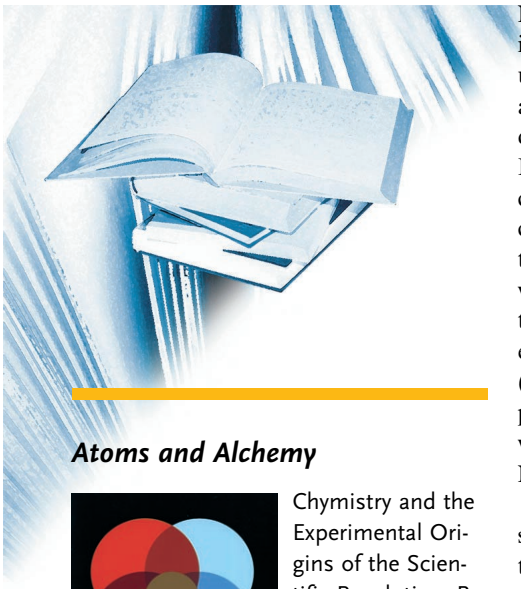
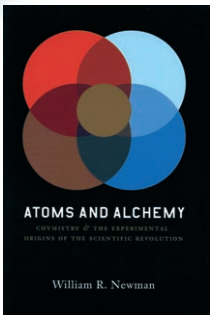


Atoms and Alchemy



Chymistry and the Experimental Origins of the Scientific Revolution. By *William R. Newman*. University of Chicago Press, Chicago 2006. 250 pp., softcover 30.00 $.—ISBN 0-226-57697-3

Half a lifetime ago, in an effort to learn something about alchemy, I tackled Carl Jung's seductively titled *Psychology and Alchemy*.[1] Never before had I read such gibberish written so earnestly. It quashed my interest in alchemy (psychology, too) and I turned my back on pre-modern chemistry. Consequently, I was disposed to accept all of the shibboleths pushed on alchemy (it was anti-science) and alchemists (they were lunatics). William R. Newman has replaced "Psychology" in Jung's title with "Atoms", and gibberish with close textual analysis, from which he reasons that alchemy was indeed a tradition of corpuscular chemistry that the pioneers of the scientific revolution built upon, rather than eschewed. His book is a bold departure. I will not be surprised if *Atoms and Alchemy* is ultimately regarded as important, a watershed in science history.

With hindsight, Newman's conclusion is common sense. It seems ridiculous that chemistry, a science made of innumerable observations and operations concerning matter and its transformations, emerged suddenly from an alchemical chrysalis. However, as Newman shows, the widely read historians of the scientific revolution were unanimous in their presentation of alchemy as so much nonsense, wholly distinguishable from the science of Robert Boyle (1627–1691) and what came afterward. In this instance, the conception of developments in chemistry as scientific revolution was overwrought. Boyle, after all, was introduced to laboratory practice by the American expatriate alchemist George Starkey (1628–1665), who is the subject of two previous books by Newman.[2] Starkey was also a favorite author of Isaac Newton.

The changing view that 20th-century science historians have taken of Newton's substantial alchemical writings parallels the changing view of alchemy overall, to which Newman has made substantial contributions. As Brock[3] explains, when one million words of Newton's alchemical writings were brought to light in 1936, historians denied that they had anything to say about the author of *Principia* or *Opticks*. However, when others studied these words closely it became evident that Newton turned to alchemy for evidence of attractions and repulsions between corpuscles. How many times have we heard a chemist ask "Did you know Newton was an alchemist?". The implication is this: "Newton may have invented calculus, but in the realm in which I know something, he was my inferior". That may make us feel good, but Newton was actually using alchemical practice to seek out a chemical force law, and he came mighty close. He certainly knew that it was not an inverse square law like gravitation.

Newman starts out by rejecting the anachronistic dichotomy of alchemy and chemistry. To achieve this, the author must likewise undermine the dichotomy between the atomism that is characteristic of Boyleian mechanical philosophy and the medieval doctrine of Aristotelian hylomorphism, the notion that the form of undifferentiated matter underlies the diversity of the material world. So that the reader never loses this intention, Newman adopts the archaic "chymistry" to refer to what we will come to recognize as one discipline, the early modern alchemy-chemistry that—while directed toward the transmutation of the metals—is nevertheless recognizable to modern chemists as chemistry. Chymists do not easily parse hylomorphism and atomism. The standard "grand narrative" of the scientific revolution fancies a sharp break with the ancients and the alchemists who maintained the philosophy of hylomorphism. But we learn that even Aristotle was not nearly as Aristotelian as formerly thought. Scholars not satisfied with the philosophy of atomism in Aristotle's *Meteorology* chose to dispute authorship rather than muddy the traditional classification of chemical world-views.

