

THE MYTHOLOGICAL TRANSFORMATIONS OF  
RENAISSANCE SCIENCE: PHYSICAL ALLEGORY  
AND THE CRISIS OF ALCHEMICAL NARRATIVE

The movement from alchemy to chemistry may be viewed as a paradigm shift, but such characterization simplifies the extraordinary complexity of the transition and blurs the ways alchemy's preoccupation with narrative continues to influence the new discipline. A register of such change appears in the *Philosophical Transactions of the Royal Society*, where one moves from the marvelous stories of monster births in the earliest volumes to the requests for astronomical data and soundings from the south seas in later ones.<sup>1</sup> Transitions, displayed in passing in the *Transactions*, stand out in alchemy where multiple narrative strategies on the local as well as metalevel come into play.

It is a common assumption that the shift from alchemy to chemistry amounts to a transition from a narrative to an atomistic semiotic code. Stripped of its scientific pretension, alchemy appears, in the words of a recent scholar, as "poetic clothing for unconscious psychic processes" (Dobbs, p. 32). But we can learn more from alchemy by thinking beyond its naive sentiment or quaint visual images. Even after the seminal work of scholars such as Allen G. Debus, alchemy remains enclosed in an antiquarian reserve that may be drawn on to justify the story of a more rational inquiry.<sup>2</sup> Besides commenting on the local and metanarratives that comprise alchemical texts and emphasizing how alchemists sought to bring stability to their narratives, I want to suggest that the thematic interest in purification so obvious in alchemical narratives does not disappear but becomes condensed in the metaphors of purification found in eighteenth-century chemistry. My remarks conclude with several questions concerning the ways language and narrative intervene in the practice of modern as well as Renaissance science.

## I

The closure symbolized by the philosopher's stone or associated with the ultimate transmutation of base metal into gold represents the most common narrative component within alchemy. Yet when one looks at

alchemical treatises such a narrative terminus receives little detailed attention. In effect, the ultimate closure that alchemy would have us imagine is absent. Instead of a single final event that receives sole attention, one discovers a process involving many stages each with a particular closure. The alchemical process may be compared to reading a novel with a complex plot in many chapters. George Ripley, for example, divides his *Compound of Alchymie* into twelve steps: calcination, solution, separation, conjunction, putrefaction, congelation, cibation, sublimation, fermentation, exaltation, multiplication, and projection.<sup>3</sup> As in reading a novel, each individual section becomes plotted within a larger chain. Alchemical emblem books by figures such as Michael Maier or Basilius Valentinus offer an even more vivid example of the sequential presentation of the process.<sup>4</sup> The image of the chain of being offers a useful way of thinking about this process, especially if we think of the formation of each link as one level of narrative and the image of the completed chain as the overarching or metanarrative that informs the entire sequence. (Since metanarrative has come to indicate a shared perception of the general process, I find its use appropriate here.<sup>5</sup> In its simplest form the alchemical metanarrative is a story of perfection.) We must be careful not to give sole importance to the metanarrative for the simple reason that it is often the local narrative rather than the metanarrative that receives the most detailed attention. Above all we need to acknowledge that alchemy proceeds by employing a metanarrative and a series of local narratives.

We may analyze the form of alchemical narratives further by comparing them to the common rhetorical figure known as the *exemplum* or enthymene. Although we have come to expect that examples direct an audience to a simple closure, they provoke another response as well. Remarks in the *Rhetorica ad Herennium* are typical: "*Exempla* are not distinguished for their ability to give proof or witness to particular causes, but for their ability to expound these causes" (Battaglia, p. 455 [my translation]). Often we mistakenly assume that an *exemplum* would simplify discourse when it actually works towards its complication. Such a function reminds us how misleading it is to reduce fables in sixteenth-century European literature to the conclusions attributed to them in mythographic handbooks. Conclusions are not end points alone but points of departure. A similar point can be made in regard to alchemical narrative. While the closure of an experiment certainly bears significance, it is only a stage in an evolving process. Rather than

approaching the multitude of variations in alchemical narratives as signs of disorder, we should think of them as evidence of the serious exploration of causes. At the end of *The Compound of Alchymie* (1471), George Ripley urges the reader to "stody tyll thou understande eche Chapter by and by" (p. 188). *Norton's Ordinall* closes with a testimony to the process: "If ye compleate their Sentences all,/Not by Opinion, but after this *Ordinall*" (Ashmole, p. 105). In effect, the anticipated result or expectation accompanying alchemical narrative becomes a departure point for a more significant process.

