164. Ashm. 411, fol. 58v. This might be the same Mrs. Shackelton whose coat of arms Forman described as having been made for her burial on January 7, 1608 (Ashm. 802, Item 37, fol. 207v).

165. Ashm. 208, Item 1, fol. 43v. Forman wrote the word "foiygomercy" in bold, distinct and upright letters.

166. Ibid., fol. 46v.

167. Ibid., fol. 59v.

168. Ashm. 1472, fol. 813 (August 19, 1594).

169. Ibid. (August 23, 1594).

170. Ibid. (September 8, 1594). The text of this dream is incomplete.

171. This is probably the same man as "John Good," who came to live with Forman in 1598 and who later confessed to robbing his study (Ashm. 208, Item 1, fol. 59v; 392, fol. 136).

172. Ashm. 354, fols. 236–37.

173. Ashm. 219, fols. 135, 136.

174. Ashm. 208, Item 1, fol. 62v.

175. Lynn Thorndike, *A History of Magic and Experimental Science* (New York: Columbia University Press, 1934), 2:281–83.

176. Bodleian Library, Jones MS 1; Cambridge, Trinity College MS O.9.7; Jerusalem, National Library, Yahuda MS VAR. 34. For Forman's drafts of the drawings see Ashm. 820, Item 3. Other copies of this text include Bodley MS 951; London, British Library, Harleian MS 181; and Sloane MS 1712. A translation of this text, without the illustrations, appears to be in the hand of Richard Napier (Ashm. 1515).

177. Ashm. 1515, fol. 23v.

178. In "Of Appoticarie Druges" Forman included a section entitled "Writing of Books" in which he outlined the ritual constituents that Raziel told Solomon were necessary for wills and petitions to be fulfilled. These included using pure, virgin parchment and special inks. This may have been why Forman made the effort to write some manuscripts on parchment (Ashm. 1491, 1303–9).

179. Jerusalem, National Library, Yahuda MS VAR. 34, fol. 8.

180. Ibid., fol. 21.

181. Cambridge, Trinity College MS O.9.7, fols. 107v, 115.

182. Ashm. 1515, fol. 34.

183. See Forman's guide to astrological physic, Ashm. 363, and his casebooks, Ashm. 234, 226, 195, 219, 236, and 411.

184. Cf. Yates, *Giordano Bruno*, 151.

8

Some Problems with the Historiography of Alchemy

Lawrence M. Principe and William R. Newman

The well-recognized complexity and opacity of alchemical literature has long constituted a barrier to its proper understanding. Indeed, since the eighteenth-century disappearance of its last serious practitioners within the community of chemists, alchemy has been the subject of several radically distinct schools of historical interpretation. The current understanding of alchemy among historians of science, not to mention the general public, remains strongly colored by one or more of these divergent schools of interpretation, which stem, respectively, from the Enlightenment rejection of obscurity and the later Romantic disenchantment with Newtonian science that led to a new embrace of the occult.[1] At present, when historical interest in alchemy is in the ascendant, it is appropriate to reexamine the content, origins, effects, and validity of these interpretations. We will argue in this chapter that none of these established interpretive schools is satisfactory, for none represents alchemy in a way that is consistent with the historical record, and all severely distort the content and context of the discipline. As we will show, this distortion is often the inevitable consequence of the adoption, frequently unwitting, of principles derived from nineteenth-century occultism, which have become widespread tenets in the historiography of alchemy. We hope, therefore, to clear away some of the detritus that has gradually accumulated around the topic, enabling scholars more accurately to chart and later to follow a path through what remains a partly uncharted domain and thus arrive finally at a clearer and more accurate understanding of alchemy.

The Eighteenth-Century View of Alchemy

The increasing rejection of traditional alchemy during the eighteenth century is generally well known, even though more detailed studies would be

beneficial to define the exact course and means of that repudiation. Increasingly from the beginning of the century there was a tendency to sequester the "older" alchemy from the "newer" science of chemistry, and this divorce appears clearly in the etymological distinctions between "alchemy" and "chemistry," which became entrenched in the first decades of the eighteenth century. As we have shown elsewhere, the words "alchemy" and "chemistry" were used interchangeably to refer to the same body of activities throughout most of the seventeenth century, and only during the eighteenth century were distinctions similar to those in common modern usage rigidly drawn between the two. In the early eighteenth century, the domain of "alchemy" was for the first time widely restricted to gold making—or what had previously been termed "chrysopoeia" or *alchemia transmutatoria*—and many writers (such as the Lemerys, Geoffroy, and Fontenelle) focused ever more exclusively on the cheating practices of alchemical charlatans, eventually indicting the whole subject as a fraud.[2] Indeed, for most writers and thinkers of the eighteenth century, alchemy was synonymous with gold making and fraud.

By the middle of the eighteenth century, "alchemy" was in fairly universal disrepute among scientific authors, save for scattered continuing support from a few writers particularly in Germany. In the lingering German debates over the validity of alchemical transmutation (which continued until the end of the century), the opponents of chrysopoeia continued to insist upon alchemy's putatively fraudulent character. These Enlightenment writers drew heavily on metaphors of light and darkness to describe the dawning of chemistry out of the misty obscurity of the medieval delusion of alchemy.[3] This strongly negative viewpoint endured well after alchemy ceased to be a topic of actual debate, being adopted wholesale by many members of the early generation of chemical historians including Johann Friedrich Gmelin and Thomas Thomson. Indeed, judgments drawn in the eighteenth century persist to the present day, even among some historians of science.[4] In protecting the developing discipline of modern chemistry from the censures to which traditional alchemy (i.e., chrysopoeia) was liable, the Enlightenment writers produced the appearance of a radical disjunction in the history of chemistry, as if the newly redefined "alchemy" and "chemistry" were only marginally contiguous. This movement paralleled the attempts of early eighteenth-century chemical practitioners to legitimize their discipline and enhance their status by

divorcing themselves sharply from the foregoing alchemical tradition, which had fallen into disrepute. The recasting of alchemy as "other" relative to chemistry was to have significant consequences in the nineteenth century and thence to the present day.

Alchemical symbolism continued to survive in some nonscientific quarters, however, even after alchemy itself was no longer reputable. For example, during the eighteenth century the Pietists both in Germany and in America propagated in a spiritual setting the alchemical imagery employed by Jakob Boehme in expounding his ecstatic visions.[5] The mystical brands of alchemical thought propounded by Heinrich Khunrath and the Rosicrucian enthusiast Robert Fludd persisted among several secret societies. The *Gold- und Rosencreutz* of the eighteenth century relied heavily on alchemical symbolism and made at least rhetorical gestures toward the importance of alchemical practice. The "Convent of the Philalethes," a Parisian masonic order sharing its name with one of the seventeenth century's most popular alchemical writers, took up alchemy along with other "occult sciences."[6] The secrecy universally connected with earlier alchemical writers and practices facilitated a juxtaposition of alchemy with different sorts of "secret knowledge" such as natural magic. Alchemical works deliberately written to be obscure and secretive in their own age sometimes became meaningless in the next. Such obscurity was a boon to those striving to display the fraudulent and "nonscientific" character of alchemy, as in the case of Johann Christoph Adelung, whose *Geschichte der menschlichen Narrheit* casts together magicians, soothsayers, and alchemists into a common bin.[7]

At the beginning of the nineteenth century, references to alchemy were to be found predominantly in association with magic, witchcraft, and the other practices commonly grouped together as "occult," topics that the eighteenth-century "triumph of reason" had ridiculed. Thus, when occult revivals began in the early nineteenth century, alchemy received new attention not so much in itself but as one of a number of "occult" sciences. The work of the occult writer Francis Barrett, whose 1801 *The Magus* involved alchemy along with natural magic, astrology, and demonology as "a complete system of occult philosophy," provides one example. This book was followed some years later by *Lives of the Alchemystical Writers*, often ascribed to Barrett as well, the very orthography of whose title signals its author's tendencies.[8] This yoking of alchemy to such disciplines as

natural magic, astrology, and theurgy, although already begun in some quarters during the Renaissance (see chapter 1 of this volume), was consummated only during the final years of the *ancien régime* in France, at the time when Franz Anton Mesmer was disseminating his pneumatic "science" to the world.[9] Mesmerism, as we shall see, laid the foundations for the mid-nineteenth-century success of the "spiritual" interpretation of alchemy.

The "Spiritual" Interpretation of Alchemy

Although nineteenth-century occultism is a complex subject in its own right, it is possible to distinguish a set of characteristic features of a "spiritual" interpretation of alchemy in this period. The esoteric or occultist school, which interpreted alchemy in this spiritual way, held (and holds) that the operations recorded in alchemical texts corresponded only tangentially or not at all to physical processes.[10] Although it was in fact a commonplace of the early modern period to build extended religious conceits on alchemical processes and to draw theological parallels therefrom—an aspect of alchemical writing Luther praised in passing[11]—the occultists of the nineteenth century went much further to claim that alchemy itself was an art of internal meditation or illumination rather than an external manipulation of apparatus and chemicals. Nineteenth-century occult writers claimed that the alchemists did not aim primarily at changes of a chemical kind but rather used chemical language and terminology only to couch spiritual, moral, or mystical processes in allegorical guise. The alchemists' important goals were supramundane. The transmutation of base metals into noble ones is thus to be read as a trope or allusive instruction for the transcendental transformation of the alchemist himself, or of all mankind through him, from a base, earthly state into a more noble, more spiritual, more moral, or more divine state. The philosophers' stone that effects this transmutation/transformation may be corporeal or noncorporeal but in either case represents a mystical or spiritual power either intrinsic or extrinsic to the contemplative spiritual alchemist. This point of view, which we shall refer to as "spiritual alchemy," sees alchemical adepts as possessors of vast esoteric knowledge and spiritual enlightenment.

The nineteenth-century focus on "spiritual alchemy" succeeded in bringing about a massive transformation in the general perception of

alchemy. Although the more extreme exponents of this school are rather easily relegated to places beyond the fringes of respectability, the overall impact of the esoteric school on present-day perceptions of alchemy, even among historians of science, remains significant. When Herbert Butterfield famously derided historians of alchemy as being "tinctured with the same type of lunacy they set out to describe," it is likely that he had this esoteric/occultist interpretation in mind.[12] The two most seminal figures in the history of the "spiritual" interpretation of alchemy date from the middle of the nineteenth century. Mary Anne Atwood in England and Ethan Allen Hitchcock in the United States independently produced spiritual explanations of alchemy in the 1850s, and they were rapidly joined by many others caught up in the Victorian fascination with the occult.

Mary Anne Atwood was born in 1817, daughter of Thomas South, a gentleman of Hampshire. At their home of Bury House in Gosport, father and daughter studied classical and esoteric literature together and became involved in animal magnetism, Mesmerism, and other manifestations of occultism then in vogue. In 1846, Thomas South, probably in collaboration with his daughter, published a small tract entitled *Early Magnetism, in its Higher Relations to Humanity as Veiled in the Poets and Prophets* (under the anagram Θυος Μαγος). This treatise is an early example of the Souths' reading of esoteric subtexts into historical literature, in this case the supposed allusive revelation of animal magnetism in the Homeric Hymns. Thereafter, the two read alchemical literature, and believing they had found therein great esoteric spiritual knowledge and practice in allegorical guise, settled upon writing two expositions, the father writing in verse and the daughter in prose. In 1850, Mary Anne's treatise was completed, sent to the press, and published as *A Suggestive Inquiry into the Hermetic Mystery*. Immediately upon publication, however, the author and her father recalled the book and, on the lawn of Bury House, burned all of the copies plus South's notes and unfinished poetical work.[13] Only the few copies that had already been purchased or sent out to libraries survived. These few examples do seem to have been eagerly read and cited by occultists in the latter half of the nineteenth century. It remains open to question whether this recall and destruction arose from a "moral panic" upon a sudden "realization of the sanctity of the Art" and a fear of being "betrayers of the sacred secret," as claimed by Atwood's followers, or was instead intended to excite future interest in the volume.[14]

The balance of Atwood's life was without further authorship; she married Rev. Alban Thomas Atwood, vicar of Leake, Yorkshire, in 1859, with whom she bore no children, and who died in 1883. Atwood herself died in 1910 and bequeathed her papers and few copies of the *Suggestive Inquiry* (bearing her revisions) to her friend and confidante Isabelle de Steiger. From these copies a new edition was produced in Belfast in 1918, introduced and edited by Walter Leslie Wilmshurst, an editor of esoterica.[15] It has remained in print almost continuously ever since.

The *Inquiry* begins with a cursory (and naive) history of alchemy from Egyptian antiquity to the seventeenth century, when a "mistrust, gathering from disappointment" generated the "absolute odium" under which alchemy and its practitioners had lain since the Enlightenment.[16] Atwood gives special place to Eugenius Philalethes (alias Thomas Vaughan) but reserves her highest (and lengthiest) praise for Jakob Boehme (1575–1624), the Lutheran cobbler-mystic, whom she calls "the plainest, simplest, and most confidential exponent" of all. She adds to her praise of Boehme a surviving fragment of her father's immolated versification that declares that the accumulated wisdom and esoteric knowledge of Orpheus, Zoroaster, Pythagoras, Plato, and every other "saint and sage"

> In Böhme's wondrous page we view
> Discovered and revealed anew.[17]

Atwood concludes that the world is "fully ignorant of the genuine doctrine" of alchemy because the adepts' recipes "though at variance with all common-sense probability, have been the means of surrounding many a literal soul with stills, coals, and furnaces, in the hope by such lifeless instruments to sublime the Spirit of nature, or by salt, sulphur and mercury, or the three combined with antimony, to extract the Form of gold."[18] What appear to be laboratory operations are but "wisdom's envelope, to guard her universal magistery from an incapable and dreaming world."[19] Such laboratory processes were doomed from the start, according to Atwood, because although the adepts could in fact transmute base metals into gold, that was the lowest form of their craft and was not accomplished by means of normal chemical operations. The physical transmutation of metals required that the alchemist first transform himself so that he could operate in a quasi-magical and pneumatic fashion. The materialist recipes of the alchemists were purely delusory: in fact, they were window dressing.

