kawamura tends to follow in her analysis).[6] Explaining the process of digestion, and then building on these concepts to explain the process of life itself was the “battleground” for these discussions, with debates (p. 130) between partisans of fermentation versus “solidists” who were partisans of “trituration” (food is digested by a mechanistically specifiable process of friction and pulverization). Kawamura generalizes this opposition (perhaps a bit strongly), so it becomes a large-scale opposition between the mechanistic and quantitative models of the Scientific Revolution, and the chemical and qualitative models characteristic both of the older “iatrochemistry” (Paracelsus and Van Helmont), of Stahl (who she does not really discuss) and, in her reading (buttressed notably by Diderot’s very favorable article “Théosophes” in the *Encyclopédie*), Diderot himself.

As Kawamura notes, Goethe’s *Elective Affinities* is the most famous work in which the literary and the chemical interact, not just as the transposition of scientific ideas into literature, but in a relation of genuine mutual influence. Yet, she wishes to study Diderot in this way, to show that he too is an author in whose work the “fermentation” of material substances, of literary characters and of philosophical concepts all occur in a kind of monism and/or immanence affecting one another. Here again, she follows Starobinski, who had emphasized the relation between chemical fermentation and the “ferment of ideas” in Diderot. And as regards the “Romantic” dimension of the literature-chemistry relation in Goethe, she picks up the presence of the chemical term “law of affinity” in Diderot’s celebrated letter to Sophie Volland of 15 October 1759 (cit. p. 29). I for one had read that letter many times and quoted it in different places without noticing the presence of the chemical vocabulary therein.

Yet, sometimes she slips into older usage, writing that “in *D’Alembert’s Dream*, Diderot develops his conception of materialism based on the biological and physiological data which were available in the early modern and Enlightenment periods” (p. 36). Here, the science and experimentation come first, and the philosophical speculation second, in an ordinary inductive understanding of things. Similarly, she contrasts this work as a literary work with Diderot’s late, unfinished (or at least unpublished) *Eléments de physiologie*, as “literary” versus “scientific” products (p. 209)[7], and states unproblematically that “Diderot elaborates his materialism by basing himself on the natural sciences of his time as well” (p. 453).

Indeed, as regards the presence of older oppositions in this book, one general difficulty I have is with Kawamura’s reliance on the concept of “mechanistic materialism” as a *repoussoir*.

According to Kawamura, “Diderot’s materialism recycles and materializes iatrochemistry” in opposition to Cartesian mechanism (p. 238). She seems (pp. 40, 53) to perpetuate the old stereotype of “mechanistic materialism” by stressing how Diderot’s symbolic value is enhanced by being the major exception to what she sees as a sea of mechanistic materialism in the eighteenth century. But scholarship going back at least to Ann Thomson’s work on La Mettrie beginning in the early 1980s, along with that of Timo Kaitaro and even this reviewer, has shown (a) that works such as La Mettrie’s *Homme-Machine* despite its provocative title are not mechanistic at all, appealing rather to the specifically embodied or

“organismic” properties of the living body and (b) that there may be almost no such thing as mechanistic materialism, with the exception of Hobbes.[8] D’Holbach’s *Système de la nature* of 1770 indeed uses the language of causality, matter, shape, and motion, yet is also suffused precisely with *chemical* concepts. Kawamura repeats Vartanian’s analysis according to which La Mettrie simply transfers the Cartesian animal-machine onto humans (p. 304), which really needs updating.

Historiographically, it is also a bit imprecise to state that eighteenth-century vitalism defines itself in contradistinction to Cartesian mechanism (p. 50), since by the 1750s-1760s mechanism had undergone many shifts and complex changes from a hundred years earlier, and authors such as Boerhaave or Haller had become much more significant—and dangerous—competitors.[9] (Indeed, some of the usage of the category “vitalism” is conceptually quite loose, as when Kawamura mistakenly describes Spinoza’s *natura naturans* as “vitalist,” p. 216n. Spinoza never made a single claim about the unique nature of living, organic bodies, despite the misinterpretations concerning the *conatus*, which were dispatched by scholars such as Sylvain Zac and François Duchesneau a generation ago.[10]) Nor is it true in any obvious sense that eighteenth-century science is dominated by the mechanist paradigm, as Kawamura writes (p. 53): what about Buffon or Linnaeus, surely influential figures of Enlightenment science? What about the parallel and perhaps rival trend of Baconian experimental histories, which were increasingly positioned as alternatives to Cartesianism, or, for that matter, the vast and multiform presence of Newtonianisms (with an “s”), which most of the time were taken as improvements on or refutations of Cartesianism?[11] Even if I think the opposition between mechanistic materialism and vital(ist) materialism is overplayed, however, Kawamura is surely right that the usage of the model or analogy of the string instrument for the nervous system is quite different in La Mettrie and in Diderot (as she emphasizes, p. 306f.), reflecting a shift from earlier machine models to more complex network models.