By concentrating on the process rather than a psycho-physical telos, we discover multiple components coupled to give an experimental formulation. The narrative structure of alchemy lends itself to elaboration: the form combines what we may think of as rules and their application in contrast to making them into wholly separate operations. The author of *Bloomefield's Blossoms* (ca. 1540) distinguishes between the metanarrative of evolving perfection and laboratory work by dividing the work into *Theorica* and *Practice* (Ashmole, pp. 315 and 319). The former reminds the reader of the mystery governing the experiment and is not unlike an invocation or blessing before a specific act.

Devotely therefore unto thee O Lord I call,  
Send me thy Grace to make explication  
Of Chaos: For thou art opener of seacrets all:  
Which ever art ready to heare the Suplicacion  
Of thy meeke Servants, which with hearty humiliacion  
To thee do I apply: send me now thy grace  
Of thy Secrets, to write in due order tyme and place. (p. 316)

In the section on *Practica* we find instructions pertaining to our moral behavior: "Be you Holy therefore, Sober, Honest, and Meeke;/Love God and your Neighbour, to the Poore bee not unkind" (p. 319), as well as practical work:

Then after that they be one Body made,  
With the sharpe teeth of a Dragon finely,  
Bring them to Dust, the next must be had,  
The true proporcion of that Dust truly,  
In a true Ballance weighing them equally;  
With three tymes as much of the fiery Dragon  
Mixing altogether, then hast thou well done.

Thy Substance thus together proportionate,  
 Put in a Bedd of Glasse with a bottome large and round,  
 There in due tyme to dye, and be regenerate  
 Into a new Nature, three Natures into one bound,  
 Then be thou glad that ever thou it found. (p. 321)

The balance between abstract invocation of theory and practical description is hardly unusual within alchemical manuals. It is especially in the sections dealing with experimentation that we find the greatest variation. Alchemical narratives vary because they permit the continuous incorporation of new narratives of experimentation. While it is possible to dismiss the proliferation of these narratives as incoherent from a modern standpoint, they also represent an interest in observing and reporting subtle changes. At the same time that alchemy's metanarrative is abstract, the localized narrative describing activities moment by moment can convey much detail. Todorov's observation that medieval romance juxtaposes two types of episodes — adventures and the description of their significance — may be applied to alchemical narrative as well.<sup>6</sup> The plot of the romance adventure corresponds to alchemical employment of experimentation, while the description of significance pertains to the alchemical metanarrative. In its distinction between theory and practice, *Bloomefield's Blossoms* exemplifies such double narrative.

We have such an enormous number of varying alchemical treatises because they are notes of individual operations and because there is no master manual that would accommodate the practical work. Moreover, the alchemical metanarrative embracing purification remains too general to guide local narratives. In contrast to mythological manuals such as Conti and Ripa, which demonstrate how carefully moral fables were controlled, alchemical treatises embody a kind of hermeneutic instability that itself promotes further experimentation.<sup>7</sup> Each effort bears an expectancy that it will bring order to a chaotic process. Even though stabilizing correspondences may be discovered with the alchemical metanarrative, their psychological nature causes them to have little bearing on the physical world. Although assimilation of the master narrative permits one to construe its local manifestations, the master narrative, because of its own abstraction, hinders the formulation of narratives of discovery on the local level.

## II

While historians of science often celebrate the appearance of atomistic theories and the notational systems that provide groundwork for modern chemistry, we should not ignore the efforts made to bring greater stability to alchemical narratives in the Renaissance. The oft-encountered claim that a certain text will truly convey the means of transmutation is evidence that practitioners desired stability. The need to repeat such declarations — to begin over and over again — marks, as Kuhn has suggested, the prescientific quality of alchemy (pp. 15–16). But it also tells us how conscious alchemists were about the absence of an experimental program. Evidence of such awareness abounds. The historical criticism or warnings against misleading alchemical books incorporated into many Renaissance works also marks an effort to find stability. Thomas Norton complains of those who make their books “full derke,/In Poyses, Parables, and in Metaphors alsoe,/which to Shollers causeth peine and woe” (Ashmole, p. 8). The author of *Bloomefield's Blossoms* portrays lost alchemists as “disguised Philosophers leane,/With Porpheries, and Morters ready to grinde and stampe,/Their heads shaking, their hands full of Crampe” (Ashmole, p. 308). Edward Kelly's prose is more direct:

Many books have been written on the art of Alchemy, which, by the multiplicity of their allegories, riddles, and parables, bewilder and confound all earnest students; and the cause of this confusion is the vast number and variety of names, which all signify and do set forth one and the same thing. For this reason I have resolved in my own mind to loosen and untie all the difficult knots of the ancient Sages (p. 113).

