

I

Plenary Lectures

Transmuting Chymistry into Chemistry: Eighteenth-Century Chrysopoeia and Its Repudiation¹

Lawrence M. Principe*

In the early decades of the eighteenth century, chemistry suddenly lost a large and central piece of its traditional domain. The sudden and definitive loss of *chrysopoeia*, that is, the search for the transmutation of base metals into gold, from chemistry in the 1720s was a crucial moment for the developing identity of chemistry. Yet despite the significance of this event, relatively little is known about it, **how** it happened, **why** it happened, and **why** it happened **when and where** it did.

The reasons for our relative lack of knowledge regarding the demise of *chrysopoeia* are not hard to locate. For a long time the history of science was dominated by triumphalist narratives of progress. In the context of these narratives, alchemy was seen as non-scientific, a misguided delusion, a blatant error. Under such circumstances, the loss of *chrysopoeia* did not seem to need any special historical explanation.

But today we know better. Transmutational alchemy was not irrational. It was studied and practiced by important figures down very nearly to the point when it vanished suddenly from the scene. It contributed important concepts and practices to the development of modern science, and was not seen as separate from what we now call chemistry. *Chrysopoeia* was a central, an essential part of chymistry.² Thus, its disappearance around 1720 *does* need to be explained historically.

The easiest explanation is that new theoretical developments ruled out the possibility of *chrysopoeia*. This hypothesis seems reasonable. However, there is no evidence to support it, and considerable evidence to refute it. Vigorous debates over the reality of transmutation and the reality of the Philosophers' Stone did *not* appear suddenly in the eighteenth or even the seventeenth century. They were the constant companion of *chrysopoeia* from the Middle Ages. What is striking is that the theory-based arguments against transmutation changed very little during all that time, some of the same arguments against transmutation cited by Geber in the thirteenth century were voiced by Thomas Erastus in the sixteenth,

* Department of the History of Science and Technology, Johns Hopkins University, Baltimore, Maryland 21218, USA. lmajp@jhu.edu

and by various other anti-*chrysopoeians* in the seventeenth. Seventeenth century mechanical views of matter and its transformations, far from weakening belief in transmutation actually strengthened it. For if all substances are composed of the same universal matter then it would be possible to transform anything into anything, indeed, to accomplish chymical changes beyond what *chrysopoeians* considered possible. That famous champion of corpuscularianism and mechanical chymistry, Robert Boyle was himself absolutely convinced of the reality of the Philosophers' Stone and its transmutational abilities.³ There simply is no evidence that new theoretical structures or experiments dealt a death-blow to *chrysopoeia*.

Thus the loss of *chrysopoeia* is not to be found, I think, in purely theoretical, scientific, or experimental developments. In fact, if we examine carefully the attacks against *chrysopoeia* in the period leading up to the 1720s, we find that they actually move *away* from purely scientific issues, and towards ridicule and moral opprobrium. The most famous example occurs in 1679 edition of Nicolas Lemery's popular *Cours de chymie* where Lemery launches a full-scale attack on transmutation.⁴ He cites the least solid of *chrysopoetic* theories and ridicules them as foolish and primitive. He then moves on to fraud, extending the well-known and long-term connection of cheating practices to transmutation to claim that **all** *chrysopoeia* is simply fraud. The reasons for Lemery's sudden attack remain unclear, but his views are nothing new. Such accusations of fraud were common back to the Middle Ages.⁵ Active *chrysopoeians* themselves catalogued such frauds. Thus while accusations of fraud and immoralities were the primary weapon used against alchemy at the end of the seventeenth century, they were not by themselves enough to explain *chrysopoeia's* demise. Something else had to use this weapon consistently and effectively.