The balance of Atwood's treatise presents her thesis wrapped in a dense and often incoherent hodgepodge of decontextualized and often unattributed quotations from alchemical and classical authors, piled high with obscure assertions, enraptured exclamations, and bizarrely twisted scientific notions.[20] Atwood asserts that the alchemists' prime matter, philosophical mercury, primordial chaos, or Spirit of Life is an imponderable incorporeal ether. The alchemical vessel is man himself, and when in a trancelike state, the adept can "magnetically" draw in this ether or primordial light and condense it into the philosophers' stone, "pure Ethereality of Nature" or "Light inspissate," a noncorporeal agent of universal change and exaltation dwelling within the enlightened adept:[21] "Man is the true laboratory of the Hermetic Art; his life the subject, the grand distillatory, the thing distilling and the thing distilled, and Self-Knowledge [is] at the root of all Alchemical tradition."[22]

The alchemical process thus involved a self-purification and exaltation to a "higher plane of existence." Simultaneously, the spiritualized esoteric adept could also manipulate matter by the application of the same forces, advancing lead into gold by purely spiritual means. Atwood declares an underlying unity of creation and the ability of all its manifestations—mineral, vegetable, animal, or spiritual—to be exalted within their sphere by the same power. Clearly alchemy is totally distinct from chemistry: "No modern art or chemistry, notwithstanding all its surreptitious claims, has any thing in common with Alchemy."[23]

Atwood's exposition of the "Hermetic Mystery" is intimately bound up with her early enthusiasm for Mesmerism. The ether that forms the foundation of hermetic manipulations is the same medium by which Mesmer's planetary influences and animal magnetism were transmitted. Atwood claims that the trancelike state necessary for self-purification and the concentration or manifestation of the "matter" was achieved in ancient times by the devotees of the Eleusinian mysteries and contemporaneously by the practitioners of Mesmerism—"the first key opening to the vestibule of this Experiment."[24] She is generally dismissive of modern science, considering it too intent upon the physical, lower order of things and its practitioners thereby both unfitted and unable to ascend to the ancient and eternal mysteries.

Shortly thereafter, Ethan Allen Hitchcock (1798–1870), a general in the U.S. Army, propounded a considerably different, but still spiritual, view of

alchemy. His *Remarks upon Alchymists* was a short work published in 1855, attempting to show "that the philosopher's stone is a mere symbol signifying something which could not be expressed openly without incurring the danger of an *auto da fé*." After an unfavorable review of the book, Hitchcock issued a response two years later in the form of the longer and more detailed *Remarks upon Alchemy and the Alchemists*.[25] Hitchcock's reading of alchemical texts is moral and Christian, arguing that they are allegories or veiled descriptions of the moral life. He asserts that the alchemists actually did nothing akin to chemistry and that "*Man* was the *subject* of Alchemy; and that the *object* of the Art was the perfection, or at least the improvement, of Man."[26] Philosophical Mercury is a clean and pure conscience, difficult to obtain but potentially available everywhere, and once obtained it leads easily (through "women's work and children's play") to the philosophers' stone, which is the consummate moral life. The true nature of the alchemical quest was hidden in secrecy owing to the "intolerance of the Middle Ages . . . known to every one." Hitchcock casts the alchemists as "Reformers" and asserts that an "open expression of their opinions would have brought them into conflict with the superstition of the time, and thus exposed them to the stake"; unfortunately, he never explains exactly why an exhortation to Christian morality would have been viewed as heretical.[27]

Hitchcock indulges in none of the bizarre occultism of Atwood's extravagant thesis. For Hitchcock, improvement of the human being comes not by psychic exaltation to higher planes of existence but rather through the practice of true religion and morality. He interprets the substances, theories, and operations of the alchemists allegorically after the manner of a preacher unfolding a scriptural parable. For Hitchcock, alchemy is wholly a dimension of orthodox religion. Accordingly, Hitchcock's work, although cited frequently by the close of the nineteenth century, did not create the furor that followed upon Atwood's more daring *Suggestive Inquiry*.

These midcentury interpretations fed a general revival of alchemy among spiritualists and occultists in both Europe and America in the late nineteenth century. In France, a broad esoteric movement followed the occultist Eliphas Lévi (alias Alphonse Louis Constant, 1810–75), and in England, occultist groups grew and flourished.[28] The esoterics Anna Kingsford (1846–88) and Edward Maitland (1824–97) created a Hermetic Society, published a *Corpus Hermeticum*, and prosecuted the

"Higher Alchemy," finding alchemical mysteries couched in the Old Testament and equating alchemy with religion itself.[29] William Wynn Westcott (1848–1925), the "Supreme Magus of the Rosicrucian Society in England, and Master of the Quatuor Coronati Lodge," summarized these esoteric formulations under the pseudonym *Sapere Aude* ("Dare to be wise") in 1893.[30] Westcott saw a link between Eastern mysticism and Western alchemy, undoubtedly provoked by the garbled Hinduism of his associate Helena Petrovna Blavatsky (1831–91) and enshrined in the Theosophical Society she founded in 1875, of which Westcott was a member. In 1888, Westcott helped organize the "Hermetic Order of the Golden Dawn," which flourished for fifteen years (before splintering into sects) and which had a seminal influence on W. B. Yeats. Its influence on late Victorian society is only beginning to be recognized.[31] Westcott also wrote a preface to a translation of Nicholas Flamel's *Hieroglyphics* and edited and annotated a *Collectanea Hermetica* (published by the Theosophical Publications Society) that included several alchemical and mystical tracts.[32]

Across the Channel in France, several occult alchemical societies were founded, including "L'Association Alchimique de France," which under its leader F. Jollivet-Castelot (author of *La synthèse de l'or* in 1909) published the monthly review *L'Hyperchimie* beginning in 1896. By the late nineteenth century the incorporation of alchemy into esoteric and magical subjects and the mythic history of secret societies had become a matter of course. Hargrave Jennings's popular work on the Rosicrucians presents alchemical adepts as mysterious, unaging, semi-immortal wanderers endowed with a knowledge and being far above that of mere mortals. Likewise, Albert Pike recapitulates the esoteric interpretation of alchemy in a Masonic context.[33] The revival of alchemy under esoteric/occult guise grew so vigorous that a report on the various groups and their tenets was presented before the American Chemical Society in 1897 and printed in the annual report of the Smithsonian Institution, wherein the author complained of the "company of educated charlatans" then engineering the revival.[34]

The most prolific of the esoterics was Arthur Edward Waite (1857–1942),[35] who published a multitude of books on occult topics ranging from Freemasonry and Rosicrucianism to devil worship and cabala. The majority of his publications, however, dealt with alchemy, and he exerted a significant influence on the development of twentieth-century interpretations of

alchemy. His first book, *Lives of the Alchemystical Writers* (1888), was a massively rewritten version of the book by the same title issued anonymously seventy years earlier. Whereas the original *Lives* was merely a compilation of uncritical and largely fictitious biographies of about fifty alchemists, Waite's expanded (but no more critical) version used these accounts to promote his own theosophical view of alchemy. His introductory essay finds fault with both Atwood's "psychical" and Hitchcock's "moral" interpretation because neither recognizes the real physical operations that the alchemists carried out in the laboratory, where they did (according to Waite) labor successfully to produce a physical philosophers' stone able to transmute metals.[36] Waite asserts that the "attempt to enthrone [alchemists] upon the loftiest pinnacles of achievement in the psychic world, however attractive and dazzling to a romantic imagination, and however spiritually attractive, must be regretfully abandoned."[37] Nonetheless, he retains a largely spiritual view of alchemy, arguing that the true "Hermetic interpretation lies in a middle course": The alchemists labored on actual physical processes, but these were only the corporeal manifestations of "a theory of Universal Development" that "had an equal application to the triune man" as to the triune metals.[38] Alchemy, or "psycho-chemistry is a grand and sublime scheme of absolute reconstruction . . . the divinisation, or deification in the narrower sense, of man the triune by an influx from above."[39] The adepts' success in physical processes is, by the "Hermetic doctrine of correspondences, . . . analogically a substantial guarantee of the successful issue of parallel methods when applied in the psychic world with the subject man."[40]

Waite dealt with this esoteric "alchemical transformation of humanity" to provide "the perfect youth to come" at length in his *Azoth, or the Star in the East,* published in 1893. There he refers to alchemy as "physical mysticism" claiming that "all alchemists [were] Mystics, and alchemy . . . a mystic work." While maintaining his view that the exclusively spiritual interpretations of Atwood and Hitchcock are "errors of enthusiasm," Waite nevertheless asserts that "alchemical literature deals primarily at least with the conscious intelligence of man, and with the unevolved possibilities of the body and mind of humanity."[41] Thus alchemy presents the means of a "spiritual evolution" of mankind as a whole into a higher form of being. The (successful) transmutation of metals, according to Waite, is the lowest form of alchemical study. Waite urges experimental trials of

psychic alchemy and provides the reader with pithy (and often bizarre) rules for activity and advancement in the spiritual realm.

Waite is perhaps best known for the alchemical treatises he translated in the early 1890s.[42] But these editions have proven to be historically pernicious, for although they appeared as translations, they are often nothing of the kind. They are almost invariably based upon corrupt editions and offer texts butchered to unrecognizability by the silent excision of large portions of material and adulterated by the addition of occultist elements and slants completely alien to the originals. The fact that there are in many cases no other modern translations with which to compare or replace them has intensified their ill effects over time. Waite's corrupt translations were used regularly by historians of science until the middle of this century, as witnessed by their frequent citation in articles in *Ambix* and *Isis,* as well as in scholarly books; some authors still continue to refer to them. Nearly all have been reprinted and are currently available in inexpensive editions.

After his string of translations in the 1890s, Waite did not publish again on alchemy for almost thirty years. In 1926, however, he produced his last book, *The Secret Tradition in Alchemy,* whose contents mark a sharp departure from his earlier interpretations. Here Waite attacks Atwood and Hitchcock much more vigorously than before, proposing to "survey alchemical literature and its history" in order to ascertain its real degree of esoteric or spiritual content. He then proceeds through biographies akin to his earlier *Lives,* but a remarkable metamorphosis is evident: a degree of skepticism and historical discretion appears, and Waite cites his "own hardened unbelief about things occult"![43] He concludes that "between the age of Byzantine records and the age of Luther there is no vestige" of a spiritual alchemy in the historical record and actually refers to the history of alchemy as a record of experimental physics.[44] At no point does Waite explicitly repudiate his esoteric theosophical theories from the *Lives,* his doctrine of the "alchemical transformation of mankind" from *Azoth,* or any of his many other clear expressions of belief in occult matters. In one place he even criticizes a reviewer for maintaining the very same esoteric view of alchemy he himself had expounded at length in *Azoth.* The occultist has marvelously transmuted himself into a positivist; whether his mind was changed by further studies or by a convenient abandonment of Victorian occultism for 1920s positivism is unclear.

Fate and Validity of the "Spiritual" Interpretation

The esoteric school remains strong to this day and continues to have an extensive impact on both the general and the learned perceptions of historical alchemy. Writers such as Julius Evola (1898–1974) and Titus Burckhardt have extended the movement through the twentieth century.[45] Outside of serious scholarship, a number of esoteric alchemical circles in the United States and Europe perpetuate the transcendental views of alchemy so popular in nineteenth-century occultism, sometimes amalgamated with heterogeneous notions from more recent occultist/spiritualist movements such as the New Age movement or radical environmentalism. Many of these groups operate presses that regularly release books on "spiritual alchemy" as well as poor editions and translations of earlier texts. Over half of the books on alchemy published since 1970 either espouse an esoteric/occultist view or are reprints originating from esoteric organizations or presses. A 1976 reprint (by Shambhala Press in Berkeley, California) of Waite's 1894 translation of Paracelsus bears a foreword by one Charles Poncé of the "Azoth Foundation," who declares alchemy to be the "product of Soul Imagining" and the "archetypal language of the soul." An even more extreme example may be found in Kenneth Rexroth's preface to a reprint of Waite's edition of the *Works of Thomas Vaughan*. Being completely ignorant of the Sendivogian alchemy that Vaughan espoused, Rexroth is free to interpret it as a veiled expression of tantric yoga. Hence Vaughan's sentimental references to his dead wife lead Rexroth to the sensational claim that "Thomas Vaughan and his wife, his *soror mystica* wrapped in entranced embrace at the Pinner of Wakefield were, it is true, blundering into a region of revelation which they little understood and which, it would seem, eventually destroyed both of them."[46]

Many books embracing the esoteric interpretation continue to be taken quite seriously. The grip of occultism was, at least at one time, particularly strong in France, where esoteric/occultist volumes have been published regularly from the last century to the present day; a reviewer of one such book referred to its contents as the "typical French approach to the subject of alchemy," and Robert Halleux has briefly catalogued such writers.[47] This unremitting flow of esoterica continues to seep into the field to the detriment of serious scholarship. Such volumes often appear on university library shelves alongside scholarly works (sometimes outnumbering them) and thus present a trap for the unwary. Within academe, scholars writing

on the relationship of alchemy to religion, art, and literature in particular have frequently embraced rather uncritically part or all of the spiritual interpretation of alchemy. Additionally, those who do not utilize primary sources are particularly liable to acquiesce to the esoteric view. One attraction of this interpretation is that it allows writers with a generally sympathetic view of alchemists to attribute grand and cosmic designs to their subjects in opposition to the (equally unwarrantable) criticism that all their efforts toward the manufacture of gold were mercenary or fraudulent.