The Pharmacopoeias or pharmaceutical handbooks that began to appear at the end of the sixteenth century offer another example.<sup>8</sup> Because of their effort to reduce complex narratives into emblematic configurations, iconographic manuals such as Michael Maier's *Atalanta Fugiens* (1618) may also be regarded as instruments of reform.

An important reform closely related to fabulous narrative appears in the expanded use of short narrative forms. Physical allegory had long been associated with the fables incorporated into alchemical narratives. In the Middle Ages fabulous narrative became a learned instrument of natural philosophy precisely because of its formulaic narrative structure. For example, in the story of Pentheus' dismemberment by his

mother and sisters, the thirteenth-century rhetor John of Garland discovers a schema for faculty psychology and Narcissus and Echo become formulaic sites representing reflection and reverberation.<sup>9</sup> I want to emphasize twelfth- and thirteenth-century science because it offers an established and even institutional approach to physical allegory. Too often we approach alchemy as a Renaissance occult science rather than seeing it as part of an established tradition of natural inquiry. The propensity to think in units so evident in alchemical allegory appears throughout the Renaissance in the use of adages, maxims, and aphorisms. Bacon's *Wisdom of the Ancients* is a well-known example:

The truth is that in some of these fables, as well in the very frame and texture of the story as in the propriety of the names by which the persons that figure in it are distinguished, I find a conformity and connection with the thing signified, as close and so evident, that one cannot help believing such a signification to have been designed and mediated from the first, and purposely shadowed out (p. 404).

As Bacon demonstrated in the aphoristic style of the *Magna Instauratio*, such forms could easily be rearranged to promote new knowledge (Stephens, esp. pp. 98–136). The personal collection and arrangement of such narratives must not be overlooked. In contrast to the traditionally sponsored compendia, individual collections could take on special force. The Renaissance commonplace book represents a site for personal discovery and potential institutional subversion. Whether in moral philosophy or physics, the maxim or adage has the capacity to challenge or reassess a known body of knowledge.<sup>10</sup> In the sixteenth century, short narrative forms appear as rhetorical weapons against scholasticism and for opening scientific inquiry.

Early efforts to quantify alchemy deserve more attention. The best-known example is the *Monas Hieroglyphica* in which John Dee divides the alchemical process into 24 quasi-Euclidean theorems. Here fabulous narratives become transformed into chains of quasi-mathematical statements that follow Dee's earlier work with Euclid and with astronomy. While mythological material remains, its formulaic structure begins to be replaced by a geometrical taxonomy: "Theorem I. The first and most simple manifestation and representation of things, non-existent as well as latent in the folds of Nature, happened by means of straight line and circle."<sup>11</sup> In contrast to the elaborate and dense documents in Ashmole's *Theatrum Chemicum Britannicum* (1652) or Jennis' *Musaeum*

*Hermeticum* (1625), Dee's *Monas* offers a simplification. In his effort to quantify alchemy, Dee anticipates the subsequent quantification of an atomistic theory of elements. While Dee's text remains impressive from the vantage point of organization, it is utterly arcane. The only master narrative to which it responds is Dee's own mental narrative.

While Dee seeks to reduce multiple texts into a single geometric system, the most frequent response was to undertake a systematic study of multiple texts. The exchange tables or code books mentioned above comprise an early example. But by far the most ambitious efforts appear later in the seventeenth century. Here it is above all Newton's elaborate effort to synthesize an ocean of alchemical texts that demonstrates how alchemy had come to depend on a working assumption of intertextuality.<sup>12</sup> Just as euhemerism informs Newton's work on history and anagogical allegory provides the code for his reading of Daniel and Revelations, physical allegory controls his approach to alchemical manuscripts.<sup>13</sup> Newton never relies on a single text but uses individual narratives as correctives for each other. For Newton, alchemy begins with reading and synthesis. Newton's 'rereading' — like Milton's rereading of the Bible and the early church fathers — carries with it the possibility of an entirely new master code.