I suggest that *chrysopoeia* fell at the hands of a movement intended to domesticate chymistry into a respectable professionalised discipline. The professionalisation of chemistry, as opposed to that of chemical pharmacy, took place most of all, it can be argued, at the Académie Royale des Sciences in Paris. It was here that chemistry received its first stable institutional home, a greatly enhanced public profile, and clear links of duty and responsibility to the State. The very first topics of study chosen by the infant Académie in late 1666 were chymical. Throughout the seventeenth century, chemistry had a presence at the Parisian Académie stronger and more prominent than anywhere else. Chemistry's position was made more visible and official during the *Rénouveau* of 1699 when five positions out of the thirty earmarked for specific scientific disciplines were given to chemistry, placing it for virtually the first time on an equal footing with astronomy, physics, mathematics, botany, and anatomy.⁶ The Académie Royale, with its state-financed members and its Academicians' status as the official natural philo-

sophical thinkers of France, guaranteed a high and public profile for chemistry that was not equalled anywhere else, and so it is here that I shall look first for answers.⁷

But this enhanced, and more public, status for chemistry provoked problems. Chemistry suffered an ambiguous reputation in the seventeenth century. Its close link to productive, artisanal, commercial and simply dirty, smelly, and messy processes tainted it with low status relative to more exalted topics such as astronomy, physics, and even mechanics. Metallic transmutation in particular was prone to accusations of fraud and futility. Contemporaneous fine art, theatre, and literature repeatedly (though not exclusively) represented chymists to the public as thieves, counterfeiters, fools, or charlatans. The records of the Bastille recount many chemists, including even the lecturer at the Jardin du Roi, Christophe Glaser, arrested on charges of poisoning, and subsequently ruined.⁸ Contrary to what we might like to believe, the seventeenth-century public ridicule of chymistry did not necessarily distinguish between the *chimistes* of the Académie and the *chimistes* ridiculed on the stage, declaimed in the popular press and gossip, and arrested for poisoning or fraud. Thus, Robert Boyle apologises explicitly in his “Essay on Nitre” for the time he spent in “such an empty and deceitful study” as chymistry.⁹ And even within the early Académie, for example, Edme Mariotte in writing his 1678 textbook of logic declared simply “How many times has one seen the curious tricked by the impostures of astrologers and chemists?”¹⁰ Thus for some people at least, admitting chemistry to the Academy was a nervous situation rather like inviting a provincial cousin to dine with the King. One is always worried about what embarrassing thing he might say, what other people might think, and whether he’ll wipe his mouth on the tablecloth.

In short, at the end of the seventeenth century chemistry needed a new identity or at least a complete make-over. The easiest solution, it seems to me, as it appears to have seemed to spokesmen of the Académie, was to make a fresh start for chemistry: to create chemistry afresh as if it had never really existed before. This included breaking visibly with the previous chemical tradition, and specifically avoiding and declaiming against the subset of chymistry most easily subject to ill repute, namely, *chrysopoeia*. Thus the Académie could protect the chemistry it was newly professionalising from the ambiguous status that had followed *chimia* since the Middle Ages. It also thus became possible to quarantine all of the questionable activities relating to chemistry under a completely different rubric, namely, that of “alchemy.”¹¹

Indeed, there is clear evidence of longstanding tension and uneasiness at the Académie in this regard. What is of particular interest is that it was predominantly the non-chemist administrators of the Académie who tried to suppress trans-

mutation while several of the chemists themselves continued to support it. This tension appears at the very founding of the institution. When Jean-Baptiste Colbert founded the Académie in 1666, he forbade only two topics: astrological prognostication and the Philosophers' Stone.¹² Today we might too easily interpret this regulation as a forward-looking rejection of so-called pseudo-sciences. But it is worth pointing out that these two topics were also those that were potentially most politically subversive and open to controversy; just the sort of a thing with which an agent of the Crown like the Académie should not be involved.

Yet despite Colbert's prohibition, the Académie's foremost chymist, Samuel Cottereau Duclos busied himself with traditional chymical pursuits including the Philosophers' Stone, and did so in the Académie's laboratory that he designed.¹³ But shortly after Duclos' death in 1685, Pierre Bayle's *Nouvelles de la Republique des Lettres* published a death-bed repudiation of the Philosophers' Stone supposedly given to Clément, the keeper of the King's Library, by Duclos.¹⁴ One should always be suspicious of death-bed conversions. If it was a true repudiation, it does nothing to diminish the fact that Duclos spent so much time on transmutation. But one cannot discount the possibility that this repudiation was, at least in part, a show for public consumption, akin to Duclos' publicised conversion to Catholicism that took place at the same time.¹⁵ Indeed, Clément's account tells of how he asked Duclos to make an avowal "for the public and the service of the King" in order to "restrain those who would too easily engage themselves with the unhappy passion of idle puffery [*la malheureuse passion de soufflerie*]."¹⁶