Another issue, which is more a question of emphasis, is Kawamura’s insistence on explaining many, if not all key features of Diderot’s thought and writing by appealing rather monolithically to the influence of chemistry in the early- to mid-1750s (p. 118). What then of the equally innovative materialist work *Lettre sur les aveugles* (1749) and its explicit Lucretian dimension, which returns in the *Rêve de D’Alembert*?[12] Similarly with the discussion of dream states and other cases of non- or sub-rational cognitive processes, where Kawamura insists on tracing all such notions back to chemical themes (p. 382-384, 455, 457, 538?), I would suggest in contrast (at least as a way of tempering the monothetic emphasis on chemistry, *not* as a disagreement since this dimension is clearly important, and Kawamura brings it out well) that some of the “dust to dust” language in Diderot—as when the character Diderot, bringing the discussion with the character D’Alembert to a close at the end of the first dialogue of the *Rêve*, says “Goodnight my friend, and *memento quia pulvis es, et in pulverem reverteris*,” i.e., “remember that you are dust and to dust you shall return,” a reference to Genesis—is itself Epicuro-Lucretian, as Diderot himself indicates when he writes in the *Lettre sur les aveugles* and the *Rêve* of the transformations of the earth, its “fertility,” its “fermentation,” and its “vicissitudes.” Similarly, Kawamura insists that Diderot’s notions of the “the Whole” and its transformations (the relation between *le grand Tout* and *le tout*) are transpositions of chemical notions (p. 235), which seems forced, not least since Diderot recorded the influence on him of the heterodox Benedictine monk Dom Deschamps’s purely metaphysical ideas on “le tout” while composing the *Rêve*.[13]

Conversely, there are entire chapters of the book, in themselves very clear and detailed, where the overall “thesis” of the work concerning the chemical “matrix” of Diderot’s dialogic thought vanishes, such as the chapter on analogy and the analysis of musical theory in the eighteenth century. After forty pages on *Rameau’s Nephew* and the functioning of dialogic structures, she suddenly notes one occurrence of the term “yeast” in that work and considers that a sufficient basis to connect her analysis to earlier chapters on chemical concepts, so that the Nephew becomes a “combination of contraries like acids and alkaloids” (p. 413), but the idea that the chemist Rouelle inspired the character of the Nephew is an intriguing one (Kawamura asserts this, p. 427, citing Georges Daniel).

There are many strong points in the book, which is overall distinguished by a very clear and precise tone. I was impressed, for instance, with the discussion (pp. 84–90, 230 n.) of how Diderot is neither properly pro-Newtonian nor anti-Newtonian, across a variety of his texts, some well known, some not. I was left wondering what the status of physics is in Diderot, for there is a great deal of discussion of atoms and molecules, of the properties of matter in general, and of course a revival of ancient atomism (fans of the *Rêve de D'Alembert* know that it was almost entitled *Rêve de Démocrite*). Yet, clearly, Diderot rejects the abstraction of what we might think of as mathematical physics. Is the answer, as Venel might have it, that chemistry is the science that allows us to “access” the specificity of vital processes? Kawamura does not say (here a comparison with Pépin’s book is useful).

Kawamura’s work is written clearly and in an engaging manner. She is to be commended for the quality of the French, but there are a few genuine ambiguities of meaning deriving from unclear French usage (e.g. pp. 103, 216 : what does it mean for “neo-Spinozism”—a term she does not define—to be “récupéré” by Diderot’s conception of matter?). Overall, one can learn a great deal here about the pre-history of Rouellian chemistry in the seventeenth century; about Diderot’s thoughts on chemistry, physics, and nature more generally; and about the internal dynamics of two (admittedly well-known) works of his, the *Rêve* and the *Neveu*. Readers interested in the intersection of eighteenth-century chemistry, literature and philosophy (in the French context) will have to read this book.

NOTES

[1] François Pépin, *La Philosophie expérimentale de Diderot et la chimie* (Paris: Garnier, coll. “Histoire et philosophie des sciences,” 2012). Quite understandably, Kawamura seeks to highlight subtle points of difference between her interpretation and that of Pépin, since both of them focus on Diderot’s relation to chemistry. At times she opts for the “difference of method” (p. 251n.), between a literary study and one belonging to the history of philosophy. At other times she suggests different readings of key works such as Diderot’s *Pensées sur l’interprétation de la nature* (1753–1754), as to whether its author had already encountered the chemistry of his time or not (e.g. p. 254n., which is not especially clear).