### III

Today we acknowledge that the emergence of a new code or system of nomenclature follows a reevaluation of narrative. Letters rather than plot become the means for more exacting investigation. As Boyle has it: "that all elemented bodies be compounded of the same number of Elements, [as] for a language; that all its words should consist of the same number of Letters" (p. 346). But the impulse to narrative is not so easily removed. Debus has shown how they continue well into the eighteenth century in mainstream chemistry.<sup>14</sup> Jacob Tollius' *Fortuita*, published the same year as Newton's *Principia* (1687), argued that the true meaning of ancient fables was related to chemistry. Aware of Newton's own intense occupation with alchemical research, Tollius' book becomes not simply a curious irony of the new juxtaposed with the old, but a means of approaching a vocabulary thoroughly familiar to the English scientist. At the height of the Enlightenment, *Les Fables égyptiennes et grecques dévoilées* (1758) — it went through four editions — by Abbé Antoine-Joseph Pernety argued that ancient myths should

be regarded as alchemical documents. In other words, at the same time that the formulation of a universal vocabulary brings about a crucial alteration in the practice of chemistry, the process continues to be narrativized.

The narrative response challenges us to think further. The formation of a new notational system does not mean that narratives are abruptly removed or simply relegated to an antiquarian heap of pseudo-science. The Webster-Ward debate illustrates the desire to formulate a more useful chemical alphabet, but does not shift discussion away from narrative. For Webster — who argues that reference must be sought in the cabala — the appeal of universal notation is inscribed in *prisca scientia* (Debus, 1970, p. 39f.). The elemental language stands not as a pragmatic code for approaching nature but rather as the very language of God. The debate is important because it marks a shift toward narrativizing the discussion of language itself. Rather than concentrating on the interpretive possibilities provoked by fabulous narrative, analysis becomes directed at the notational system itself. Here we must make a critical distinction as well. While the analytical interest in notational systems becomes distinguished from fable or plot on the level of the local narrative, it remains closely related to the metanarrative. As plot or fable become criticized, the criticism itself reveals its own emplotted nature. Galileo's pronouncement that the book of nature is written in mathematical language offers an illustration (pp. 237–8). At the same time that it offers an implicit criticism of natural philosophy grounded in ordinary language, it reasserts a logocentric assumption through the metaphoric appropriation of mathematics in the book of nature. While mathematics offers a new language, it is envisioned in the context of an old book. The metaphor not only reminds us of Galileo's accomplishments, but testifies that nature's language will now be accessible only to a specialized group of mathematicians. The elitism associated with metaphysical narratives now transfers itself to a non-linguistic notational system. Where the power of interpretation once rested in a linguistic metanarrative, it now begins to shift to the notational system itself. Nevertheless, ordinary language continues to supply the context for applying a notational language such as algebra and for thinking about the evolving chemical codes. At the same time that an efficient, atomistic system of notation evolves, ordinary language remains not only the vehicle for application and commentary but the very field in which chemistry becomes defined.

In my concluding comments I want to suggest that even though early

chemistry challenges alchemy's use of fable on the level of local narrative, it inherits aspects of the alchemical metanarrative concerned with purification. In effect the alchemical object of a psycho-physical purity becomes directed away from physical reality and toward the purification of language. As we saw above, concern with the obscurity of alchemical language is hardly a discovery of the new chemistry. Until the seventeenth century, however, such concern remains on the level of interpretation rather than representation. With critics like Pierre Joseph Macquer, representation becomes identified as a program in itself. As Anderson's important discussion shows, Macquer's *Dictionnaire de chymie* (1766) amounts to a manifesto directed not toward the matter of chemistry but toward the posture of knowledge.<sup>15</sup> For Macquer, chemistry's object is the cure and prevention of the alchemical disease that plagues language: "The Panacea, although certainly the maddest of all the ideas that entered into the heads of the alchemists, was however that which led to the founding of rational chemistry, and to its being raised upon the ruins of alchemy."<sup>16</sup> In essence the chemist is a doctor who finds in language both disease and cure. While Macquer's preoccupation with purification challenges the obscurity of alchemy's fables, it also reasserts alchemy's own ideal. It does so, however, by aligning alchemy's metanarrative with linguistic purification. Although applied examples of Macquer's manifesto appear throughout the eighteenth century, I have room to include only several from a major work on chemistry and language from the end of that century.