Indeed, it is conceivable that the statement was not even Duclos', but an independent public relations move by the Académie itself. The account does seem exaggerated in some details. For example, it states that Duclos burned all his papers on alchemy; but this was not true, many volumes survive scattered in several archives in France and many more existed at least until the late 1750s. And we know that the Académie was already uncomfortable with Duclos' work, or more accurately, with public knowledge of it. During Duclos' life the Académie refused him permission to publish a major work on chemistry, and his massive work on salts, ready for the press, and including large sections on such things as the Helmontian alkahest, remains unpublished to this day.¹⁷ Moreover, just three months after Duclos' death, Louvois, Colbert's successor as the minister overseeing the Académie, sent a memo to the assembly ordering them to avoid any work dealing with "the extraction of the mercuries of the metals, the transmutation of metals, and their multiplication, about which Mr. de Louvois does not want to hear anything spoken."¹⁸ Surely this ministerial intervention was a response to Duclos' former activities.

Yet this second ministerial warning had no more lasting effect than the first. Five years later, Wilhelm Homberg was elected to the Académie, bringing with himself a considerable range of experiences and interests in metallic transmutation. Homberg, whom I have been studying closely for the past several years, was the chief chemist at the Academy from 1691 until 1715. He, more than any other chemist of the early eighteenth century, laboured to produce a coherent theory of chemistry based upon and illustrated by experiments. Indeed, his system was widely read, adopted, amended, and extended by others throughout the first half of the eighteenth century.¹⁹

Homberg was a crucial figure in the end of *chrysopoeia*. Homberg was perhaps the only person ever to be both a professional chemist in the modern sense of that word and an unapologetic *chrysopoeian*. Rhetoric carefully crafted by others to provide new boundaries for chemistry would render it impossible for anyone else ever to hold both of those positions again.

There is no question that Homberg was deeply involved in studies of metallic transmutation throughout his career. In 1684 he worked on a process to transmute mercury into silver. Soon after his installation at the Académie, he worked on the extraction of metallic mercuries, one of the very things forbidden by Louvois. Throughout the 1690s he worked extensively with a specially prepared mercury, known in *chrysopoetic* circles as Philosophical Mercury, and believed to be the crucial ingredient for the Philosophers' Stone. The process links Homberg inseparably with other *chrysopoeians* such as Alexander von Suchten, Basilius Valentinus, Johann Joachim Becher, and George Starkey, *alias* Eirenaeus Philalethes.²⁰ Indeed, the unpublished manuscript of Homberg's first attempt to write a textbook of chemistry, dating from the 1690s affirms explicitly that he carefully pursued "the entire work of Philalethes" in regard to Philosophical Mercury and the Stone.²¹ In the same text, Homberg's second chapter is a lengthy and sensitive overview of the theory of transmutation and the Stone, and states unambiguously that transmutation is an important and integral part of chemistry.

In 1702, Homberg became the chemistry tutor to Philippe II, Duc d'Orléans, nephew of Louis XIV. Philippe built a magnificent laboratory at the Palais Royal where he and Homberg worked together on chemical experiments. When Philippe bought the enormous burning lens made by Graf Ehrenfried Walther von Tschirnhaus, the first experiments they performed with it were attempts to use the sun's light to transmute silver into gold.²² Finally, Homberg's most important publication, his *Essais de chimie*, a kind of a serial textbook published in the Académie's *Mémoires* from 1702 to 1710, is built to a large extent around illustrative experiments with Philosophical Mercury. Homberg also claims to have converted a portion of the mercury into gold, using a traditional *chrysopoetic* method.²³