The chief problem with the esoteric view is that even laying aside the more extreme positions, the historical record (as Waite, for whatever reason, finally concluded in 1926) simply does not countenance it. Although the works of many alchemical writers contain (often extensive) expressions of period piety, imprecations to God, exhortations to morality, and even the occasional appearance of an angelic or spiritual messenger, we find no indication that the vast majority of alchemists were working on anything other than material substances toward material goals. The distinctions in tone and attitude toward spirituality that quite admittedly exist between many "alchemical" texts and more modern "chemical" texts can be explicated without recourse to the spiritual interpretation's disjunction between "alchemy" and "chemistry" and its labeling of them as esoteric and exoteric traditions, respectively. First, it must be remembered that transmutatory alchemy fell out of wide popularity at around the time of the widespread secularization of intellectual culture that occurred in the eighteenth century. Most alchemical texts originated in a culture of greater religious sensibility than our own and thus naturally exhibit more spiritual and religious expressions than do later works of "chemistry." Second, the secrecy and "initiatic style" ubiquitous in works on transmutation led quite naturally to a tone of mystery absent from the later, more "open" writings of eighteenth-century chemistry. This emphasis on secrecy led originally to the fairly common contemporaneous invocation of morality or divine agency as "gatekeepers" to secret knowledge, but in the nineteenth century to a linkage of the arcana of alchemy to the secrets of "the occult" as a whole.[48] These culturally based differences of expression and tone do not countenance the spiritual interpretation, which fails to recognize the cultural context of alchemical texts.

This is not to say that there was nothing whatsoever akin to a "spiritual alchemy" in the broad historical spectrum of alchemy. The relationship

between alchemy and religion, theology, and spirituality is complex, but still does not countenance the esoteric spiritual school of interpretation. It is true that a tradition of using alchemical terms and imagery in religious and spiritual literature did in fact develop in the early modern period; indeed, such works sometimes use the term "spiritual alchemy." St. Francis de Sales, for example, writes of Christian love as the "divine powder of projection" and labels the transforming power of that love as a "holy and sacred alchemy." The alchemical emphasis on purification, transformation, and the quest for the perfection of gold naturally provided an abundant supply of similitudes to religious writers. Secular writers and poets made a similar use of alchemy and its ideas, and the Scriptures themselves occasionally invoke metallurgical images of the refiner's fire to express spiritual trials in a similar way.[49]

Alchemical theories and processes also provided theological and devotional object lessons. Sir Thomas Browne remarked that his study of material relating to the philosophers' stone "taught me a great deale of Divinity." More dramatically, the alchemist Pierre-Jean Fabre wrote a book entitled *Alchymista Christianus,* in which "most of the mysteries of the Christian faith are explained by means of chymical analogies and figures."[50] Complementary to the use of alchemy to instantiate and illustrate religious truths, the same religious truths and revelations were also employed to direct alchemical work. There exist numerous "alchemical readings" of the Bible, just as there are alchemical readings of pagan mythology.[51] It was this practice of some seekers after transmutation which Thomas Sprat criticized when he wrote dismissively that "they believe they see some footsteps of it, in every line of *Moses, Solomon,* and *Virgil.*" Interpretations of holy texts also contributed occasionally to the cause of alchemical secrecy, as in the case of a description of how to make the philosophers' stone disguised under the forms and words of the Mass.[52] Of course, many fundamental terms and themes in alchemy—such as death and resurrection, exaltation and sublimation—derive from Christian theology.

But in all these interactions of alchemy with spirituality, it is clear that alchemy functions as a source of tropes and imagery for rhetorical embellishment or didactic exemplification rather than as an inherently spiritual exercise which elevates the practitioner by some esoteric illumination. It might be noted that the deployment of alchemical images to express spiritual themes metaphorically is in some sense related to Hitchcock's exposition of alchemical themes as metaphorical descriptions of Christian principles and devotions, but it has nothing in common with the "spiritual alchemy" that stems from Atwood and her followers, with its links to Mesmerism and other nineteenth-century occultist movements. When alchemical authors deploy sacred texts or spiritual terminology, this is a relatively unproblematic use of images, concepts, and terms drawn from the religious culture of the time, rather than evidence that alchemical practices were concerned primarily or essentially with the spiritual enlightment or development of the practitioner. These linkages were made by minds more attuned to the drawing of similitudes and the reading of "meanings" (and more convinced of the epistemological value of similitudes in general) than are those of our highly literal modern world.

Perhaps the most pervasive use of alchemical language in spiritual writings appears in Jakob Boehme's mystical theology. The language of the Paracelsian *tria prima,* the divine *Salitter (sal nitrum),* and related concepts are used to express divine qualities, powers, and activities and to expound the cobbler's ecstatic visions. But Boehme's use of alchemical language and imagery—as extensive as it is—remains clearly of a different order than, for example, the practical and theoretical antimonial exercises of Basil Valentine, Alexander von Suchten, Eirenaeus Philalethes and others, or the rigorous Scholastic alchemy of "Geber," Albert the Great, Petrus Bonus, or Gaston Duclo.[53] Even if Boehme's work were taken as evidence of the "spiritual alchemy" promoted by esoterics and occultists, it would remain to be proven by historical argument that he falls into the mainstream of early modern alchemical thought, and that extrapolations about alchemy in general could be reliably or usefully made from him.

We should also mention the little-recognized school of "supernatural alchemy" which seems to have developed in seventeenth-century England. This school held that certain alchemical products had supernatural effects either upon the external world or upon the possessor. Robert Boyle, for example, thought that the philosophers' stone might summon angels and facilitate communication with them, and Elias Ashmole and others mentioned yet greater "supernatural stones" which gave the possessor special intellectual or spiritual powers.[54] But even these notions are only superficially similar to the spiritual interpretation of alchemy as it was

conceived in the nineteenth century. Now it is possible that this school may have initiated a certain tradition of alchemical interpretation which persisted at some low level through the eighteenth century, and then provided a nucleation point for nineteenth-century occultist writers, but there is presently no clear historical evidence for this conjecture. (The same conjecture might also be made regarding Behmenist thought.) The seventeenth-century supernatural school needs more study to define its origins, content, extent, and influence. Nonetheless, at present it is clear that this "school" was a small and perhaps fairly localized subset of alchemy, and so it would be wrong to extend its characteristics to "alchemy" as a whole.

Thus it goes without question that alchemy and religion (or spirituality of various kinds) interpenetrated one another in the medieval and early modern periods, and that each borrowed terms and concepts from the other. This fact is not, however, remarkable in itself, nor is such interpenetration with religion unique to alchemy. Recent work across the entire spectrum of the history of science displays clearly the ubiquity and the importance of religious and theological concerns and influences in early modern natural philosophy; alchemy should be neither an exception nor a special case. By rejecting the "spiritual interpretation" of alchemy we do not intend to imply that the discipline over the *longue durée* was unconcerned with religion any more than modern historians of science would wish to deny the religious and theological dimensions and motivations of the works of Kepler, Boyle, or Newton. We do argue that the view which sees alchemy as an essentially spiritual activity, and which maintains that the degree or character of alchemy's religious or theological content renders it distinct from other branches of contemporaneous natural philosophy (and particularly from "chemistry") is an ahistorical formulation which postdates the early modern period and was fully developed only in the context of nineteenth-century occultism.

In addition to its direct effects on the historical understanding of alchemy, the prevalence of the esoteric interpretation in the late nineteenth and early twentieth centuries seems to have had even greater indirect effects. The currency of the notion of an internal alchemy whose goal was the transformation of the soul cannot have failed to influence the construction formulated by Carl Gustav Jung, with which it shares an emphasis on psychic states and spiritual self-development. Indeed, the

Jungian view, as we shall see, seems little more than nineteenth-century occultism translated into "scientific" terminology.

The Jungian Interpretation of Alchemy

Carl Jung has probably exercised a greater influence on the common perception of alchemy than any other modern author. His psychologizing view of alchemy has been propelled into the cultural mainstream by such writers as the historian of mythology Joseph Campbell, the literary critic Northrop Frye, the philosopher Gaston Bachelard, and the historian of religion Mircea Eliade.[55] But Jung has had an even more pronounced effect on the historiography of alchemy itself. The Jungian approach to alchemy is a stock element of most popularizing texts on the subject, for example, Gareth Roberts's 1994 *The Mirror of Alchemy* and Allison Coudert's 1980 *Alchemy: The Philosopher's Stone.* Even such serious students of the subject as F. Sherwood Taylor and E. J. Holmyard felt obliged to consider the Jungian perspective in their own surveys.[56] Among recent serious historians of science, Betty Jo Teeter Dobbs promoted the Jungian approach in her famous *Foundations of Newton's Alchemy* and reaffirmed it unequivocally as recently as 1990.[57] Even the praiseworthy *Norton History of Chemistry* pays homage to the Jungian analysis of alchemy, citing it as a "traditionalist" view of the subject. This note of approbation is shared by the debunker of alchemical symbolism Marco Beretta.[58]

Jung was deeply interested in occultism from at least his adolescence. His doctoral dissertation, "On the Psychology and Pathology of So-Called Occult Phenomena," was based on the spiritualist seances of his cousin Helly Preiswerk, in which he was an active participant.[59] As early as 1913, he had adopted a "spiritualist and redemptive interpretation of alchemy," and one can be sure that this reflected his wide reading in the occult literature of the nineteenth century.[60] In addition, Jung was aware of and probably influenced by earlier work on alchemical symbolism by the Freudian psychologist Herbert Silberer.[61] But only in the 1920s did he begin writing on the subject, a pursuit that was to occupy the rest of his life.[62] By far the clearest specimen of Jung's approach can be found in his "Die Erlösungsvorstellungen in der Alchemie," published in the *Eranos-Jahrbuch* of 1936 and translated into English as "The Idea of Redemption in Alchemy."[63] Here Jung put forth his soon-to-be-famous claim that in the

analysis of alchemy, "we are called upon to deal, not with chemical experimentations as such, but with something resembling psychic processes expressed in pseudo-chemical language."[64]

According to Jung, alchemists were concerned less with chemical reactions than with psychic states taking place within the practitioner. The practice of alchemy involved the use of "active imagination" on the part of the would-be adept, which led to a hallucinatory state in which he "projected" the contents of his psyche onto the matter within his alembic.[65] The Jungian alchemist literally "saw" his own unconscious expressing itself in the form of bizarre archetypal images, which were "irruptions" of the collective unconscious into his conscious mind. Because he viewed the primary role of alchemy in the light of the unconscious, Jung pointedly devalued the chemical content of alchemical texts. The alchemist's "experience had nothing to do with matter in itself," and consequently, the attempt to decipher alchemical texts from a chemical point of view was quite "hopeless."[66] In this claim one can see clear vestiges of Jung's immersion in Victorian occultism. Like Atwood and Hitchcock, Jung pointedly rejects the image of alchemy as protochemistry. Unlike the more radical upholders of spiritual alchemy, however, Jung did not altogether deny the role of the laboratory in alchemy. In this regard, Jung's view of alchemy greatly resembles A. E. Waite's notion of "alchemical transformation" expressed in *Azoth,* rather than those of inveterate spiritual alchemists such as Atwood and Hitchcock. Perhaps this should not be surprising, given that Waite's works were circulating among members of Jung's Zurich Psychological Club in the 1910s.[67] Like Waite, Jung did not completely reject the claim that alchemy involved laboratory experiment, but in effect he wrote it out of the picture, since alchemy's real concern was the transformation of the psyche, which could project its contents onto any sort of matter. The actual substances employed in a process made no difference at all to the alchemist so long as they stimulated the psyche to its act of projection. In reference to the many operations intended to produce the philosophers' stone, Jung explicitly stated that "[o]ne can make nothing of these from the standpoint of our modern chemical knowledge; if we turn to the texts and the hundreds and hundreds of processes and recipes which the Middle Ages and Antiquity have left behind, we find among them relatively few which contain any chemical sense."[68] According to Jung, therefore, the alchemical experience had more in common with the ecstasy of the illuminé in a state of *unio mystica* than with that of the laboratory technician.

Beyond his confident view that alchemy represented a process of psychic transformation, Jung also had comments to make on the subject of alchemical secrecy. Alchemists did not use obscure language to conceal chemical ingredients or to delude the uninitiated. Instead, they employed their bizarre terminology of dragons, dying kings, and copulating couples because these were the forms in which the unconscious projected itself onto matter.[69] Since the Latin Middle Ages were dominated by Christianity, the minds of medieval alchemists were especially filled with images of Christ, leading to the elaboration of a widespread "Lapis-Christus parallel," in which the philosophers' stone was symbolized by Christ.[70] The multiplicity of names for the *materia prima,* the starting point of the alchemical work, was a necessary consequence of the fact that "projection derives from the individual, and is different for each individual."[71]

Because the unconscious, according to Jung, always reveals itself in the form of hints and images, ambiguity was therefore an essential element of "genuine" alchemy. From this it follows that any alchemical text that could be clearly decoded into chemical language would be a second-rate product, and indeed, Jung went so far as to say that "there are good and bad authors in alchemical literature as elsewhere. There are productions by charlatans, simpletons, and swindlers. Such inferior writings are easily recognizable by their endless recipes, their careless and uneducated composition, their studied mystification, their excruciating dullness, and their shameless insistence on the making of gold. Good books can always be recognized by the industry, care, and visible mental struggles of the author."[72]

This claim incorporates, of course, an important self-validating principle. If a historian, by successfully decoding a given allegorical recipe into chemical language, were to challenge Jung's assertion that alchemical processes are expressions of the psyche, Jung (or a Jungian) could simply reply that the very fact that such a recipe could be translated into modern chemistry means that it is not a specimen of "good" or "genuine" alchemy. Genuine alchemy, by definition, cannot be decoded.