In his *Method of Chemical Nomenclature* [*Méthode de nomenclature chimique*] (1787) Lavoisier writes: "It is time to rid chemistry of obstacles of every kind which retard its progress and to introduce in it a true spirit of analysis; we have proved sufficiently that this reform must be brought about by perfecting the language" (Crosland, p. 131). Here the narrative once used to direct inquiry shifts from allegory to the metaphoric treatment of nomenclature itself. In a sense a new 'fable' is created that involves the purity of language. Once applied to the purification of natural elements, the process now occurs within language itself. The alchemical romance now appears as an effort to purify, cleanse, purge a diseased language. Lavoisier's comments are hardly unique but fit within an ongoing diagnosis of nomenclature in the eighteenth century. What we should notice is that dissolution of alchemical narratives hardly leads to the disappearance of narrative but to its concentration in metaphor.

Metaphors of disease, as we have noticed, become one way narra-

tives remain present. Others appear through comparisons of science and religion or in the social metaphors used to describe the cooperation of chemists in their new science. In their reverence for their discipline, Lavoisier would have chemists demonstrate a respect analogous to a culture's regard for literature: "Love of literary propriety has ceded . . . to the love for science . . . we have sought to imbue ourselves completely with this spirit".<sup>17</sup> Anderson underscores the importance of this relationship by noticing that here Lavoisier looks upon the individual scientist as part of an enterprise larger than his own interests, an enterprise he must accept as an act of faith. Elsewhere the spiritual metaphors that signal the accompanying narratives become even more social. For Macquer the accompanying narratives become even more social. For Macquer the clarity of a chemist's language — in contrast to the antisocial obscurity of the alchemist — designated that he was a good citizen: "These true citizens [of] chemistry would be able to provide excellent remedies . . .".<sup>18</sup> In Lavoisier the social metaphor used to describe the evolving discipline are closer to the "esprit de corps" of a unified body of citizens or even a military force. "Chemistry marches towards its goal and towards its perfection by dividing, subdividing, and re-subdividing yet again; and we cannot tell where such successes shall end".<sup>19</sup> In contrast to the alchemist's belief in individual perfection, accomplishment for the new chemist becomes less dedication to an isolated search than adherence to a community vision. Where alchemy's goal rested in the projected negotiation of a complex process, chemistry's object becomes analysis of complexity; the discipline becomes characterized not by composition but decomposition. While the object of the chemist's enterprise shifts direction in comparison with the alchemist, the metaphors used to imagine its purpose continue to describe a belief in perfectibility.

#### CONCLUSION

My comments have concerned the function of narrative forms in a limited number of alchemical discussions from the Renaissance and chemical treatises from the eighteenth century. Initially I argued that alchemical texts should be approached by attending both to a local narrative (concerned with a specific laboratory function) and to a more abstract narrative that I have referred to as the metanarrative. While the metanarrative permits general social assent, the component or local

narratives are problematic sites and sources of obscurity. In the second part of my comments I noticed that the obscurity of alchemical narratives provoked a continuous effort to enforce a kind of hermeneutic stability in alchemy and contributed to the development of the new chemistry. Finally, I suggested that the hermeneutic stability associated with the new chemistry comes not from the wholesale dissolution of the alchemical narratives. Stability actually emerges from the extension of the alchemical metanarrative concerning purification to chemistry. Such a metanarrative, however, appears not in the form of a plot or fabula but asserts itself condensed in the metaphors of purification that accompany early chemistry.

At the beginning of this paper I suggested that the characterization of the transition from alchemy to chemistry as a paradigm shift greatly simplifies the complex transition. At this point I would add that such a formulation not only simplifies but engenders a blindness that comes from expecting shifts rather than continuity. My intention in this paper has been to suggest that the complexity of this transition may be approached through ongoing study of the narrative forms that contribute to both disciplines. In conclusion, I want to emphasize how the study of narrative may contribute even more to issues that have only been touched upon in this paper. My closing observations may be put in the form of questions:

1. *What relation do literary genres have to scientific narratives?* In regard to alchemy it is necessary to explore even more closely how romance narratives — characterized by Todorov as including both adventure and description of meaning — may be applied to alchemy. The object of such investigation would be found not in the simple alignment of literary and scientific texts but in the further exploration of ways the mythos of romance supplies the dominant narrative form in science.