But Homberg's continued activity in *chrysopoeia* was in direct conflict with the new image of chemistry that the institution's public spokesman, the perpetual secretary Bernard de Fontenelle, was trying to project. Fontenelle is the antagonist of this story. He held a low opinion of chemistry in general, seemingly because it could not be reduced to deductive axioms, to "l'esprit géométrique" of Descartes, like mathematics and physics. Indeed in his lengthy essay on the utility of the sciences, he mentions chemistry in only one sentence, and then only as an adjunct to medicine.²⁴ Fontenelle's prejudice against chemistry appears again and again. For example, in 1700 Homberg published a sophisticated paper that literally sets the foundations for the standardisation of chemical reagents for analysis, yet Fontenelle misses, or ignores, the paper's whole point for chemistry, and instead picks out a trivial comment made by Homberg about using ground oyster shells as an antacid, and so concludes pompously in his summary of the paper that "it is principally to these sorts of [medical] uses that all chemical discoveries ought to be turned."²⁵ For Fontenelle, chemistry was not even a science in itself. The search for hidden arcana, like transmutation and the alkahest, only made things worse for chemistry. Indeed, one of Fontenelle's popular *Dialogues of the Dead* summons up the ghost of Ramon Lull, supposed author of numerous *chrysopoetic* works, who admits that after his death he finally realised (too late!) that the Philosophers' Stone was a lie, but Lull concludes happily that "though I was not able to make the Stone, at least I was able to fool other people into believing I had."²⁶

Homberg and Fontenelle were opposed regarding nearly everything dealing with chemistry. While Fontenelle praised physics and Descartes above all else, Homberg rejected Descartes and his methods, and praised chemistry specifically as the science of "infinite extent" that gives us true knowledge, whereas the physicists could not tell us anything certain about the material world.²⁷ As a colleague of Homberg's wrote shortly after his death "For Homberg, all philosophy came through the manipulation of the fire-tongs."²⁸ But worst of all, for Fontenelle that is, Homberg's *chrysopoetic* activities became well known outside the Académie. As such they were constantly working against Fontenelle's propaganda for the Académie and for the much diminished and highly domesticated role he was marking out for chemistry. For example, in 1711 Leibniz wrote to Homberg asking him to reveal more of his experiences with transmutation, arguing that such experiments would be useful to refute the matter theories of physicists like Nicolaas Hartsoeker and others.²⁹ A remarkable book-length manuscript written about 1720 went much further. Extant in multiple copies in France and England, this work, entitled "Essay to Uncover the Knowledge and Practice of the Work of the Chemical Philosophers," fully embraces Homberg within the alchemical tradition. When the anonymous author lists several methods of making the

Philosophical Mercury, he cites in order the methods of Pantaleon and Philalethes, followed directly by “the method of Mr. Homberg.” Even more strikingly, he adopts Homberg’s chymical theory, replete with explicit citations to papers in the Académie’s *Mémoires*, and grafts this theory seamlessly onto a theory of the Philosophers’ Stone and metallic transmutation. Perhaps yet more surprisingly, the third part of the book, which supplies recipes for various preparations relating to *chrysopoeia*, actually imitates the style of Lemery’s famous *Cours de chymie*, with preparative processes followed by sections headed “Remarques” that provided the theoretical background for the procedures. This manuscript argued clearly that developments in chemistry, whether in terms of theory, practice, or style of exposition, did not defeat *chrysopoeia*, instead, here a *chrysopoeian* eagerly adopts the most modern chemical theory in order to *help* in his search.³⁰

Amid Homberg’s continuing publication of papers on the analysis of metals and the production of gold and silver, his student Etienne-François Geoffroy claimed success in synthesising iron from non-metallic starting materials.³¹ Not *chrysopoeia*, surely, but evidence of the producibleness of the metals, and thus support for more traditional transmutation and the theories that undergirded it. Geoffroy’s claim was attacked by Louis Lemery, son of Nicolas, and their debate lasted from 1704 to 1708.³² During this time, Homberg used Geoffroy’s results to lend support to traditional *chrysopoeia*, while Lemery sarcastically criticised Geoffroy’s work by tying it to that of Johann Joachim Becher. Fontenelle used the opportunity to reflect negatively upon the artificial production of metals in an unusually lengthy commentary on the paper.³³