Jung's belief in a "good" and a "bad" alchemy led him to make numerous historiographical statements, and these have had a marked effect on subsequent historians. Jung believed that the history of alchemy could be

divided into two chronological periods. The first, which he called the "classical period," fell between late antiquity and the end of the sixteenth century.[73] The second, which Jung called the period of alchemy's "decay," began with Paracelsus and Jakob Boehme, who split the field into two divergent realms. Paracelsus was responsible for putting alchemy on the path that would convert it into a "natural science" by emphasizing its medical aspect, whereas Boehme transformed it into a purely speculative mystical theology.[74] Jung put this metamorphosis of alchemy into typically graphic terms: "As we have seen, the Gnostic vision of the nous entangling itself in physical nature flashes out again from these late-comers to alchemy. But the philosopher who, in earlier days, descended like a Hercules into the darkness of Acheron to fulfill a divine opus has now become a laboratory worker given to speculation."[75]

In other words, the Paracelsians of the seventeenth century were no longer engaged in the "integration of the personality" by means of alchemy: They were mere technicians and scientists with a side interest in symbolism. The followers of Boehme, on the other hand, forsook the laboratory altogether and converted alchemy into a devotional literature. They too abandoned the path of ancient and medieval alchemy, which had relied on the integration of laboratory practice and visionary projection for its success as a path to "individuation" (the healing of the psyche). Jung believed, then, that alchemy began to divide into something like modern chemistry on the one hand, and Hermetic theosophy on the other, around the beginning of the seventeenth century. He added that this "degeneration" of alchemy continued into the late eighteenth century and that the classical tradition received its coup de grâce with the parallel occurrence of the chemical revolution of Lavoisier and Goethe's fully conscious use of alchemical metaphor.

Criticism of the Jungian Interpretation

Despite the widespread acceptance of Jung's approach to alchemy, a number of his key suppositions have been challenged recently. First, Richard Noll's fundamental study of Jung as a cult figure has cast considerable doubt on the validity of Jung's "collective unconscious," supposedly the deepest level of the mind, from which profound "archetypal images" can irrupt into the conscious.[76] Part of Jung's fascination with alchemy lay in his observation that "alchemical" visions and dreams spontaneously occurred in the minds of his own psychotic patients, along with other archaic, esoteric images.[77] As Noll has argued, the showpiece in Jung's theory was a patient known subsequently as "the Solar Phallus Man." The patient had visions of the sun endowed with a swaying penis from which the winds issued. Jung was struck by the similarity of this image to a Mithraic liturgy stemming from late antiquity. On numerous subsequent occasions, Jung claimed that the patient could not have had any knowledge of the ancient mysteries and that the particular Mithraic text had not even been published at the time of his vision. Thus the Solar Phallus Man assumed an important role for Jung and his followers, providing evidence of the universal, transchronological character of archetypes drawn from a collective unconscious. As Noll has convincingly shown, however, Jung knew perfectly well that the Mithras liturgy had been translated and published both in German and English before the patient's remarkable vision and that the symbol was available in other sources as well. Jung engaged in a deliberate pattern of deception to buttress the scientific validity of his collective unconscious, itself an outgrowth of nineteenth-century occultism.[78]

Although it is not our purpose here to engage in an ad hominem attack on Carl Jung, it is important to emphasize the weakness of his theory of the collective unconscious, for without it, his interpretation of alchemy cannot stand. Jung explicitly argued that in the "classical period" of alchemy, the collective unconscious provided the stock of alchemical imagery: "The alchemistic process of the classical period (from antiquity to the end of the sixteenth century) was a chemical research into which there entered an admixture of unconscious psychic material by the way of projection. For this reason the alchemistic texts frequently emphasize the psychological prerequisites of the work. The contents that come into consideration are those that suit themselves to projection upon the unknown chemical substance. Because of the impersonal nature of matter, it was the collective archetypes that were projected."[79]

Since Jung's theory of the chronological development of alchemy depends on his belief in the complex mechanism of "projection," according to which the contents of the collective unconscious acquire an external, hallucinatory reality, it follows that the fortune of his interpretation is yoked to the fate of the collective unconscious itself. The evidence of fraud that Noll uncovered therefore acquires a significance beyond the unsavory

light in which it places Jung, for by exposing the deeply problematic character of the collective unconscious, it undercuts the foundation of his interpretation and "historiography" of alchemy.

In addition to Noll's probing analysis of Jung himself, the historians Barbara Obrist and Robert Halleux have presented detailed arguments against Jung's interpretation based upon their extensive reading of late medieval and Renaissance alchemical texts, indeed, some of the very same figurative texts that Jung found most attractive.[80] Obrist in particular has shown that the *Aurora consurgens,* a highly emblematic alchemical text of the late Middle Ages ascribed to Thomas Aquinas, can be interpreted more simply and easily without the elaborate apparatus of analytical psychology. Nor do we need to invoke the gratuitous hypothesis made by its Jungian commentator Marie Luise von Franz that St. Thomas wrote the *Aurora consurgens* in a state of visionary ecstasy on his deathbed. The work is manifestly pseudonymous, having little relation either to the philosophical or theological work of Thomas Aquinas.[81]

Finally, we have elsewhere argued extensively against the validity and utility of the Jungian model. Briefly, if the images used in alchemical texts are in fact irruptions of the unconscious, then there would be no possibility of "working backward" from them to decipher such images into actual, valid laboratory practice. Nonetheless, we have presented comprehensive decodings of alchemical symbolism into modern, replicable chemical terminology.[82] Even some of the most allegorical writings—even when describing operations intimately linked with the making of the philosophers' stone—can be sensitively "decoded" and the chemical effects reproduced in a modern laboratory. Since these decoded authors include Eirenaeus Philalethes and Basilius Valentinus, who were among Jung's favorite examples for use in his psychological interpretation, Jungians cannot dismiss them as "bad alchemists."

Furthermore, we have shown clearly how extravagant alchemical imagery was consciously constructed to hide actual laboratory operations and how the very same alchemists who penned bizarre allegorical descriptions in print were able routinely to express their knowledge in clear, unambiguous "chemical" terms in private communications. A clear example of this is the preparation of the "sophic mercury" darkly veiled in the allegorical writings of Eirenaeus Philalethes but lucidly expressed in operational terms in the private 1651 letter of George Starkey (the real author of the Philalethes tracts) to his friend Robert Boyle. Indeed, contemporaneous alchemical readers were highly eager to "decode" allegorical texts such as Philalethes' *Introitus apertus ad occlusum regis palatium,* and many were successful in doing so as well as in reproducing the results described.[83]

Additionally, some alchemists were quite specific in cogently describing and designing apparatus for particular operations. Were alchemy a psychic phenomenon involving the collective unconscious and an external, hallucinatory reality, there would be no requirement for intelligent apparatus design as a prerequisite for success. Finally, chemical replications of results described in alchemical texts under the guise of extravagant imagery, including some of those that Jung himself used to argue for the nonchemical basis of alchemy, have demonstrated that the images that Jung claims originate in the collective unconscious actually have much more reasonable origins, namely, in the sometimes evocative physical appearances of chemicals reacting in flasks.[84] Clearly, then, alchemical texts, even highly emblematic and chrysopoetic ones, are not mere irruptions of the unconscious; they are descriptions of laboratory operations consciously and purposefully outfitted in sometimes outlandish guise. The alchemists' images are not unconscious productions, but rather expressive metaphors developed under the guidance of actual observation of chemical reactions coupled with the need to maintain secrecy and the outlook fostered by the "emblematic world-view" characteristic of the premodern period.[85]

Despite the fact that Jung's interpretation of alchemy is riddled with problems, many continue to accept his historiographical model. Surprisingly, few have challenged his claim that an alchemy previously unified by its single-minded projection of psychic contents onto matter began splitting into a natural science and a devotional art as a result of the early modern iatrochemical movement. To the contrary, Dobbs explicitly adopted this model in her *Foundations of Newton's Alchemy,* and it has striking resonances with her later attempts to distinguish between seventeenth-century "chemistry" and "alchemy."[86] According to her, the former was characterized by its straightforward practicality, whereas the latter had such themes as the redemption of matter and the salvation of the soul.[87] We have argued elsewhere against similar anachronistic attempts to distinguish "alchemy" from "chemistry" in seventeenth-century contexts, such as those made by Dietlinde Goltz and Marco Beretta.[88] In fact, the

overarching discipline of late antique and medieval alchemy already contained a multitude of practical laboratory pursuits along with religious motifs; sometimes the two tendencies are combined in one text, but often they are not. The same is true of premodern alchemy's successor, the "chymistry" of the sixteenth and seventeenth centuries. There is no compelling reason to adopt nor any clear evidence to support the Jungian theory that a previously homogeneous discipline disintegrated into the two realms of devotional and practical alchemy upon the advent of Paracelsianism and that these immediately came to be identified as "alchemy" and "chemistry" respectively.[89]

Although Jung was an important contributor to the notion that an essential difference of philosophical or spiritual outlook divided alchemy from chemistry, the idea is not restricted to Jungians. Many scholars characterize alchemy as an essentially vitalistic, organic view of nature as well as a spiritual illumination granted to its adepts. Hence alchemy supposedly incorporates a "mentality" radically different from that of modern chemistry. Traces of nineteenth-century occultism are clearly evident in this viewpoint, though its twentieth-century proponents do not always perceive these vestiges. In the following section, we shall refer to this view of alchemy, in which illuminism and vitalism are viewed as atemporal, essential characteristics of the discipline, as the "panpsychic" model.

The Panpsychic Interpretation of Alchemy

The view that alchemy was a historical constant, suffused with ecstatic illuminism and vitalism over its entire period, and that the loss of this outlook signified the death of the discipline had already been promoted as early as 1938 by the comparative religionist Mircea Eliade, whose essay "Metallurgy, Magic and Alchemy" formed the nucleus around which he built his immensely popular *The Forge and the Crucible*.[90] Eliade, like Jung, had early ties with the popular occultism of the late nineteenth and nascent twentieth centuries. In his student years, he was a devotee of Rudolph Steiner's "Anthroposophy" and developed a keen interest in alchemy.[91] This juvenile interest bore fruit later in "Metallurgy, Magic, and Alchemy," in which Eliade, like Jung, portrayed alchemy as a discipline concerned primarily with soteriology. Although the alchemist might work tangentially with chemicals and metals, his real quest concerned the soul:

"The alchemist, while pursuing the 'perfecting' of the metal, its 'transformation' into gold, pursued in fact his own perfection."[92]

Eliade was not a psychoanalyst, and he therefore eschewed the language of analytical psychology, yet this part of his message is identical with Jung's.[93] Like the Swiss psychologist, Eliade thought that alchemists experienced an initiatic experience leading to "certain states of consciousness inaccessible to the uninitiated."[94] And like Jung, Eliade stressed that the chemical side of alchemy became pronounced only when the discipline "decayed" or "degenerated" from its primeval simplicity.[95] As the "sacred" side of alchemy declined, the ecstatic experiences of the adept abated, making it possible for the newly "profane" science of chemistry to emerge and for precise laboratory observations to be made. This division of sacred alchemy from profane chemistry also recalls the spiritual interpretation of alchemy. Eliade differs from Jung, however, in his extreme emphasis on the vitalism of alchemy, which he claimed to be a defining characteristic of the discipline. Drawing numerous parallels with African smith traditions, Eliade focused on alchemical texts that spoke of the growth of metals within the earth and of their "love" and "marriage" with one another.[96] His alchemists described the furnace as a surrogate for the "great tellurian matrix" of the earth, in which the philosophers' stone as an "embryo" would be incubated.[97]

Eliade further claimed that alchemy represented a sort of "organic" worldview in contradistinction to the mechanism of modern science.[98] Only with the birth of the scientific worldview during the early modern period did alchemy lose its cosmic vision: "After the mental revolution accomplished by the Renaissance, the physico-chemical operations and cosmic events achieve their autonomy from the laws of universal life, enclosing themselves, though, into a system of 'dead' mechanical laws."[99]

For Eliade, the development of mechanism killed alchemy and inaugurated modern science. Indeed, in a remarkably prescient turn of phrase, Eliade made it clear that for him, the death of alchemy was synonymous with the death of nature. It is only through the persistence of a few alchemical topoi in Western civilization, he said, that "the Cosmos 'dies' very late in [the] European imagination."[100]

Eliade's panpsychic view of alchemy has a surprising counterpart in the writings of a contemporaneous and influential historian of chemistry, Hélène Metzger. Although Metzger seems to have influenced Eliade little

if at all, she had already proposed important parts of his interpretation in a fundamental article of 1922, which later resurfaced as an integral part of her well-known *Les doctrines chimiques en France du début du XVIIe à la fin du XVIIIe siècle* of 1923.[101] Metzger maintained, like Eliade, that alchemists took a hylozoic approach to matter and that they believed that metals and minerals grew like vegetables or animals within the earth.[102] This very vitalism, according to Metzger, made alchemy possible, for the "Hermetic philosophers" based their belief that base metals could be perfected on an organic model: "Now in order to justify their research, the Hermetic philosophers said that gold is a metal that has attained the final limit of its perfection. The imperfect metals, like green fruits exposed to the sun, ripen spontaneously and transform themselves naturally into gold."[103]

Hence the very notion of metallic transmutation was based, according to Metzger, on a transference from the plant and animal realm to that of minerals and metals. Metzger went so far as to argue that such specious analogical reasoning was at the heart of alchemy. Just as alchemists made an invalid comparison between the inanimate mineral realm and that of the living, so they assumed that there were operative correspondences working between stars and metals or between minerals and the parts of the body.[104] She believed such "primitive," "illogical" thought to be responsible for alchemy's origin and longevity.[105] As Jan Golinski has argued, Metzger was probably influenced here by the famous philosopher-anthropologist Lucien Lévy-Bruhl, who happened to be her uncle.[106] Lévy-Bruhl too had spoken of a "primitive mentality" characterized by the reification of analogies, and Metzger explicitly used this concept to explain alchemy in several of her later articles.[107]

Metzger shared with Eliade not only the belief that alchemy was by its very nature vitalistic, but also the conviction that the mechanical worldview of modern science killed it off. According to Metzger, the emergent corpuscular philosophy of the seventeenth century was fundamentally opposed to alchemical transmutation, for the matter theory of the Cartesians left no room for "perfectability" in the mineral realm. Metzger was unequivocal about this point, which resurfaces at various places in her oeuvre: "What did manage to ruin [alchemy] was the Cartesian theory, which did not even attack it directly; indeed, to admit, as Descartes had done, that 'all varieties which are found in matter depend on the movement of its parts,' was in effect to admit that matter is similar to itself everywhere; it is therefore to render absurd the idea of the perfection of chemical substances or even of Nature, which remains always as created."[108]

According to Metzger, there was an inviolable schism between corpuscular theory and alchemy. With the accession of the former, the latter had to fall. One result of this observation is that whenever Metzger found early modern writers on chemical subjects invoking the language of "corpuscles" or "minimal parts," they automatically became "chemists" rather than "alchemists." This was one tool that she used in defining the emergent discipline of chemistry, as opposed to alchemy. "Alchemy" could not coexist with mechanism, whereas "chemistry," as in the writing of the important iatrochemist Nicolas Lemery, could and did.[109]

Metzger and Eliade both asserted, then, that alchemy was fundamentally stamped by its insistence that matter was alive, indeed, ensouled, and when this view came into question during the Scientific Revolution, alchemy had to pass into oblivion. Hylozoism was therefore an essential characteristic of alchemy, according to these two writers. Jung too upheld that all alchemists viewed matter as alive and ensouled. Only this notion of the soul of matter allowed alchemists to develop their myth of redemption, according to which the philosophers' stone became an analogue of Christ. All three authors were therefore forced to see the development of early modern chemistry as a divorce from a radically different mentality represented by alchemy. In the case of Eliade and Jung this schism appeared in the nostalgic terminology of "decay" or "degeneration," whereas Metzger, driven by other sentiments, employed a different language. But she too, no less than they, believed the seventeenth century to have witnessed the birth of our modern science of chemistry, to the immediate discomfiture of the alchemists.

