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AESTHETICS OF CHEMISTRY

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It. *Estetica della chimica*; Fr. *Esthétique de la chimie*; Germ. *Ästhetik der Chemie*; Span. *Estética de la química*. Chemical processes and transformations are the imperceptible architects of the realm of *qualia*: the mesmerizing presence of a gilded background, the otherworldly aliveness of an oil portrait, the smooth warmth of Carrara marble – colours, tastes, smells, textures are all material properties that correspond to specific chemical outcomes. Chemistry places us in front of the fabric of reality and offers us the possibility to play an active role in it. Reuniting human doing with the inner causes of reality was indeed the ideal of premodern chemistry. For the first Western philosophers, like Thales and Anaximenes (who lived in an age in which early technology, practical knowledge of chemical reactions and anthropogenesis were still strictly interrelated) the relation with the chemical principles of nature represented, instead, the object of philosophy itself.

Alchemy echoes all the symbolic and practical implications of chemistry with the birth of human civilization (Read 1995) and can rightfully be considered the precursor of modern chemistry. The profound aesthetic potential of alchemy was made explicit by Johann Wolfgang von Goethe and the first Romantic generation, during an age in which chemistry was taking its first steps as a modern science. Goethe's *Elective Affinities* (1809) is one of the most famous examples of aesthetic thematization of sympathy: in this elemental bond, Goethe saw an original movement consisting of simultaneous composition and decomposition. Drawing on the philosophies of nature of Goethe and Schelling, Philipp Otto Runge (1810) highlighted the rooting of art in luminous and chromatic phenomena. More generally, Romantic science cast light on a universe teeming with differences in eternal correlation, an ever-transforming, ever-manifesting plane of heterogeneous forces and materials (Poggi 2000). This fundamentally materialistic operation drew attention to what we may define the aspiration of matter to self-transcend, often considered in the fundamental relation to an active observer.

From the coalescence of knowledge and action that characterizes chemistry descend the two sides of the aesthetics of chemistry:

a) The aesthetics of material transformations, placed in a wider aesthetics of nature. Chemistry presents us with a reality endowed with autonomous processes of becoming and even with autonomous symbolic

processes, at least in an extended sense. Human capacity to intercept and modulate these processes is not excluded in principle but ceases to be an absolute criterion.

b) The aesthetics of chemical experience. It can be an experience mediated by symbols and instruments or an immediate experience of transforming materials at the level of their perceivable manifestation. This aspect encompasses the feeling of a “chemical sublime” as well.

THE CONTEMPORARY DEBATE

The philosophy of chemistry is, today, a young but alive branch of epistemology (see Baird, Scerri, McIntyre 2005; Scerri 2008; Woody, Hendry, Needham 2012; Scerri, McIntyre 2015; Scerri, Fischer 2016). Few attempts, however, have been devoted to an aesthetics of chemistry. Yet, chemistry has not only always had a deep and wide cultural significance throughout the history of human civilization, but it has also been the subject of literary works (such as Primo Levi’s *Periodic System* and Oliver Sack’s *Uncle Tungsten*) and artistic explorations (see *infra*) during the past century. The chemical stories of matter are undisputedly fascinating.

Some recent and contemporary contributions have highlighted the creative potential of matter itself. Nobel Prize winner in chemistry Manfred Eigen and Ruthild Winckler have argued (1993) that the “play” of nature precedes human symbolism and unfolds in complete autonomy from it, displaying a more general notion of “information”. The language of nature is thus provided with its own kind of creativity, being only partially analogous to human expression and only relatively transparent to human experience. This very idea, which stemmed from the combination of system theories, early biosemiotics, and holistic thought, can be found today in the work of Stuart Kauffman, who puts forth the idea of “propagating self-organization” as an all-encompassing principle of reality (Kauffman 2000). This view presents a new idea of nature and even new naturalistic mythologies.

The notion of an autonomous and creative agency of nature (along with that of a specific chemical agency) has also taken hold outside this neo-encyclopaedic project. In general, “we are beginning to understand”, writes De Landa (2004: 17), “that any complex system, whether composed of interacting molecules, organic creatures or economic agents, is capable of spontaneously generating order and of actively organizing itself into new structures and forms”. Chemistry in particular reveals the nondeterministic, chaotic, and morphogenetic nature of matter (Tripaldi 2020). Suggesting the concept of material expressivity, the knowledge of active matter leads to a sort of “visceral” or “absolute empiricism” (Grant 2000) in which chemical creativity can be conceived as a catalytic potency (De Landa 1997). If the aesthetic experience of these events is at all possible, then it is something of a “chemical sublime”, a sensation of matter before humankind: the magnificence of Earth as an ocean of flowing metals, long before biotic life emerged, or the “unimaginable beauty” of the subatomic world, as hinted at by Theosophy (Morrisson 2009).

A different line of research considers the sensitive features of chemical phenomena. The idea of “molecular aesthetics” (Weibel, Fruk 2013), for instance, or that of “nanoaesthetics” (Spector 2012) revolves around the possibility of having an aesthetic experience not only of the mesoscopic products of

chemical processes but also of their microscopic configurations. There may even be an experience of “molecular beauty”, which lies in the structural features of molecular groups and in the “interplay of dimensionality” (Hoffman 1990: 194) and is tied to the symbolic representation of chemical configurations (Hoffman, Laszlo 1991). One can also have an aesthetic experience of chemical products or of depictions of chemical reactions on the mesoscopic scale of experience (Ball, Zhu, Liang 2020). Finally, one can experience aesthetic satisfaction in actively cooperating with the unfolding of chemical processes, a pleasure reserved for chemists only (Fabbrizzi 2012).