2. *What role do short narrative forms have in the practice of science?* While much attention has been given to the larger forms that characterize science, the shorter narrative forms that accompany science have been the subject of little research. The story or word problem which has been part of scientific pedagogy and practice in all periods deserves special attention. In contrast to the conceptual shifts that often preoccupy attention in the history or philosophy of science, the short form displays a remarkable continuity.

3. *What relationship is there to metaphor and narrative in scientific*

texts? At a time that metaphor supplies a means of opening comparisons between literary and scientific texts, it is necessary to question whether metaphor supplies sufficient epistemological ground for extended work. While our cultural understanding of scientific texts will certainly benefit from exploring the status of metaphor in regard to narrative, we also need to consider the ways it may constrict as well as enhance our inquiry.

## NOTES

<sup>1</sup> For a study of the development of the scientific report, including the *Philosophical Transactions of the Royal Society*, see Bazerman.

<sup>2</sup> The work of Debus constitutes a major project in the study and reassessment of alchemy. Comprised of detailed histories, specific studies, bibliographic guides, and editions, his work not only challenges scholars to engage alchemy — and to undertake the thorough study of the discourse of chemistry in modern periods — but to learn from the ways early periods in the history of science were displaced by positivistic historians of science. For a recent meditation on the historiography of the history of science see Debus (1984).

<sup>3</sup> Sir George Ripley, *The Compound of Alchymie* in Ashmole (pp. 107–93). For an overview of the individual steps within the alchemical process see Shumaker (esp. pp. 170–73).

<sup>4</sup> For a discussion of Michael Maier, *Atalanta fugiens* (1618) and Basilus Valentinus, *Douze Clefs de la Philosophie* (1624) see J. Van Lennep.

<sup>5</sup> For a review of metanarrative in a discussion of legitimizing myths and narrative archetypes see Frederic Jameson's introduction to Lyotard (pp. vii–xxi); see also Jameson (1981).

<sup>6</sup> "We are confronted, then, from the outset and in a systematic fashion, with a double narrative, with two types of episodes, of a distinct nature but referring to the same event and alternating regularly . . . the interpretation is included within the texture of the narrative. One half of the text deals with adventures, the other with the text which describes them. Text and metatext are brought into continuity" (Todorov, p. 123).

<sup>7</sup> For a discussion of hermeneutic instability with regard to fable see Knoespel (1985).

<sup>8</sup> The major work on alchemical semiotics remains Crosland. For discussion of pharmacopoeias beginning with the *Pharmacopoeia Augustana* (ca. 1564) see p. 94f.

<sup>9</sup> Ghisalberti (lines 171–76; 163–66). For a discussion of Garland's commentary in the context of thirteenth-century physics see Knoespel (1985, pp. 38–45).

<sup>10</sup> Slaughter provides an even broader discussion of the implementation of axiomatic forms in the seventeenth century.

<sup>11</sup> Josten (pp. 84–221; p. 155); for Dee's use of language, see Knoespel (1987).

<sup>12</sup> "It was often Newton's custom in his note-taking to enter references to works other than the one being noted, presumably when it seemed to him that the other works expressed similar alchemical ideas. As he read more and more widely, his alchemical manuscripts were frequently more and more copiously annotated" (Dobbs, p. 130). For a recent discussion of Newton's reading habits see Westfall.

<sup>13</sup> An excentric but perceptive account of Newton's allegorical and anagogical practice is found in Castillejo (1981).

<sup>14</sup> My reference to eighteenth-century alchemical literature is indebted to Debus (1986), a paper delivered at a symposium on "Representation and Value: Literature, Philosophy, and Science." The symposium was jointly sponsored by The Program in Literature and Science in the Department of English at Georgia Tech and the NEH.

<sup>15</sup> My remarks on language in eighteenth-century chemistry are indebted to Anderson's excellent book.

<sup>16</sup> "La Médecine Universelle, quoique la plus folle sans doute de toutes idées qui étoient entrées dans la tête des Alchymistes, fut cepend qui commença à établir la Chymie raisonnable, & à l'élever sur les ruines de l'alchymie" (Anderson, p. 32).

<sup>17</sup> "L'amour de la propriété littéraire a cédé . . . à l'amour de la science . . . nous avons cherché à nous pénétrer tous du même esprit" (Anderson, p. 123).

<sup>18</sup> "Ces vrais citoyens [de] la Chymie pouvoient fournir d'excellens remèdes . . ." (Anderson, p. 32).