This panpsychic view of alchemy has received a more modern expression in some of the less overtly Jungian writings of Dobbs, and indeed, she employed both Eliade and Metzger directly.[110] It is interesting to note that Dobbs makes no reference at all to Jung in two of her last publications, *Alchemical Death and Resurrection* and *The Janus Faces of Genius,* despite her simultaneous endorsement of his views elsewhere.[111] In these two works Dobbs stresses that alchemy has always been characterized by a desire to view nature in biological and vitalistic terms.[112] Not only is vitalism a fundamental trait of alchemy, however; so too is the quest for religious

illumination.[113] This fusion of vitalism and illuminism that characterizes alchemy over its entire history is in turn the product of a primitive understanding of life, death, and resurrection that imposes these categories on the animal, vegetable, and mineral realms.[114] What is instructive about these comments is the ease with which Dobbs manages to pass from an overtly Jungian point of view to one that is bereft of the apparatus of analytical psychology while maintaining Jung's essential point that alchemy was above all a quest for religious revelation.

A romantically colored rendition of the panpsychic view also forms a central thesis of Carolyn Merchant's popular *The Death of Nature* (1980), whose very title could be a restatement of Eliade. Merchant uses Eliade and Jung to argue that the alchemists—again considered as a homogeneous body—held a sacred view of nature in which the earth was revered as female.[115] She sees the (supposed) triumph of the mechanical philosophy over alchemy in the seventeenth century as a central example of "the transition from the organism to the machine."[116] Evelyn Fox Keller has also expressed these themes from the panpsychic interpretation in her *Reflections on Gender and Science* of 1985.[117] According to Keller, "the hermetic tradition" (here uncomplicatedly equated with alchemy) and "mechanism" provided the two poles available to natural scientists in mid-seventeenth-century Britain.[118] Unlike the upholders of a mechanical worldview, the alchemists employed a highly gendered language whose "basic images" were "the hermaphrodite and the marital couple."[119] Hence, although she asserts that the alchemists were not actually feminists themselves, Keller sees them as having championed the "view of nature and woman as Godly," a position that she claims the mechanical philosophers defeated.[120] The traces of Eliade's interpretation lie just below the surface of such claims, whether explicitly invoked or transmitted by authors such as Merchant and Dobbs.[121]

Criticism of the Panpsychic Interpretation

One can see, then, how the panpsychic model of alchemy, based primarily on the work of Eliade and a diluted version of Jung's conceptions, but also abetted by Metzger's focus on vitalism, has colored the current view of alchemy. It seems to us that there are three fundamental problems with the panpsychic interpretation. From a historian's point of view, one of its most obvious weaknesses lies in its failure to acknowledge the development of alchemical theory and practice over the *longue durée* as well as its internal diversity during a particular time. It is an essentialist picture of alchemy. Its goal has often been the segregation of the field from other scientific disciplines for one or another polemic or historiographical purpose. As we and others have argued elsewhere, alchemy as a historical phenomenon is too diverse to permit such overly reductionistic views.

This diversity comes to the fore when we treat the second problem: vitalism. The panpsychic notion that alchemy is inherently and necessarily vitalistic draws some support from alchemical sources, which often speak in a language that attaches images of vegetable and animal life to the mineral realm. Images from agriculture and reproduction are particularly common. But here we encounter a problem analogous to that found in the spiritual interpretation, namely, how much of such imagery is to be understood in a literal sense? We argue that among many alchemists these images are merely metaphorical or heuristic. Although we cannot declare that this is true for all alchemical writers, because of the inherent diversity of the subject, there are sufficient numbers of nonconforming alchemists to subvert any attempt to characterize alchemy on the basis of its vitalistic content. For example, the famous medieval *Testamentum* ascribed falsely to Ramon Lull uses the term *menstruum* to describe a corrosive, drawing an elaborate parallel between the Galenic theory of human generation, with its male and female sperms and menstrual blood, and the mineral realm. But pseudo-Lull explicitly says that this analogy between the mineral and the animal is only a metaphor: "the mineral genus is added only figuratively, for the sake of similarity."[122] What may have appeared at first to be a naive case of hylozoism turns out to be a deliberate choice of metaphor.

Unlike post-Enlightenment writers on alchemy, early modern scholars were sensitive to this distinction between analogy and identity in alchemical thought. When the polymath Daniel Georg Morhof wrote his 1672 overview of alchemical thought, for example, he explicitly considered the question "an metalla vivant" (whether metals live). Morhof's response is enlightening, for he excuses himself from answering the question at length and lists only Giordano Bruno and the little-known Berigardus as proponents of such vitalistic or hylozoic notions before he passes on to other topics. Clearly, the widely read Morhof did not see vitalism as ubiquitous or even widespread in alchemy as demanded by the panpsychic model.[123]

Additionally, the popular late sixteenth-century chrysopoetic writer Gaston Duclo, or "Claveus," explicitly discusses the use of vitalistic imagery. In his 1590 *Apologia chrysopoeiae* (written against the attack of Thomas Erastus on transmutation), Duclo states clearly that the laws governing the animate world of animals and vegetables are different from those governing the inanimate world of minerals and metals. The anti-Paracelsian Erastus had in fact used cross-realm analogies in his attack on alchemy, and Duclo unequivocally asserts their faulty nature. Nevertheless, Duclo himself uses terms like *anima* and *semen* and the image of the alchemist imitating the farmer growing crops, but he firmly denies any literal-minded interpretation of these expressions, stating that they are used only *metaphorice*.[124] Such terminology is only superficially vitalistic: it does not imply the hylozoism claimed by the panpsychic interpretation.

But there is a third flaw imbedded here as well. Adherents of the panpsychic model insist on a thoroughgoing break between alchemy and chemistry, which they claim to have been implicit throughout much of the seventeenth century. This notion reflects Jung's assertion that alchemy ceases to be alchemy when it becomes clear enough to be understood in chemical terms, and this seems also to be the case for Eliade, with the added criterion that such "degeneration" from the older tradition of alchemy marks a passage from the sacred to the profane. This break also appears in Metzger's work, which contains a crucial erroneous element beyond the mere assertion that much of the seventeenth century saw alchemy and chemistry as widely divergent practices. As we have already stated, the definitive break between alchemy and chemistry occurs for Metzger when the iatrochemists of the seventeenth century adopt an explicit corpuscular theory as in the case of Nicolas Lemery. This distinction displays the flip side of the supposed vitalist-mechanist dichotomy: alchemists are vitalists, chemists are mechanists. But this distinction will not hold. It is now a demonstrated fact that an important corpuscularian tradition was associated with alchemy from the thirteenth century onward. Indeed, this alchemical corpuscular theory influenced the conceptions of no less a mechanical philosopher than Robert Boyle himself.[125] Thus not only is the assertion that alchemy was necessarily vitalistic flawed, so is the complementary assertion that it was nonmechanical and noncorpuscularian. In fact, the very notion of a clean distinction between vitalism and mechanism in the seventeenth century, regardless of their putative attachment to "alchemy" and "chemistry" respectively, is open to question.[126]

Metzger, Jung, and Eliade all employ a supposedly nonarbitrary, historically founded criterion of demarcation for alchemy that they can then use to repel all countervailing criticisms. If one points out an alchemist who employed clear language, an expressly nonvitalist system, or the language of atomism, then these authors can simply reply that by virtue of their definition, he was not really an alchemist, or at least not a "good" one. But it does not require tremendous acumen to see that such a response is little more than a species of begging the question.

Positivist and Presentist Treatments

The reader will note that a common theme in all of the three foregoing interpretations of alchemy is the tendency to downplay or eliminate any natural philosophical or "scientific" content in alchemy. Although we argue that the artificial segregation of alchemy from the scientific tradition is an error, we wish equally to steer away from a "positivist" position that there is no real distinction between alchemy and later science. It is pertinent then, briefly to mention the positivist view of alchemy, whose tutelage we must likewise decline.

We are ill at ease with the label "positivist," however, because of the diffuseness of its common use. The case of the nineteenth-century organic chemist Justus Liebig provides a good example of the problems inherent in the term. In the third letter of his *Chemische Briefe,* Liebig treats the history of chemistry and states that "alchemy has never been anything other than chemistry."[127] Although Liebig's position here has often been characterized as positivist because he dwells upon the positive contributions of alchemy without due consideration of its historical context, at the end of the same letter Liebig explicitly refutes the threefold development thesis of Auguste Comte on which classical positivism is based.[128] The kind of "positivism" that is generally alluded to by historians of science and that we mean to critique in its application to alchemy shares much with "presentist" or "Whig" historiography, which assigns relative importance to historical ideas based upon their level of connection with or similarity to current scientific notions and shows insufficient interest in the historical

and cultural context of those ideas. For the sake of simplicity, then, we will henceforth refer to this type of historical writing as "presentist."

This presentist historiography has had two quite opposite effects on the scholarly study of alchemy. Shortly before the appearance of Atwood's *Suggestive Inquiry,* Hermann Kopp published the first of his several historical studies on the history of chemistry.[129] Kopp began by listing the specific contributions of alchemists to chemistry—for example, methods of separation and purification, apparatus, and various chemical products—denominating alchemy as a developmental phase of chemistry. Yet he also dismissed as mere error whatever did not make a positive, experimental contribution to later chemistry. As one historian has remarked, Kopp "merely takes the seeds out of the fruit, which to him are the only things of value. He has no interest in the uniqueness of the fruit as a whole, its shape, color, and smell."[130] But in spite of this criticism, it should be remembered that before Kopp, alchemy was seen, following Enlightenment judgments, primarily as a fraud without redeeming qualities; thus Kopp's reading offers not only a more accurate representation of the historical account, but also a rehabilitation of alchemy. Kopp's scholarship much exceeds that of his predecessors Johann Friedrich Gmelin and Karl Christoph Schmieder, and in his later contributions he develops a somewhat broader view of alchemy. Yet the approach of picking and choosing nuggets of positive contributions to chemistry out of their alchemical context continued to characterize much of the serious historical literature of the nineteenth and early twentieth centuries, particularly general histories of chemistry.[131] Such well-intentioned rehabilitation of alchemists and their art lies behind the early twentieth-century denomination of the reality of radioactive decay as a "vindication" of the alchemical belief in transmutation; this spurious connection is still encountered in popular texts on alchemy and serves as a point of confusion rather of clarification.

At the same time, presentist attitudes have led certain historians to dismiss alchemy from serious scholarly consideration. The spiritual and nonscientific interpretations outlined earlier in this chapter made the subject appear even more unpalatable to those with a positivist bent. For example, George Sarton expressed a notorious revulsion for alchemy, which led him to declare as late as 1950 that alchemists were all "fools or knaves, or more often a combination of both in various proportions." His presentist outlook is fossilized in the *Isis* classification system he devised, which continues to this day to classify alchemy with witchcraft and divination under the opprobrious rubric of "pseudo-science."[132] Alchemy seemed insufficiently "scientific" to merit serious consideration in the history of science. Such views stand behind the resistance to revelations that respected figures of early modern science, such as Newton and Boyle, were devotees of traditional alchemy.[133] Similar sentiments undergird the continued casual use of alchemy as a convenient foil against which to set off modern science. On the flip side, the presentist extractions of "scientific germs" from the totality of alchemy left the overall context of the field largely unexplored, allowing esoteric and psychological notions to fill that vacuum with little resistance, thus further removing from our reach an accurate understanding of the sum of the discipline. The unsatisfactory nature of a presentist approach need not be insisted upon to modern historians.

Summary

The reader may already have noticed that of the three most influential interpretations of alchemy presented and critiqued here—spiritual, psychological, and panpsychic—none (excepting Metzger's role in the panpsychic model) were devised by historians. Jung and Eliade, moreover, were directly influenced by late nineteenth-century occultism, and Metzger by the anthropological musings of her uncle Lévy-Bruhl. Yet in spite of their origins outside of properly historical studies, a fact sufficiently manifested by their tendency to view alchemy as a chronological constant, these interpretations have all permeated the historiography of alchemy to such an extent that many historians have adopted them without being aware of either their origins or their unsuitability.

A factor common to these interpretations is their tendency to separate alchemy from "science" or natural philosophy; all insist upon psychological, ecstatic, or irrational elements as fundamental to alchemy. Much of this view arises from the often rather alien nature of alchemical writings, whether we consider the highly metaphorical style, the commonplace religious sensibilities and sentiments, or the outlandish emblems and figures. Clearly these modes of expression are far removed from those encountered in the writings of more recent and more well-established scientific figures. But differences of expression need not translate directly into differences of intent or content. We have mentioned above the readings of even ostensibly

bizarre texts recently offered by us and others that "decode" alchemical language into a language of the laboratory and of natural philosophy. We do not deny that alchemical thought often embodied cultural and intellectual presuppositions and intents far different from those typical of the modern age; we do, however, deny the validity of interpretations that artificially, unwarrantably, and most of all, ahistorically introduce a chasm between "alchemy" and "chemistry." We argue that this putative divide is largely an artifact of the interpretations critiqued in this chapter.