But while Lemery and Fontenelle could criticise Geoffroy, there was little they could say openly about Homberg, given his close relationship to the Duc d’Orléans. Yet while this relationship undoubtedly protected Homberg to some extent, it did nothing to help the public status of chemistry. For knowledge of Philippe’s passion for chemistry co-existed with rumors (and perhaps more than just rumors) that the Duc’s interest in chemistry was accompanied by one in magic, necromancy, water-gazing, and demonic invocations, and it was easy to imply that Homberg was involved as well. This situation explains the strange disclaimer made by the Duc de Saint-Simon when describing Philippe’s interest in chemistry, for he is eager to point out that “it was all done very publically” as if to counter unspoken assumptions that something secret and disreputable was going on. Saint-Simon also claims that Philippe scoffed at transmutation, but Philippe’s mother, Liselotte von der Pfalz, wrote in her letters about how her son and Homberg could make gold in the laboratory, thus indicating a more positive view of *chrysopoeia* on the part of future Regent of France.³⁴ (It should also be pointed out that another of Philippe’s physicians was Adrien Helvetius, son of the famous Johann Friedrich Helvetius who witnessed transmutation at his house in

The Hague at the hands of an anonymous travelling adept in 1666, and described in *Vitulus aureus*.³⁵ More embarrassment came in 1712, when following the deaths of the Dauphin and Dauphine, Homberg was, like Glaser before him, accused of being a poisoner. Unlike Glaser, however, Homberg was saved from the Bastille, but only barely and only by the direct action of Louis XIV.³⁶ All of this must have looked very bad indeed from the point of view of Fontenelle and his program for the public face of the Académie and of chemistry.

Upon Homberg's death in 1715, Fontenelle immediately began to sanitise Homberg's legacy. His eloge of Homberg is full of revisionist statements intended to force Homberg into the identity Fontenelle had cast for respectable chemists and a respectable chemistry.³⁷ According to Fontenelle, both Homberg and Lemery (who died the same year) *literally fled* from practitioners of the "old disreputable" chymistry. For Lemery it was from Glaser, whom Fontenelle describes as "a true chemist, full of obscure ideas, greedy of such ideas, and unsociable."³⁸ For Homberg, his alleged fear over association with a *chrysopoeian* compelled him leave Paris and flee to Italy. At this point, Fontenelle declares loudly that "Homberg was too capable to aspire to the Philosophers' Stone and too sincere to put such a vain idea into anyone's head." But Fontenelle protests too much, for Homberg himself described in print how at just this time he was trying to transmute mercury into silver using an oil distilled from human faeces.³⁹

But Fontenelle's attempt to enhance the status of chemists and chemistry involved not only denying relationships with the disreputable but also creating relationships with the reputable. Thus Fontenelle's eloge of Homberg also provides him apprenticeships with more than a dozen notables of the late seventeenth century, even when it means that Fontenelle's chronology apprentices Homberg to people who would have been dead when Homberg met them.⁴⁰ Fontenelle is correct to say that Homberg met Boyle, although my research shows that it is impossible that he stayed with him for a year to study, as Fontenelle claimed, in "one of the most learned schools of *physics*." Furthermore, I note with delicious irony, that the only thing that I can confidently assert that Homberg did learn from Boyle was the secret preparation the Philosophical Mercury.⁴¹

Fontenelle, or perhaps the Académie in a more corporate sense, may even have played a role in preventing Homberg's life-work from being published. Upon his death, Homberg left behind a completed version of his *Essais de chimie*, on which he had been working for over a decade. The manuscript was entrusted to his student Geoffroy, with the request to publish it as soon as possible.⁴² But nothing ever appeared. Given the "alchemical" origins of the experiments upon which so much the text was based, and its claims successfully to have produced gold from mercury, the publication of this work, bearing Homberg's name and his title as

Academician, may well have been unwelcome for the image of the Académie and of chemistry being constructed in 1716. If some kind of suppression did take place, it reminds one of the suppression of Duclos' treatises a generation earlier.⁴³

The topic of the loss of *chrysopoeia* brings us finally to an event that is often cited in the literature as signaling the last nail in the coffin of *chrysopoeia*, namely the publication of a paper by Etienne-François Geoffroy entitled "Some cheats concerning the Philosophers' Stone."⁴⁴ Presented in 1722 and published in 1724, it relates methods used by fraudulent would-be transmuters of metals to trick people into believing that they have witnessed a transmutation; for example, using crucibles that contain gold hidden under a false bottom, or stirring a molten mixture with a hollow rod that contains gold hidden inside. While this paper is often cited, it needs to be better contextualised, for the paper presents a number of historical problems. To what extent does it represent Geoffroy's views? More importantly, why did Geoffroy present it at all, and why in 1722?