<sup>19</sup> "La chimie marche donc vers son but et vers sa perfection en divisant subdivisant, et resubdivisant encore, et nous ignorons quel sera le terme de ses succès" (Anderson, p. 136).

## REFERENCES

- Anderson, W.: *Between the Library and Laboratory*, Johns Hopkins Press, Baltimore, 1984.
- Ashmole, E.: *Theatrum Chemicum Britannicum* (1652), Johnson Reprint Corporation, New York, 1967.
- Bacon, F.: *Wisdom of the Ancients* (selections), in *Selected Writings of Francis Bacon* (ed. by H. Dick), Modern Library, New York, 1955, pp. 403–20.
- Battaglia, S.: *La Coscienza Letteraria del Medioevo*, Editore Liguori, n.p., 1965.
- Bazerman, C.: *Shaping Written Knowledge: The Genre and Activity of the Experimental Report*, Univ. of Wisconsin Press, Madison, 1988.
- Boyle, R.: *The Sceptical Chymist* (1661), Dawson, London, 1965.
- Castillejo, D.: *The Expanding Force in Newton's Cosmos*, Ediciones de Arte y Bibliofilia, Madrid, 1981.
- Crosland, M.: *Historical Studies in the Language of Chemistry*, Dover, New York, 1978.
- Debus, A.: 'Myth, Allegory, and Scientific Truth: An Alchemical Tradition in the Period of the Scientific Revolution' (Paper delivered at Georgia Institute of Technology, February 21, 1986).
- Debus, A.: *Science and Education in the Seventeenth Century: The Webster-Ward Debate*, Macdonald, London, 1970.
- Debus, A.: *Science and History: A Chemist's Appraisal*, Univ. of Coimbra, Coimbra, 1984.
- Dobbs, B.: *The Foundations of Newton's Alchemy*, Cambridge Univ. Press, Cambridge, 1975.
- Galileo: *The Assayer*, in *The Discoveries and Opinions of Galileo* (ed. by Stillman Drake), Doubleday, New York, 1957, pp. 229–278.
- Ghisalberti, F., ed.: *Integumenta Ovidii: Poemetto inedito del secolo XIII*, Giuseppe Principato, Milan, 1933.

- Jameson, F.: *The Political Unconscious*, Cornell Univ. Press, Ithaca, 1981.
- Josten, C.: 'A Translation of John Dee's "Monas Hieroglyphica" (Antwerp, 1564) with an Introduction and Annotations', *Ambix* 12 (1964) pp. 84—221.
- Kelly, E.: *The Theatre of Terrestrial Astronomy in The Alchemical Writing of Edward Kelly* (ed. by A. Waite), Vincent Stuart & John M. Watkins, London, 1970 rpt.
- Knoespel, K.: 'Fable and the Epistemology of Expanding Narrative', *University of Hartford: Studies in Literature* 17:2 (1985) pp. 28—42.
- Knoespel, K.: 'The Narrative Matter of Mathematics: John Dee's Preface to the *Elements* of Euclid of Megara (1570)', *Philological Quarterly* 66.1 (1987) pp. 27—46.
- Knoespel, K.: *Narcissus and the Invention of Personal History*, Garland, New York, 1985.
- Kuhn, T.: *The Structure of Scientific Revolutions* 2nd edn., Univ. of Chicago Press, Chicago, 1970.
- Liotard, J.: *The Postmodern Condition: A Report on Knowledge*, Univ. of Minnesota Press, Minneapolis, 1984.
- Royal Society of London: Philosophical Transactions*, Johnson Reprint Corporation, New York, 1963.
- Shumaker, W.: *The Occult Sciences in the Renaissance*, Univ. of California Press, Berkeley, 1972.
- Slaughter, M.: *Universal Languages and Scientific Taxonomy in the Seventeenth Century*, Cambridge Univ. Press, Cambridge, 1982.
- Stephens, J.: *Francis Bacon and the Style of Science* Univ. of Chicago Press, Chicago, 1975.
- Todorov, T.: *The Poetics of Prose*, Cornell Univ. Press, Ithaca, 1977.
- Van Lennep, J.: *Art & Alchimie: Étude de l'Iconographie Hermétique et de ses Influences*, Editions Meddens, Bruxelles, 1966.
- Westfall, R.: 'Newton and Alchemy', in *Occult and Scientific Mentalities in the Renaissance* (ed. by B. Vickers), Cambridge Univ. Press, 1984, pp. 315—35.

*Georgia Institute of Technology*