On first thumbing through Newman's text, one is struck by the absence of reproductions of woodcuts depicting magical symbols, and figures engaged in arcane procedures. Instead, there is a central section of sharp color photographs illustrating laboratory operations, in particular the processes of silver dissolution in aqua fortis (nitric acid), re-precipitation as a carbonate, and reduction to give back silver metal, operations carried out by Newman in the laboratories of his Indiana University colleagues. This series of transformations is important in relation to the atomism of the book's central character, Daniel Sennert (1572–1637), an alchemist from the University of Wittenberg. Sennert filtered his aqua fortis silver solution without leaving a residue. He thus reasoned that silver retained its nature, even following dissolution, and that the particles, having passed through the filter, must have been very tiny indeed. Boyle repeated Sennert's procedures exactly, described the processes nearly verbatim in his *Atomicall Philosophy*, and used this evidence to support his developing notions of the "indivisibility and permanent identity" of matter. Newman, by giving "ocular testimony" of alchemical reactions in a form that any practicing chemist recognizes, invites the readers of this journal and comparable others to join in his rehabilitation of alchemy. Obscurum per obscurius (explaining an obscurity by something still more obscure), as the secretive alchemists were fond of saying, poorly characterizes the strategy of Newman, whose comparatively slim text rings clear with his sharply pointed message: the evolution of alchemy to chymistry to chemistry was much more

of a continuum than was formerly realized, and this becomes almost self-evident from a careful reading of the original texts.

William R. Newman has successfully written an ambitious book. He restores alchemy to the history of chemistry (and secondarily restores the reputations of historians of alchemy who were dismissed by authorities such as the oft-quoted Butterfield as "tinctured with the same type of lunacy they set out to describe").[4] Newman is no lunatic, but a careful, sober scholar. Still, *Atoms and Alchemy*, although strongly argued, and hewing closely throughout to the aforementioned central themes, is not an easy book. Newman concedes as much. Scholastic natural philosophy, he wrote, "was dense, thorny, and replete with unstated metaphysical and religious assumptions. To the modern reader … scholasticism is a minefield of interpretive difficulties, where one poorly understood concept can lead to a wasteland of misapprehension". Yet, this warning comes with the author's empathy; Newman does a yeoman's job in protecting us from explosion. For example, he does not pedantically require that we read Latin. Many alchemical scholars frequently lord their linguistic facility over their readership so as—it self-consciously seems to me—to comment silently on the degradation of public education. Newman wants his arguments to be understood by a circle much larger than the community of his peers. His prose pushes forward in bursts, but periodically steps back to re-examine and reiterate difficult points in new ways.

When I noticed an article by Newman about Jung,[5] I wagered to myself that, given my affinity for Newman's point of view, he too would have little taste for Jung's notion that alchemy was nothing more than the expression of psychic processes, disguised in the form of pseudochemical language. I cheered silently when Newman pulled no punches: "Jung was entirely wrong", he wrote. The bottom line, crassly stated, is this: if it looks like chemistry and smells like chemistry, it is chemistry, or at least chymistry. Even today, we find in any chemistry department, or among readers of this journal, scientists with different motivations who are boiling similar pots. One of them may be trying to understand the forces between atoms and molecules, another may be trying to invent a new industry and make a fortune, another may be trying to cure cancer, and still another might be a sculptor—but chemists all. Likewise, Starkey and Boyle, teacher and student, were not so much warriors on either side of a revolution but rather scholars engaged in understanding the meaning of similar dissolutions, precipitations, oxidations, and reductions. Boyle was not waging an Oedipal struggle with his forebears. Rather, he aimed to forge "a good understanding betwixt the chymists and the mechanical philosophers". Newman too—and I hope he forgives the characterization—is a uniter, not a divider.

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[1] C. G. Jung, *Psychology and Alchemy*, Princeton University Press, Princeton, **1980**.
[2] W. R. Newman, *Gehennical Fire: The Lives of George Starkey, an American Alchemist in Scientific Revolution*, The University of Chicago Press, Chicago, **2003**; W. R. Newman, L. M. Principe, *Alchemy Tried in the Fire: Starkey, Boyle and the First of Helmontian Chymistry*, The University of Chicago Press, Chicago, **2002**.
[3] W. H. Brock in *The Norton History of Science*, W. W. Norton, New York, **1993**, pp. 29–31.
[4] H. Butterfield, *Origins of Modern Science, 1300–1800*, MacMillan, New York, **1951**, p. 98.
[5] W. R. Newman, *Revue Hist. Sci.* **1996**, *49*, 159.