We have shown moreover that not only the esoteric spiritual interpretation but also, to varying degrees, both the Jungian and the panpsychic interpretations draw their inspiration from nineteenth-century occultism. The similarity of Jung's psychologizing view to the "spiritual evolution" system of A. E. Waite's *Azoth* is clear, and what we now know of Jung's juvenile interest in the occult and the currency of Victorian esoterica in Jung's early circles supports this observable similarity. Likewise, the concept in Eliade and others that "genuine" alchemy had spiritual illumination as its goal and that early modern alchemy was a product of a degeneration from a more "sacred," purer, or more "organic" time are developments of ideas that can be found in the work of Atwood and other occultists. Since Jung's and Eliade's views have been widely accepted by subsequent historians of alchemy, we therefore come to the rather surprising conclusion that the residues of Victorian occultism have deeply colored the historical study of the discipline. It seems unlikely that many historians would continue to engage in the blithe generalizations criticized in this chapter if they realized their dubious origins.

Future of Alchemical Studies

Thus far we have devoted this chapter to a study of various influential interpretations and approaches to alchemy, all of which we find unsatisfactory. We hope that this exercise will succeed in clearing away these skewed historiographies and their claims and allow for more accurate and more penetrating future studies. Although it would be premature to sketch out in any detail what a fresh view of alchemy would look like, it is not amiss to conclude with suggested directions for the historical study of the subject, some of which are currently being explored.

A fundamental difficulty in the study of alchemy has been the lack of reliable historical data relating to both authors and their texts. This twin problem, which inhibits the accurate situation of authors and texts into their historical and cultural contexts, presents a major hurdle to be overcome before thorough and substantive advances in the understanding of alchemy can be made. Some notable advances have been effected in this arena, and further advances are to be expected from the work now in the hands of prominent scholars.[134] Nonetheless, rigorous historical attention to issues of textual purity and authorial biography should be one important focus for alchemical studies over the next decades. Critical editions of important individual works are needed and more comprehensively, editions of the complete *opera* of important figures, containing careful discrimination between the strata of authentic, interpolated, and spurious works. Even the writings of so important a character as Paracelsus, in spite of the labors of Karl Sudhoff decades ago, are still quite problematic.[135] The present corpora of many important figures are heterogeneous masses of texts; some are validly attributable to the real author, whereas others were composed by students or imitators who in some instances lived centuries later.[136] Clearly, the possession of emended texts localizable to a time and a place, coupled with information regarding the intellectual, temporal, religious, social, and political situation of their authors, are prerequisites to solid and contextual historical inquiry.

A common failing of the interpretations critiqued in this chapter is the depiction of alchemy as a uniform and constant monolith; consequently, future studies should pay attention to mapping out the development and fine structure of the discipline. One potentially fruitful method of approaching this problem is by executing a variety of focused case studies of specific alchemists or their schools; broad surveys of alchemy in the style of Taylor and Holmyard are no longer of value for advancing the field. Such precise studies could then be drawn upon for making comparisons and contrasts between styles and contents among different schools and epochs.[137] For example, we already know a great deal about Paracelsians, and it would now be useful to contrast this group with non-Paracelsian alchemical workers. Such a segregation of alchemical schools would sort out the conflicting works of rival alchemical practitioners, possibly showing, for example, that Paracelsus, somewhat too casually marked as a chief

doyen of alchemy, was as much an outsider and iconoclast to the alchemical tradition as he was to classical Galenism. Likewise, the bracketing of Van Helmont and the Helmontians would resolve some of the paradoxes presented by apparent self-contradictions in seventeenth-century alchemy.

Since there is strong evidence that there is now a new interest in alchemy among historians of science, we hope that the kind of studies advocated here will be carried out with renewed vigor and liberated from the misconceived interpretations that this chapter has undertaken to criticize. Now that the importance of alchemy to the origins of early modern science is a more or less established fact, future studies will serve to define more rigorously what the precise lines of influence were. These future developments should also serve to elucidate the spectrum of notions, attitudes, and pursuits generally grouped under the wide umbrella of "alchemy" and to portray it as a vastly more dynamic field than has hitherto been presumed.

Acknowledgments

We wish to thank the National Science Foundation (SBR-9510135) and the National Endowment for the Humanities (RH-21301–95) for their support of our collaboration, part of the results of which are presented in this chapter.

Notes

1. For nineteenth-century occultism and the Romantic movement, see the still indispensable August Viatte, *Les sources occultes du romantisme,* 2 vols. (Paris: Librairie ancienne Honoré Champion, 1928). The Romantic rejection of Newtonianism is particularly strong in the works of William Blake. For his occult connections, see Kathleen Raine, *Blake and Tradition,* 2 vols. (Princeton: Princeton University Press, 1968), esp. 1:99–125, and 2:189–213.

2. William R. Newman and Lawrence M. Principe, "Alchemy vs. Chemistry: The Etymological Origins of a Historiographic Mistake," *Early Science and Medicine,* 3 (1998): 32–65.

3. W. Ganzenmüller, "Wandlungen in der geschichtlichen Betrachtung der Alchemie," *Chymia,* 3 (1950): 143–54; Dietlinde Goltz, "Alchemie und Aufklärung, Ein Beitrag zur Naturwissenschaftgeschichtsschreibung der Aufklärung," *Medizinhistorisches Journal,* 7 (1972): 31–48. For examples of the late debate against gold making, see J. C. Wiegleb, *Historich-kritische Untersuchung der Alchemie* (Weimar, 1777), and Siegmund Heinrich Güldenfalk, *Sammlung von mehr als hundert wahrhaftigen Transmutationsgeschichten* (Frankfurt and Leipzig, 1784).

4. Johann Friedrich Gmelin, *Geschichte der Chemie,* 3 vols. (Göttingen, 1797–99); Thomas Thompson, *History of Chemistry,* 2 vols. (London, 1830). The exception that proves the rule is Karl Christoph Schmieder, *Geschichte der Alchemie* (Halle, 1832). Schmieder not only provides a positive view of alchemy but seems actually to have been a believer in alchemical transmutation. An example of a contemporary author who continues the eighteenth-century equation of alchemy with fraud (copious recently published evidence to the contrary notwithstanding) is Maurice Crosland; see, for example, his "Chemical Revolution of the Eighteenth Century and the Eclipse of Alchemy in the 'Age of Enlightenment,'" in Z. R. W. M. von Martels, ed., *Alchemy Revisited* (Leiden, the Netherlands: E. J. Brill, 1990), 67–77; compare his article with the balance of the volume.

5. Julius Sachse, *The German Pietists of Provincial Pennsylvania, 1694–1708* (Philadelphia: P. C. Stockhausen, 1895), passim.

6. Christopher McIntosh, *The Rose-Cross and the Age of Reason* (Leiden, the Netherlands: Brill, 1992); Charles Porset, "Les enjeux 'alchimiques' du Convent des Philalèthes," in Didier Kahn and Sylvain Matton, eds., *Alchimie: Art, histoire et mythes: Actes du 1er colloque international de la Société d'Étude de l'Histoire de l'Alchimie* (Paris: Société d'Étude de l'Histoire de l'Alchimie, 1995), 757–800.

7. Johann Christoph Adelung, *Geschichte der menschlichen Narrheit* (Leipzig, 1785).

8. Francis Barrett, *The Magus, or Celestial Intelligencer* (London, 1801); [Barrett?], *Lives of the Alchemystical Writers* (London, 1815).

9. See the treatments of Mesmerism in Robert Darnton, *Mesmerism and the End of the Enlightenment in France* (Cambridge: Harvard University Press, 1968); Henri Ellenberger, *The Discovery of the Unconscious* (New York: Basic Books, 1970); Alan Gauld, *A History of Hypnotism* (Cambridge: Cambridge University Press, 1992); and George Bloch, *Mesmerism* (Los Altos: W. Kaufmann, 1980).

10. If we restrict the meaning of esoteric to "accessible to only a small group or elite" and occult to "hidden," then alchemy is both esoteric (its meaning being consciously restricted) and occult (hidden from the common reader) during much of its history; however, the meanings attached to these words in common parlance since the nineteenth century and by the school now under consideration do not fall within such narrow denotative limits. The modern construction "occultist" appears to have been coined by Eliphas Lévi in the nineteenth century and was used first in English in 1881, connoting something more than a mere believer in one or more of the occult sciences. It refers primarily to a fusion of Eastern and Western magical and mystical beliefs that reached its apotheosis in the works of Madame Blavatsky and has undergone a revival in the "New Age" movements. See Joscelyn Godwin, *The Theosophical Enlightenment* (Albany: State University of New York Press, 1994), esp. 49; Mircea Eliade, *Occultism, Witchcraft, and Cultural Fashions* (Chicago: University of Chicago Press, 1976), esp. 47–54; and Brian P. Copenhaver, "Natural Magic, Hermetism, and Occultism in Early Modern Science," in

David C. Lindberg and Robert S. Westman, eds., *Reappraisals of the Scientific Revolution* (Cambridge: Cambridge University Press, 1990), 261–301, esp. 289.

11. Martin Luther, *Colloquia Mensalia* [*Tischreden*], trans. Henry Bell (London, 1652), 480; here Luther praises alchemy "for the sake of the Allegorie and secret signification . . . touching the Resurrection of the dead."

12. Herbert Butterfield, *The Origins of Modern Science 1300–1800* (New York: Macmillan, 1952), 98.

13. A fragment of the Thomas South's poem, entitled "Enigma of Alchemy," was found in 1918 as proof sheets folded into a secondhand book in a London bookshop. This fragment was published by William Leslie Wilmshurst (the editor of the reprinted version of *Suggestive Inquiry*) in *The Quest*, 10 (January 1919): 213–25 (reprinted, Edmonds, WA: Alchemical Press, 1984).

14. Mary Anne Atwood, *A Suggestive Inquiry into the Hermetic Mystery* (Belfast: William Tait, 1918), from the introduction by Walter Leslie Wilmshurst, 6–9.

15. A revised edition appeared in 1920 and a reprint of it in 1960 (New York: Julian Press); another reprint (1918 edition) is still in print (Yogi Publication Society).

16. Atwood, *Inquiry*, 52–53.

17. Ibid., 57; Philalethes on 61–62.

18. Ibid., 70–71.

19. Ibid., 26.

20. As an example: "chemical affinity, called Elective Attraction, is ruled by the same laws; and it is found that when two matters unite, one is attractive and the other repulsive; when either attraction or repulsion predominates in a matter, the circulation is in ellipse; but when they are in equilibrium, a circle is produced" (ibid., 155). A generous reader might compare this to Atwood's adored Boehme admixed with a sort of Newtonianism and Berzelian dualism; alternatively, more skeptical minds may see a resemblance to the superficial examination answers cobbled together by ingenious but unlearned students.

21. Ibid., 78–85, 96–98, 162, 454–55.

22. Ibid., 162.

23. Ibid., 143.

24. Ibid., 543; 527–58: "Mesmerism, as it is mechanically practiced in the present day, is a first step indeed, and this only before the entrance of that glorious temple of Divine Wisdom which a more scientific Handicraft enabled the ancients experimentally to enter, and from its foundation build up, as it were, a crystalline edifice of Light and Truth."

25. Ethan Allen Hitchcock, *Remarks upon Alchymists* (Carlisle, Penn., 1855); *Remarks upon Alchemy and the Alchemists* (Boston, 1857). The review appeared in the *Westminster Review*, 66 (October 1856): 153–62. See I. B. Cohen, "Ethan Allen Hitchcock: Soldier-Humanitarian-Scholar, Discoverer of the 'True Subject of the Hermetic Art,'" *Proceedings of the American Antiquarian Society*, 61 (1951): 29–136.

26. Hitchcock, *Remarks upon Alchemy*, iv.

27. Ibid., viii and 30. The fact that he implicitly extends the medieval "midnight of darkness" into the eighteenth century can be passed over with only a smirk. Not surprisingly, there are glimpses of period anti-Catholicism even though Hitchcock seems to speak well of the Catholic Church at one juncture (64–65).

28. See, for example, Ellic Howe, ed., *The Alchemist of the Golden Dawn: The Letters of the Reverend W. A. Ayton to F. L. Gardner and Others 1886–1905* (Wellingborough, U.K.: Aquarian Press, 1985). Eliphas Lévi, *Dogme et rituel de la Haute Magie*, 2 vols. (Paris, 1854–56). Lévi's volume was translated into all the important Western European languages; the English-language version was by A. E. Waite, *Transcendental Magic: Its Doctrine and Ritual* (London, 1897). See also Thomas A. Williams, *Eliphas Lévi: Master of Occultism* (University of Alabama Press, 1975), and Christopher McIntosh, *Eliphas Lévi and the French Occult Revival* (New York: Samuel Weiser, 1975).

29. See *The Story of Anna Kingsford and Edward Maitland, and of the New Gospel of Interpretation*, 3rd ed. (Birmingham, Ala.: 1905); Godwin, *Theosophical Enlightenment*, 333–37. Only two volumes of the *Corpus* appeared: a reissue of John Everard's 1649 translation of *Pymander* (London, 1884), and *The Virgin of the World of Hermes Trismegestus* (London, 1885; reprinted, Madras, 1900). One of the characteristics of Kingsford and Maitland—reproduced in their followers to this day—is a predilection for ludicrous etymologies; e.g., the "Guardin" of Eden, and Noah as a form of *nous*.

30. S. A. [Sapere Aude, alias William Wynn Westcott], *The Science of Alchymy* (London: Theosophical Publishing Society, 1893), 17–20. Westcott thought Atwood to be a clergyman of the Church of England, 17. Besides these esoteric notions, Westcott was known in a wholly different context as the coroner of northeast London and the coeditor of *The Extra Pharmacopaeia of Unofficial Drugs* (1883) and its fifteen supplements dating up to 1920; he is briefly mentioned (with a photograph) in *The Chemist and Druggist* for September 2, 1922, 339.