It has been shown that the majority of Geoffroy's paper is copied from the *Examen fucorum pseudochymicorum*, a well-known work published in 1617 by Michael Maier and intended to help his fellow *chrysopoeians* to distinguish true from false transmutations. And much of Maier's work is in turn borrowed from Heinrich Khunrath's *Trewhertzige Warnungs-Vermahnung* of 1597.⁴⁵ Thus Geoffroy's paper provided nothing new, merely a restatement of material over a century old. Moreover, it would be incorrect to conclude that Geoffroy was necessarily himself utterly opposed to transmutation, for while he describes the cheating practices he nowhere claims that all *chrysopoeia* is fraudulent. Indeed, the catalogue of Geoffroy's library shows that he owned more than seventy books on transmutation, including classic works by Philalethes, Valentine, and others, as well as Manget's huge 1702 compendium *Biblioteca chemica curiosa*.⁴⁶

One important, but hitherto overlooked, feature of Geoffroy's paper is that it was presented not at a private *séance*, but rather at one of the Académie's semi-annual public assemblies (on 15 April 1722); thus, we must consider that it was designed for a wider audience than just the Académie. Papers given at these special assemblies were carefully chosen by committee, and Geoffroy's was virtually unique in that it did not present any research results. It seems instead designed as a public statement intended to reinforce the new boundaries of chemistry, and as will be suggested in a moment, perhaps to deflect contemporaneous rumors about the Academy in regard to transmutation.

Fontenelle used Geoffroy's paper as an opportunity to write a lengthy commentary containing his most vitriolic and sarcastic condemnations of "les Alchimistes."⁴⁷ But Fontenelle also used this opportunity explicitly to distinguish "alchemical" claims from the work done by Homberg twenty years earlier. He also

asserts that alchemists have never made a single grain even of an imperfect metal, perhaps a reference to Geoffroy's earlier claims to have produced iron. Geoffroy's reading of this paper might thus be seen as a public act, a kind of a renunciation of the work both he and his master had performed previously, and a statement of the Académie's official views. The paper's public presentation also meant that the popular press covered the event, but while the *Mercure Galant* routinely mentioned the Académie's public meetings, in this case, almost uniquely, the following month's issue carried an additional seven-page reprise of Geoffroy's paper, and no mention of the other papers presented that same day.⁴⁸ It might not be out of place to suggest that Fontenelle may have orchestrated this broader coverage in the popular monthly.

But were there special incentives for this paper in 1722? Two events that reinforce the idea that Geoffroy's paper was primarily a public relations event will now be pointed out. Consider the financial state of France in 1720 and 1721. The banking scheme organised by the Scot John Law, with the backing of the Regent, had begun a spectacular collapse in 1720. Too many bank-shares had been sold and there was simply not enough gold in France to back up the banknotes. Not having enough gold was the traditional problem for alchemists! Thus a rumor began to circulate that the Regent of France had ordered the chemists of the Académie to apply themselves precisely to the problem of *chrysopoeia*.⁴⁹ Apparently the rumor gained sufficient currency that the agent of the English ambassador, who was sending weekly reports to London on the developing bank crisis, felt obliged to send home a special account of the Regent's abilities in chemistry, and his work with Homberg.⁵⁰ If the rumor was true, then what a change from the orders of Colbert and Louvois, and whether or not it was true, then what a disaster for the image of the Académie and of its professionalised, domesticated, and respectable chemistry that Fontenelle was struggling to craft! The involvement of the Regent may also explain the rather late date at which with paper was published. Geoffroy's rather mild paper was given in 1722, and published along with Fontenelle's vitriolic condemnation only in 1724, by which time the young Louis XV had been crowned and the Regent had died.

Another contributing event may have been the publication, just before Geoffroy's presentation, of *Les secrets les plus cachés des Philosophes anciens* by Francesco Maria Pompeo Colonna. The book recounted successful transmutations and other outstanding chymical feats. Colonna's book was reviewed in the *Journal des Sçavans*, which, although it complained that it was written in very bad French, still maintained that it contained important scientific material.⁵¹ While a single publication might not ordinarily provoke a response from the Académie, in this case Colonna had several links to the Académie. He had collaborated with Geoffroy's father, was a friend of the famous astronomer Gian Domenico Cassini

and of the brother of Jean-Paul Bignon, President of the Académie.⁵² Thus Geoffroy's publically delivered paper could serve as a countermeasure to possible rumors about the Academie's links to *chrysopoeia*.