Different aesthetic values can hence be attributed to scientific language, natural phenomena and poetic practices (Schummer 1995; 2003; 2009; 2013). Chemical poetics, i.e., the artistic exploitation of chemical phenomena, also falls into these categories, especially the last two. Let us consider Alberto Burri’s use of materials such as plastic, wood, iron and concrete, explored in their expressive properties, where the artist gesture becomes one and the same as a chemical process; Joseph Beuys’ sculpture, which makes use of chemical processes like fermentation, chromatic alteration, organic decay, desiccation and state change in matter; Gilberto Zorio’s installations, conceived as full-fledged alchemic devices; Sigmar Polke’s experimentations on the chemical nature of photography; or Thomas Feuerstein’s processual sculptures. Chemical poetics seems to truly reunite humankind’s chemical knowledge of the world and the chemical agency that belongs to reality itself.

BIBLIOGRAPHY

- D. Baird, E. Scerri, L. McIntyre (eds.), *Philosophy of Chemistry. Synthesis of a New Discipline*, Dordrecht, Springer, 2005.
- P. Ball, W. Zhu, Y. Liang, *The Beauty of Chemistry. Art, Wonder, and Science*, Cambridge-London, MIT Press, 2020.
- M. De Landa, *The Machinic Phylum*, in J. Brouwer, C. Hoekendijk (eds.), *TechnoMorphica*, New York, Philip Galgiani, 1997: 31-59.
- *Material Complexity*, in N. Leach, D. Turnbull, C. Williams (eds.), *Digital Tectonics*, Chichester, Wiley-Academy, 2004, 14-21.
- M. Eigen, R. Winkler, *Laws of the Game: How the Principles of Nature Govern Chance*, Princeton, Princeton University Press, 1993.
- L. Fabbrizzi (ed.), *Beauty in Chemistry: Artistry in the Creation of New Molecules*, Berlin-Heidelberg, Springer, 2012.
- I. H. Grant, *The Chemical Paradigm (Interview)*, “Collapse”, 7 (2011): 39-84.
- R. Hoffman, *Molecular Beauty*, “The Journal of Aesthetics and Art Criticism”, 48 (1990): 191-204.
- R. Hoffman, P. Laszlo, *Representation in Chemistry*, “Angewandte Chemie International Edition”, 30 (1991): 1-16.
- S. A. Kauffman, *Investigations*, Oxford, Oxford University Press, 2000.

- M. S. Morrisson, *Occult Chemistry and the Theosophical Aesthetics of the Subatomic World*, "Canadian Art Review", 34 (2009): 86-97.
- S. Poggi, *Il genio e l'unità della natura. La scienza della Germania romantica 1790-1830*, Milano, il Mulino, 2000.
- J. Read, *From Alchemy to Chemistry*, New York, Dover Publications, 1995.
- P. O. Runge, *Color sphere* (1810), in *On Vision and Colors by Arthur Schopenhauer and Color Sphere by Philipp Otto Runge*, tr. and with an introduction by G. Stahl, New York, Princeton Architectural Press, 2010.
- E. Scerri, *Collected Papers on Philosophy of Chemistry*, London, Imperial College Press, 2008.
- L. McIntyre (eds.), *Philosophy of Chemistry. Growth of a New Discipline*, Dordrecht, Springer, 2015.
- E. Scerri, G. Fischer (eds.), *Essays in the Philosophy of Chemistry*, New York, Oxford University Press, 2016.
- J. Schummer, *Ist die Chemie eine schöne Kunst? Ein Beitrag zum Verhältnis von Kunst und Wissenschaft*, "Zeitschrift für Ästhetik und Allgemeine Kunstwissenschaft", 40 (1995): 145-178.
- *Aesthetics of Chemical Products: Materials, Models, and Molecular Models*, "Hyle", 9 (2003): 73-104.
- *Aesthetic Values in Technology and Engineering Design* (with Bruce MacLennan & Nigel Taylor), in A. Meijers (ed.), *Philosophy of Technology and Engineering Sciences*, Oxford-Amsterdam-Waltham, Elsevier, 2009: 1031-1068.
- *Aesthetic Values in Chemistry*, "Rendiconti Lincei – Scienze Fisiche e Naturali", 25 (2014), 317-325.
- T. I. Spector, *Nanoaesthetics: From the Molecular to the Machine*, "Representations", 117 (2012): 1-29.
- L. Tripaldi, *Materialismo spettrale*, in AA.VV., *Demonologia rivoluzionaria*, Roma, Nero 2020: 53-84.
- P. Weibel, L. Fruk (eds.), *Molecular Aesthetics*, Cambridge-London, MIT Press, 2013.
- A. I. Woody, R.F. Hendry, P. Needham (eds.), *Philosophy of Chemistry*, Oxford-Amsterdam-Waltham, Elsevier, 2012.

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