31. Ellic Howe, *The Magicians of the Golden Dawn* (New York: Samuel Weiser, 1978); R. A. Gilbert, *The Golden Dawn: Twilight of the Magicians* (San Bernardino, Calif.: 1988); see also the issues of *Cauda Pavonis* dedicated to the Golden Dawn, new series 8 (Spring and Fall 1989).

32. The Flamel text was a modernized version of the 1624 English translation by "Irenaeus Orandus" and was published at London in 1870. Seven volumes were issued in the *Collectanea Hermetica* between 1893 and 1896: Jean d'Espagnet's *Hermetic Arcanum* (Westcott's translation of the 1623 Latin edition); *Pymander; Lover of Philalethes, Hermetic Art* (1714); *Aesch Mezareph*, collected from *Cabala Denudata* of Rosenroth; *Somnium Scipionis; Chaldean Oracles of Zoroaster;* and Eugenius Philalethes, *Euphrates* (1655 edition).

33. Hargrave Jennings, *The Rosicrucians* (London, 1870); see esp. 20–39; Albert Pike, *Morals and Dogma of the Ancient and Accepted Scottish Rite* (London, 1871).

34. H. Carrington Bolton, "The Revival of Alchemy," *Science*, 6 (1897): 853–63, and *Annual Report of the Smithsonian Institution 1897*, 207–17.

35. See R. A. Gilbert, *A. E. Waite: Magician of Many Parts* (Wellingborough, U.K.: Crucible, 1987).

36. Arthur Edward Waite, *Lives of the Alchemystical Philosophers* (London, 1888), 9–27. The work was reissued as *Alchemists through the Ages* (New York: Rudolf Steiner Publications, 1970).

37. Waite, *Lives of the Alchemystical Philosophers*, 273.

38. Meaning, of course, the spirit, soul, and body of man and the mercury, sulfur, and salt of metals.

39. Ibid., 30–36 and 273.

40. Ibid., 274.

41. A. E. Waite, *Azoth, or the Star in the East, embracing the first matter of the Magnum Opus, the evolution of the Aprodite-Urania, the supernatural generation of the son of the sun, and the alchemical transfiguration of humanity* (London, 1893), 54, 58, and 60.

42. Waite was the editor and translator of each of the following: *Alchemical Writings of Edward Kelly* (1893); Basil Valentine, *Triumphal Chariot of Antimony* (1893); *Musaeum hermeticum*, 2 vols. (1893); Benedictus Figulus, *Golden Casket* (1893); *Hermetic and Alchemical Writings of Paracelsus*, 2 vols. (1894); Petrus Bonus, *Pearl of Great Price* (1894); *Turba Philosophorum* (1896). On Waite's translating activity, its context, and effects in terms of Paracelsus, see Andrew Cunningham, "Paracelsus Fat and Thin: Thoughts on Reputation and Realities," in Ole Peter Grell, ed., *Paracelsus: The Man and His Reputation, His Ideas, and Their Transformations* (Leiden, the Netherlands: Brill, 1998), 64–68.

43. A. E. Waite, *The Secret Tradition in Alchemy* (New York: Alfred Knopf, 1926), 165.

44. Ibid., 366.

45. Julius Evola, *La tradizione ermetica* (Bari: Guis, 1931); recently reprinted in English translation as *The Hermetic Tradition* (Rochester, Vt.: Inner Traditions International, 1995); Titus Burckhardt, *Alchimie, Sinn und Weltbild* (Olten: Walter Verlag, 1960), translated as *Alchemy, Science of the Cosmos, Science of the Soul* (London: Stuart and Watkins, 1967).

46. A. E. Waite, ed., *The Works of Thomas Vaughan*, foreword by Kenneth Rexroth (New York: University Books, 1968), 10.

47. G. Heym's review of René Alleul, *Aspects de l'alchimie traditionelle* (Paris: 1953), in *Ambix*, 5 (1956): 129–30; Robert Halleux, *Les textes alchimiques* (Turnhout, Belgium: Brepols, 1979), 56–58; "L'unique mérite de leur travaux est de montrer qu'une approche érudite de l'alchimie est plus qu'une nécessité scientifique: c'est une exigence de santé mentale," p. 57.

48. For a consideration of the "initiatic style" and its sources, see William R. Newman, *The Summa perfectionis of pseudo-Geber* (Leiden, the Netherlands: Brill, 1991), 85–99. On divine agency in alchemical laboratories see our forthcoming study on chymical laboratory practice.

49. Sylvain Matton, "Thématique alchimique et littérature religieuse dans la France du XVIIe siècle," *Chrysopoeia*, 2 (1988): 129–208 (De Sales quotation on pp. 199–200); Sylvia Fabrizio-Costa, "De quelques emplois des thèmes alchimiques dans l'art oratoire italien du XVIIe siècle," *Chrysopoeia*, 3 (1989): 135–162; Stanton J. Linden, *Darke Hieroglyphicks: Alchemy in English Literature from Chaucer to the Restoration*, (Lexington, KY: University of Kentucky Press, 1996). See also Daniel Merkur, "The Study of Spiritual Alchemy: Mysticism, Gold-Making, and Esoteric Hermeneutics," *Ambix* 37 (1990): 35–45. Refining metaphors occur in the Bible at, for example, I Peter 1:7, Proverbs 17:3 and 27:21, Wisdom 3:6, Job 23:10.

50. Thomas Browne, *Religio medici* in *Works of Sir Thomas Browne*, ed. Geoffroy Keynes, 4 vols. (Chicago: University of Chicago Press, 1964) 1:50; on Fabre, see Bernard Joly, *Rationalité de l'alchimie au XVIIe siècle* (Paris: Vrin, 1992), esp. pp. 42–45; Pierre Jean-Fabre, *Alchymista Christianus, in quo Deus rerum author et quam plurima fidei christianae mysteria per analogias chymicas et figuras explicantur, christianorumque orthodoxa doctrina, vita et probitas non oscitanter ex chymica arte demonstantur* (Toulouse, 1632).

51. Sylvain Matton, "Une lecture alchimique de la Bible: les 'Paradoxes chimiques' de François Thybourel," *Chrysopoeia*, 2 (1988): 402–22. Although the best-known exposition of Classical mythology as alchemy is Antoine-Joseph Pernety, *Les fables égyptiennes et grecques devoilées* (Paris, 1758), the genre was well-established much earlier; see the fifteenth-century Vincenzo Percolla, *Auriloquio*, ed. Carlo Alberto Anzuini, in *Textes et Travaux de Chrysopoeia* 2, 1996, and for other examples, Michael Maier, *Arcana arcanissima* (s.l., s.d. [London, 1613 or 1614]), and Pierre-Jean Fabre, *Hercules piochymicus* (Toulouse, 1634).

52. Thomas Sprat, *History of the Royal Society* (London, 1667), p. 37; Nicholas Melchior, *Processus sub forma missae*, in *Theatrum chemicum*, 6 vols. (Strasbourg, 1659–61), 3:758–61.

53. Yet even in the case of Boehme, it is not clear that practical alchemy was entirely excluded. See Will-Erich Peuckert, *Das Leben Jakob Boehmes* (Jena, Germany: Eugen Diederichs, 1924), 167.

54. Lawrence M. Principe, *The Aspiring Adept: Robert Boyle and His Alchemical Quest* (Princeton: Princeton University Press, 1998), 188–90, 197–201; Robert M. Schuler, "Some Spiritual Alchemies of Seventeenth-Century England," *Journal of the History of Ideas*, 41 (1980): 293–318.

55. Joseph Campbell, *The Flight of the Wild Gander: Explorations in the Mythological Dimension* (New York: Harper Perennial, 1990; first ed., 1951), 86–87, 218–19. Idem, *The Masks of God: Primitive Mythology* (Harmondsworth, U.K.: Penguin, 1982; first ed., 1959), 72. Northrop Frye, *Anatomy of Criticism* (Princeton: Princeton University Press, 1957). For Bachelard, see Barbara Obrist, *Les débuts de l'imagerie alchimique (XIVe–XVe siècles)* (Paris: Le Sycomore, 1982), 22–23. Mircea Eliade, *The Forge and the Crucible* (Chicago: University of Chicago Press, 1978; first ed., 1962; first French ed., 1956), 221–26.

56. Gareth Roberts, *The Mirror of Alchemy* (London: British Library, 1994), 7, 66. Allison Coudert, *Alchemy: The Philosopher's Stone* (London: Wildwood House, 1980), 148–60. F. Sherwood Taylor, *The Alchemists: Founders of Modern Chemistry* (New York: Henry Schuman, 1949), 159, 228. E. J. Holmyard, *Alchemy* (New York: Dover, 1990; first ed., 1957), 163–64, 176.

57. Betty Jo Teeter Dobbs, *The Foundations of Newton's Alchemy* (Cambridge: Cambridge University Press, 1975), 26–35; "From the Secrecy of Alchemy to the

Openness of Chemistry," in Tore Frängsmyr, ed., *Solomon's House Revisited* (Canton, Mass.: Science History Publications, 1990), 75–94, esp. 76. Dobbs's endorsement of the Jungian historiographical model has served not only to further its acceptance among historians of science but to justify the model to other Jungians. Hence Nathan Schwartz-Salant's *Encountering Jung on Alchemy* (Princeton: Princeton University Press, 1995), 10, explicitly cites Dobbs in support of the claim that historians of science "have recognized the value of Jung's approach."

58. William H. Brock, *The Norton History of Chemistry* (New York: Norton, 1993), 17 and 678. Marco Beretta, *The Enlightenment of Matter* (Canton, Mass.: Science History Publications, 1993), 77, n. 6, and 331.

59. Richard Noll, *The Jung Cult* (Princeton: Princeton University Press, 1994), 144. Idem, *The Aryan Christ* (New York: Random House, 1997), 25–30, 37–41.

60. Noll, *Aryan Christ*, 171.

61. Luther H. Martin, "A History of the Psychological Interpretation of Alchemy," *Ambix*, 22 (1975): 10–20, esp. 12–16.

62. Jung's earliest writing on alchemy is found in *The Secret of the Golden Flower*, published with Richard Wilhelm in 1929: see Martin, "A History," 16. Sustained treatments are found in *The Collected Works of Carl Gustav Jung*, 20 vols. (London: Routledge, 1953–79), vol. 9, pt. 2: *Aion;* vol. 12: *Psychology and Alchemy;* vol. 13: *Alchemical Studies;* vol. 14: *Mysterium Conjunctionis.*

63. Jung, "Die Erlösungsvorstellungen in der Alchemie," in *Eranos-Jahrbuch 1936* (Zurich: Rhein-Verlag, 1937), 13–111; in English, "The Idea of Redemption in Alchemy," in Stanley Dell, ed., *The Integration of the Personality* (New York: Farrar & Rinehart, 1939), 205–80. A retranslated and much expanded version of the original Eranos lecture appears in Jung, *Works*, vol. 12: *Psychology and Alchemy*, 227–471.

64. Jung, "Redemption in Alchemy," 210.

65. Ibid., 215. The German text is quite unequivocal in its reference to "hallucinations" (Jung, "Die Erlösungsvorstellungen," 23–24): "Wie die beiden vorhergehenden Texts, so beweisen auch Hoghelande's Ausführungen, dass während der praktischen Arbeit halluzinatorische oder visionäre Wahrnehmungen erfolgten, die nichts anderes sein können als Projektionen unbewusster Inhalte."

66. Jung, "Redemption in Alchemy," 213, 206.

67. Noll, *Aryan Christ*, 229–30.

68. Jung, "Die Erlösungsvorstellungen," 16: "Man kann sich vom Standpunkt unseres modernen chemischen Wissens darunter nichts vorstellen; und greifen wir zu den Texten und zu den Hunderten und Aberhunderten von Verfahren und Rezepten, die uns das Mittelalter und die Antike hinterlassen haben, so finden wir darunter relativ wenige, welche einen erkennbaren chemischen Sinn erhalten."

69. Jung, "Idea of Redemption," 239–47.

70. Ibid., 250–67.

71. Ibid., 239.

72. Jung, *Works*, vol. 12: *Psychology and Alchemy*, 316. Here the *Collected Works* version gives a better rendition of the German ("Die Erlösungsvorstellungen," 59) than does Dell's translation, "Redemption in Alchemy," 239.

73. Jung, "Redemption in Alchemy," 269–71.

74. Ibid., 268. For an elaboration of Jung's view of Paracelsus as a reformer of alchemy, see his early "Paracelsus," in Jung, *Works*, vol. 15: *The Spirit in Man, Art, and Literature*, 3–12. The essay is a translation of an address given in 1929.

75. Jung, "Redemption in Alchemy," 267.

76. Noll, *The Jung Cult*, 181–84.

77. Jung, *Works*, vol. 13: *Alchemical Studies*, 253–349.

78. Noll, *Aryan Christ*, 22–52, 98–119.

79. Jung, "Redemption in Alchemy," 269–70. "Die Erlösungsvorstellungen," 103–4: "Die alchemische Prozess der klassischen Zeit (von der Antike bis zum Ende des 16. Jahrhunderts) war eine an sich chemische Untersuchung, in welche sich auf Wege der Projektion unbewusstes psychisches Material mischte. Die psychologische Bedingung des Werkes wird daher in den Texten vielfach betont. Die in Betracht kommenden Inhalte sind solche, welche sich zur Projektion in den unbekannten chemischen Stoff eignen. Wegen der unpersönlichen, rein dinglichen Natur des Stoffes finden Projektionen von unpersönlichen, sogenannten kollektiven Archetypen statt."

80. Obrist, *Les débuts de l'imagerie alchimique*, 15–21, 183–245; Halleux, *Les textes alchimiques*, 55–58.

81. Marie-Luise von Franz, *Aurora consurgens: A document attributed to Thomas Aquinas* (New York: Pantheon Books, 1966), 407–31.