It is also crucial to note that the new boundaries of chemistry were reified at this same time, at least in French, by the definitive separation of the words alchemy and chemistry. Geoffroy's paper never uses the word *alchimiste*. He writes instead *chimiste philosophe*, the same term employed by Colonna and nearly all other advocates of transmutation writing in France in the early eighteenth century. But Fontenelle employs the word *alchimiste* consistently and as a term of ridicule, to mark out, to segregate, a group now to be separated entirely from the *chimistes*. Before the end of the next decade this division was complete. For example, the abbé Pluche's 1739 *Histoire du ciel*, describes *la chimie* as a useful and admirable science, while *l'alchimie* was a discredited superstition of former ages.⁵³

What is portrayed in this paper is the long-term tension within the Académie Royale over the status and boundaries of chemistry, particularly regarding *chrysopoeia*. The non-chemist administrators—Colbert, Louvois, and most of all Fontenelle, joined occasionally by the Lemerys, took a strongly negative view of *chrysopoeia*, and simultaneously tried to push chemistry towards a servant role to pharmacy. At the same time, the chief chemists, that is to say, the most prominent and most innovative chemists of the Academie, who had an expansive view of the explanatory and philosophical status of chemistry, namely Duclos, Homberg, and Geoffroy, continued to explore transmutational experiments. Geoffroy's final views on the subject will be treated elsewhere, but herein it is proposed that his famous (or infamous) paper of 1722 was largely an act of public relations, triggered by events and associations that could have reflected badly on the Académie.

Given the continued interest in *chrysopoeia* by prominent chemists, we cannot consider the loss of *chrysopoeia* to be simply the result of scientific developments. I have instead pointed to the desire to domesticate and redefine the identity and scope of chymistry into a professionalised and respectable public discipline. Of course I do not claim that the end of *chrysopoeia* came about from a single cause, I am not that reductionist or that brash. One must consider both active and passive factors at work in several contexts. Herein the focus is on the important active repression of *chrysopoeia* at the Paris Academy, and much further work must be done for other locales. At this point, I will mention only the curious fact that Georg Ernst Stahl turned from being a supporter to a critic of *chrysopoeia* at very nearly the same time, the late 1710s and early 1720s, which also correlates with a change in his social status as he moved from university to court.⁵⁴ Nonetheless, publications on *chrysopoeia* continued to be produced in Germany into the 1760s long after

they had ceased in France and England. In Sweden, even some official and high-ranking chemists continued to hope and to work for transmutation in the 1750s.⁵⁵ The greater longevity of alchemy in Sweden and Germany might be attributable to the absence of high-profile, centralised scientific authorities, or perhaps to the greater economic importance of metals and mining in those countries. In France on the other hand, industrial chemistry of all sorts began to prosper in the early eighteenth century. Thus those skilled in or attracted to chemistry might be drawn away into glass or porcelain works or various other industrial processes, rather than working primarily with metals (in which resources France is poor), and certainly with greater prospects of monetary success than working on transmutation. Yet the necessary work of expanding our view of the demise of *chrysopoëia* beyond what I have been able to present herein must remain a task for the future.

Notes

¹ A fuller treatment of this topic appears in my book, *Wilhelm Homberg and the Transmutations of Chymistry at the Académie Royale des Sciences*, forthcoming 2009.

² On the use of the word *chymistry*, see 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 Lawrence M. Principe, *The Aspiring Adept: Robert Boyle and his Alchemical Quest* (Princeton: Princeton University Press, 1998).

⁴ Nicolas Lemery, *Cours de chymie*, 3rd edition, (Paris, 1679), pp. 57-60; on Lemery, see Michel Bougard, *La chimie de Nicolas Lemery*, (Turnhout: Brepols, 1999).

⁵ Tara Nummedal, *Alchemy and Authority in the Holy Roman Empire*, (Chicago: University of Chicago Press, 2007), pp. 48-72.

⁶ *Histoire de l'Académie Royale des Sciences* (hereinafter *HARS*) 1, (1699):4.