[2] A predecessor was Jean-Claude Guédon’s article “Chimie et matérialisme. La stratégie anti-newtonienne de Diderot,” *Dix-huitième siècle* 11 (1979): 185–200. See also Bernard Joly, “L’anti-newtonianisme dans la chimie française au début du XVIII^e siècle,” *Archives internationales d’histoire des sciences* 150–151(53) (2003): 213–224. Christine Lehman, *Gabriel-François Venel, (1723–1775). Sa place dans la chimie française du XVIII^e siècle*, PhD, Université Paris X, 2006 (Lille: Atelier national de reproduction des thèses, 2008), and the special issue of *Corpus* she edited with François Pépin on *La Chimie et l’Encyclopédie* (# 56, 2009); Rémi Franckowiak, “Rouelle, un vrai-faux anti-newtonien,” *Archives internationales d’histoire des sciences* 150–151(53) (2003): 240–255 and “Sur un air de chimie dans l’*Encyclopédie*,” *Recherches sur Diderot et l’Encyclopédie* 44, 2009, 31–46; Luc Peterschmitt, “Fontenelle, The Idea of Science and the Spirit of Chemistry,” in Miguel López-Perez, ed., *Science and Nature in Early Modern Europe (1450–1750)* (Cambridge: Cambridge Scientific Publishers, 2010), 367–385.

[3] Gerhardt Stenger, *Nature et liberté dans la pensée de Diderot après l’Encyclopédie* (Oxford: Voltaire Foundation / Paris: Universitas, 1994); Michel Serres, *The Birth of Physics* (orig. 1977), trans. J. Hawkes, ed. D. Webb (Manchester: Clinamen Press, 2000)

[4] Pierre Gassendi, *Disquisitio Metaphysica seu dubitationes et instantiae adversus Renati Cartesii metaphysicam et responsa* (1644; first published with Descartes’ *Meditations* in 1641), *Dubitatio VIII*, p. 311a–b, ed. & trans. B. Rochot, *Recherches métaphysiques, ou Doutes et instances contre la métaphysique de R. Descartes et ses réponses* (Paris: Vrin, 1962), p. 182.

[5] His lecture notes on Rouelle were first published in 1887, and are now available in the standard edition of Diderot's works: *Cours de chimie de Mr Rouelle*, in *Œuvres complètes*, eds. H. Dieckmann, J. Proust, J. Varloot (Paris: Hermann, 1975-), vol. IX.

[6] Jean Starobinski, *Action et réaction. Vie et aventures d'un couple* (Paris: Seuil, 1999).

[7] A more subtle analysis of the "genre problem" in these works by Diderot is Jean-Claude Bourdin, "Du *Rêve de D'Alembert* aux *Éléments de physiologie*. Discours scientifique et discours spéculatif dans *Le Rêve de D'Alembert*," *Recherches sur Diderot et sur l'Encyclopédie* 34 (2003): 45-69, which Kawamura cites elsewhere.

[8] Ann Thomson, "Pour en finir avec L'Homme machine," *Studies on Voltaire and the Eighteenth Century* 264 (1989): 883-885; Timo Kaitaro, "The Eighteenth-Century French Materialists and 'Mechanistic Materialism'," in J. Alavuotunki, A. Leikola, J. Manninen and A.-L. Räisänen, eds., *Aufklärung und Französische Revolution II*. Publications of the Department of History, University of Oulu, no. 3/1987, 66 – 83; "Man is an admirable machine' – a dangerous idea," in *Mécanisme et vitalisme, La lettre de la Maison française d'Oxford* 14 (2001), special issue, ed. M. Saad: 105–121; Charles T. Wolfe, "Machine et organisme chez Diderot," *Recherches sur Diderot et l'Encyclopédie* 26 (1999): 213–231.

[9] On vitalism, mechanism and the case of Haller, see particularly Hubert Steinke, *Irritating Experiments. Haller's Concept and the European Controversy on Irritability and Sensibility, 1750-1790* (Amsterdam/New York: Rodopi, 2005).

[10] Sylvain Zac, *L'idée de vie dans la philosophie de Spinoza* (Paris: Presses Universitaires de France, 1963), ch. IV; François Duchesneau, "Modèle cartésien et modèle spinoziste de l'être vivant," *Cahiers Spinoza* 2 (1978): 241-285.

[11] See Robert E. Schofield, "An Evolutionary Taxonomy of Eighteenth-Century Newtonianisms," *Studies in Eighteenth-Century Culture* 7 (1978): 175-192; J. B. Shank, *The Newton Wars and the Beginning of the French Enlightenment* (Chicago, Ill.: University of Chicago Press, 2008).

[12] For a beautiful analysis of the Diderot-Lucretius relation in terms both of their materialism and of their articulation of a poetic or experimental prose form and a naturalistic project, see Alain Gigandet, "Lucrèce vu en songe. Diderot, *Le rêve de D'Alembert* et le *De rerum natura*," *Revue de Métaphysique et de Morale* 35(3) (2002): 415-427.

[13] See for example Yves Citton, *L'Envers de la liberté. L'invention d'un imaginaire spinoziste dans la France des Lumières* (Paris: Éditions Amsterdam, 2006).

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