82. William R. Newman, *Gehennical Fire: The Lives of George Starkey, an American Alchemist in the Scientific Revolution* (Cambridge: Harvard University Press, 1994), 125–33; Lawrence M. Principe, "'Chemical Translation' and the Role of Impurities in Alchemy: Examples from Basil Valentine's Triumph-Wagen," *Ambix*, 34 (1987): 21–30.

83. William R. Newman, "The Authorship of the 'Introitus Apertus ad Occlusum Regis Palatium,'" in von Martels, *Alchemy Revisited*, 139–44; "'Decknamen or pseudochemical language?' Eirenaeus Philalethes and Carl Jung," *Revue d'histoire des sciences*, 49 (1996): 159–88; and *Gehennical Fire*, 128, 132. In our forthcoming study of the alchemical collaboration of Starkey and Boyle we will detail the methods of analysis used by Starkey to "decode" the writings of earlier alchemical writers such as Bernard of Trier.

84. Lawrence M. Principe, "Apparatus and Reproducibility in Alchemy," in Trevor Levere and Frederick L. Holmes, eds., *Instruments and Experimentation in the History of Chemistry* (Cambridge: MIT Press, 2000), 57–74.

85. On the emblematic worldview, see William B. Ashworth, "Natural History and the Emblematic World-View," in Lindberg and Westman, *Reappraisals of the Scientific Revolution*, 303–31.

86. Dobbs, *Foundations of Newton's Alchemy*, 26–29.

87. Betty Jo Teeter Dobbs, "Conceptual Problems in Newton's Early Chemistry: A Preliminary Study," in Margaret J. Osler and Paul Lawrence Farber, eds., *Religion, Science, and Worldview: Essays in Honor of Richard Westfall* (Cambridge: Cambridge University Press, 1985), 3–32, esp. 4. Dobbs claims to base this on a distinction made by Newton himself between "vulgar" and "vegetable" chemistry. See the critique of Dobbs's position in William R. Newman's review of *The Janus Faces of Genius, Isis* 84, no. 3 (1993): 578–79.

88. Newman and Principe, "Alchemy vs. Chemistry," passim.

89. Ibid.

90. Mircea Eliade, "Metallurgy, Magic and Alchemy," in *Cahiers de Zalmoxis, publiés par Mircea Eliade,* vol. 1 (Paris: Librairie Orientaliste Paul Geuthner, [1938]).

91. Mac Linscott Ricketts, *Mircea Eliade: The Romanian Roots, 1907–1945* (Boulder, Colo.: East European Monographs, 1988), 141–53, 313–25, 804–8, 835–42.

92. Eliade, "Metallurgy, Magic and Alchemy," 44. See also his "Alchemy as a Spiritual Technique" in *Yoga: Immortality and Freedom,* second ed., Bollingen Series 55 (Princeton: Princeton University Press, 1969), 290–92.

93. Indeed, *The Forge and the Crucible* is heavily influenced by Jung; see 52, 158, 161, 163, and 221–26.

94. Ibid., 162.

95. Eliade, "Metallurgy, Magic and Alchemy," 44.

96. Ibid., 23–25.

97. Ibid., 27 and 38.

98. Ibid., 23.

99. Ibid.

100. Ibid., 38.

101. Hélène Metzger, "L'évolution du règne métallique d'après les alchimistes du XVIIe siècle," *Isis,* 4 (1922): 466–82; *Les doctrines chimiques en France du début du XVIIe à la fin du XVIIIe siècle* (Paris: Les Presses Universitaires de France, 1923), 99–142.

102. Metzger speaks of "la théorie alchimique" as a homogeneous whole. According to "les philosophes hermetiques," "les transmutations sont non seulement possibles, mais certaines, qu'elles se font dans un sens determinée toujours la même, et qu'elles aboutissent forcement à donner aux metaux imparfaits l'admirable forme de l'or." See "L'évolution du règne métallique," 472.

103. Metzger, "L'évolution du règne métallique," 473.

104. Hélène Metzger, *Chemistry,* trans. Colette V. Michael (West Cornwall, Conn.: Locust Hill Press, 1991; first French ed., 1930), 13–18.

105. Metzger, *Les doctrines chimiques,* 162–63.

106. Jan Golinski, "Hélène Metzger and the Interpretation of Seventeenth Century Chemistry," *History of Science,* 25 (1987): 85–97.

107. Hélène Metzger, "L'a priori dans la doctrine scientifique et l'histoire des sciences" (1936) and "La philosophie de Lucien Lévy-Bruhl et l'histoire des sciences" (1930), in Gad Freudenthal, ed., *La méthode philosophique en histoire des sciences: textes 1914–1939* (Paris: Fayard, 1987), 41–56, 113–28 (esp. 50–51, 119–20). Golinski has already drawn attention to these passages in "Metzger and Chemistry," 96, n. 10.

108. In order for alchemy to collapse, "il fallait tout d'abord qu'une autre notion de la perfection succedât au mysticisme des alchimistes: or, à l'époque du triomphe de la philosophie cartésienne, les savants, qu'ils donnent ou refusent leur adhésion à l'ensemble de la nouvelle doctrine, les savants refusaient d'admettre qu'une substance quelconque qui occupe de l'étendue soit théoretiquement plus parfaite que toutes les autres substances analogues. Les métaux ont été créés par Dieu pour demeurer ce qu'ils sont; et le monde entier reste constamment semblable à lui-même, semblable à ce qu'il était au moment de la création; si, comme le prétend Descartes, 'toutes les variétés qui sont en la matière dependent du mouvement de ses parties,' si d'autre part 'Dieu qui est la première cause du mouvement en conserve toujours une égale quantité dans l'univers,' la nature qui est parfaite n'a donc aucune tendance au perfectionnement! L'idée même du perfectionnement paraîtra fantaisiste et inintelligible" (Metzger, *Les doctrines chimiques,* 138).

109. Metzger, *Les doctrines chimiques,* 27, 93, 133, 247, 289–91, 423–24. Dobbs has correctly criticized Metzger on this point: *Foundations of Newton's Alchemy,* 44–47. But Dobbs herself, though recognizing that corpuscularian views need not be at odds with transmutation, did not recognize that alchemical texts themselves often embody a corpuscular theory of matter having medieval roots.

110. Dobbs, *Foundations of Newton's Alchemy,* 26, n. 2; 43, n. 46 (for Eliade); 44–45, 45, n. 54 (for Metzger).

111. Betty Jo Teeter Dobbs, *Alchemical Death and Resurrection* (Washington, D.C.: Smithsonian Institution Libraries, 1990), and *The Janus Faces of Genius* (Cambridge: Cambridge University Press, 1991). For her 1990 endorsement of Jung, see "From the Secrecy of Alchemy to the Openness of Chemistry," 76.

112. Dobbs, *Alchemical Death,* 4; *Janus Faces,* 46.

113. Dobbs, *Alchemical Death,* 13, 25.

114. Ibid., 24.

115. Carolyn Merchant, *The Death of Nature* (San Francisco: Harper & Row, 1983; first ed., 1980), 17–20, 25–27. Merchant's use of Eliade is documented on 296, n. 1, her use of Jung on 298, n. 21.

116. Ibid., xxii.

117. Evelyn Fox Keller, *Reflections on Gender and Science* (New Haven: Yale University Press, 1985), 43–65. See the critique of Merchant and Keller in William Newman, "Alchemy, Domination, and Gender," in Noretta Koertge, ed., *A House Built on Sand* (Oxford: Oxford University Press, 1998), 216–26.

118. Keller, *Reflections,* 44.

119. Ibid., 48.

120. Ibid., 53–54.

121. Keller cites Merchant and Dobbs explicitly in *Reflections*. See 54–55, nn. 11–12.

122. See Newman, *Gehennical Fire*, 101–6, for a discussion of this issue. For the passage from pseudo-Lull, see *Il Testamentum alchemico attribuito a Raimondo Lullo*, ed. Michela Pereira and Barbara Spaggiari (Florence: Sismel, 1999), pp. 28–29.

123. Daniel Georg Morhof, *Epistola de metallorum transmutatione ad Joelum Langelottum*, in Manget, *Bibliotheca chemica curiosa*, 1:168–92, at 179; Lawrence M. Principe, "Daniel Georg Morhof's Analysis and Defence of Transmutational Alchemy," in *Mapping the World of Learning: The Polyhistor of Daniel Georg Morhof*, ed. Françoise Waquet (Wiesbaden: Harrassowtiz, 2000), 139–153.

124. Lawrence M. Principe, "Diversity in Alchemy: The Case of Gaston 'Claveus' DuClo, a Scholastic Mercurialist Chrysopoeian," in Allen G. Debus and Michael Walton, eds., *Reading the Book of Nature: The Other Side of the Scientific Revolution* (Kirksville, Mo.: Sixteenth Century Press, 1998), 181–200; Gaston DuClo, *Apologia chrysopoeiae et argyropoeiae*, in Lazarus Zetzner, ed., *Theatrum chemicum*, 6 vols. (Torino: Bottega d'Erasmo, 1981; reprint of 1659–61 Strasburg ed.), 1:4–80, at 36–37, 39, 43–44, and 65.

125. Newman, *Gehennical Fire*, 92–114; 141–69; "The Corpuscular Transmutational Theory of Eirenaeus Philalethes," in Piyo Rattansi and Antonio Clericuzio, eds., *Alchemy and Chemistry in the XVI and XVII Centuries* (Dordrecht, the Netherlands: Kluwer, 1994), 161–82; "The Corpuscular Theory of J. B. van Helmont and its Medieval Sources," *Vivarium*, 31 (1993): 161–91; "Boyle's Debt to Corpuscular Alchemy," in Michael Hunter, ed., *Robert Boyle Reconsidered* (Cambridge: Cambridge University Press, 1994), 107–18; and "The Alchemical Sources of Robert Boyle's Corpuscular Philosophy," *Annals of Science*, 53 (1996): 567–85.

126. Antonio Clericuzio, "A Redefinition of Boyle's Chemistry and Corpuscular Philosophy," *Annals of Science*, 47 (1990): 561–89; see 583–87, and John Henry, "Occult Qualities and the Experimental Philosophy: Active Principles in Pre-Newtonian Matter Theory," *History of Science*, 24 (1986): 335–81.

127. Justus Liebig, *Chemische Briefe* (Heidelberg, 1851), 59.

128. For an instance where Liebig is used to exemplify the positivist view of alchemy, see Beretta, *Enlightenment of Matter*, 330. Liebig dissents from Comte in *Briefe*, 68–70.

129. Hermann Kopp, *Geschichte der Chemie* (Brunswick, 1843–47); *Alchemie in Älterer und Neuerer Zeit* (Heidelberg, 1886).

130. Ganzenmüller, "Wandlungen," 69.

131. Jost Weyer, "The Image of Alchemy and Chemistry in Nineteenth and Twentieth Century Histories of Chemistry," *Ambix*, 23 (1976): 65–70. There are some notable exceptions, such as E. O. von Lippman, *Die Entstehung und Ausbreitung der Alchemie* (Berlin: Springer, 1919).

132. George Sarton, "Boyle and Bayle, the Sceptical Chemist and the Sceptical Historian," *Chymia*, 3 (1950): 155–89, at 160.

133. Dobbs, *Foundations of Newton's Alchemy*, 6–12, 16–18; Principe, *Aspiring Adept*, 18–23.

134. Only a few examples of recent and ongoing work are Barbara Obrist's translation and edition of Constantine of Pisa's *The Book of the Secrets of Alchemy* (Leiden: Brill, 1990); Robert Halleux, *Les alchemistes grecs* (Paris: Les Belles Lettres, 1981); William Newman, *The Summa perfectionis of the pseudo-Geber* (Leiden: E. J. Brill, 1991); the publications of *Chrysopoeia* under the direction of Sylvain Matton; Michela Pereira and Barbara Spaggiari, *Il Testamentum alchemico attribuito a Raimondo Lullo*, (Florence: Sismel, 1999); and Fabre's *Manuscriptum* in Bernard Joly, *Rationalité de L'alchimie au XVIIe siècle*, (Paris: Vrin, 1992).

135. Andrew Weeks, *Paracelsus: Speculative Theory and the Crisis of the Reformation* (Albany: State University of New York Press, 1997), 36–44. Problems of disputed authenticity occur with the *Paracelsian De natura rerum*, among others.

136. One example of a work untangling knotty attributions is Michela Pereira, *The Alchemical Corpus Attributed to Raymond Lull*, Warburg Institute Surveys and Texts no. 18 (London: Warburg Institute, 1989).

137. For a few of many possible examples of such case studies, see the collections Rattansi and Clericuzio, *Alchemy and Chemistry in the XVI and XVII Centuries;* Jean-Claude Margolin and Sylvain Matton, eds., *Alchimie et Philosophie à la Renaissance* (Paris: Vrin, 1993); and von Martels, *Alchemy Revisited;* as well as Karin Figala, "Zwei Londoner Alchemisten um 1700: Sir Isaac Newton und Cleidophorus Mystagogus," *Physis*, 18 (1976): 245–73; Principe, *Aspiring Adept* and "Diversity in Alchemy"; Newman, *Gehennical Fire;* and Robert M. Schuler, "William Blomfild, Elizabethan Alchemist," *Ambix*, 20 (1973): 75–87.

Transformations: Studies in the History of Science and Technology
Jed Buchwald, general editor

Sungook Hong, *Wireless: From Marconi's Black-Box to the Audion*

Myles Jackson, *Spectrum of Belief: Joseph von Fraunhofer and the Craft of Precision Optics*

William R. Newman and Anthony Grafton, editors, *Secrets of Nature: Astrology and Alchemy in Early Modern Europe*

Alan J. Rocke, *Nationalizing Science: Adolphe Wurtz and the Battle for French Chemistry*

Secrets of Nature

Astrology and Alchemy in Early Modern Europe

edited by William R. Newman and Anthony Grafton

The MIT Press
Cambridge, Massachusetts
London, England