⁷ For relevant scholarship on the early Académie, see, for example, Roger Hahn, *The Anatomy of a Scientific Institution: The Paris Academy of Sciences, 1666-1803* (Berkeley: University of California Press, 1971); Alice Stroup, *A Company of Scientists: Botany, Patronage, and Community at the Seventeenth Century Parisian Academy of Sciences* (Berkeley: University of California Press, 1990); David Sturdy, *Science and Social Status: The Members of the Académie des Sciences, 1666-1750* (Woodbridge: Boydell, 1995); for chemistry at the early Académie, see Frederic L. Holmes, *Eighteenth-Century Chemistry as an Investigative Enterprise* (Berkeley: Office for History of Science & Technology, University of California at Berkeley, 1989).

⁸ *Archives de la Bastille*, 19 vols, (Paris, 1866-1904), esp. vol. 12 (1881): *Règnes de Louis XIV et de Louis XV* (1709 à 1772), pp. 1-5, 52-4; Clara de Milt, "Christophle Glaser," *Journal of Chemical Education* 19, (1942): 53-60; Arlette Lebigre, *1679-1682, L'Affaire des poisons* (Brussels: Complexe, 2001).

⁹ Robert Boyle, "Essay on Nitre," in *Certain Physiological Essays* (1661) in *The Works of Robert Boyle*, eds. Michael Hunter and Edward B. Davis, 14 vols. (London: Pickering and Chatto, 1999-2000), 2:85.

¹⁰ Edme Mariotte, *Essai de logique* (1678), preface, in *Oeuvres*, 2 vols. (The Hague, 1740), 2:611.

¹¹ On the words "alchemy" and "chemistry" and their changing meanings, see Newman and Principe, "Alchemy vs. Chemistry."

¹² *Lettres, instructions, et mémoires de Colbert*, ed. Pierre Clément, 8 vols. (Paris: Imprimerie Impériale, 1861-70), 5:515 (cited from “Notes et desseins de Claude Perrault, August 1667).

¹³ On Duclos see Alice Stroup, “Censure ou querelles savantes: L’Affaire Duclos (1666-1685),” pp. 435-52 in *Règlement, usages et science dans la France de l’absolutisme*, eds. Christiane Demeulenaere-Douyère and Éric Brian (Paris: Lavoisier Tec et Doc, 2002), and Doru Todériciu, “Sur la vraie biographie de Samuel Duclos (Du Clos) Cotreau,” *Reveu d’histoire des sciences* 27, (1974):64-67.

¹⁴ *Nouvelles de la République des Lettres*, October 1685, pp. 1139-43.

¹⁵ *Mercur Galant*, August 1685, pp. 136-37.

¹⁶ *Nouvelles*, October 1685, pp. 1141-2.

¹⁷ See Stroup, “Censure ou Querelles”, where the work on salts (Bibliothèque Nationale, MS fr. 12309) is identified as Duclos’ for the first time, p. 439.

¹⁸ Archives de l’Académie des Sciences, Procès-verbaux (30 January 1686), vol. 11, fols. 157r-158r (on fol. 157r).

¹⁹ On Homberg, see my forthcoming *Wilhelm Homberg and the Transmutations of Chymistry*, which contains a completely revised biography for Homberg, and an analysis of his chymical studies and influence; on his *chrysopoeia*, see Lawrence M. Principe, “Wilhelm Homberg: Chymical Corpuscularianism and Chrysopoeia in the Early Eighteenth Century,” 535-56 in *Late Medieval and Early Modern Corpuscular Matter Theories*, eds. C. Lüthy, J. E. Murdoch, and W. R. Newman (Leiden: Brill, 2001); on his chymical theory of light, see Lawrence M. Principe, “Wilhelm Homberg et la chimie de la lumière,” *Methodos: Savoirs et textes* 8, (2008) at <http://methodos.revues.org/>

²⁰ Principe, “Chymical Corpuscularianism,” p. 555.

²¹ Wilhelm Homberg, Voennomeditsinskoi Akademii, Boerhaave Archive, MS 130, fols. 233r-v. This newly discovered MS is fully treated in my forthcoming book on Homberg.

²² Principe, “Chimie de la lumière,” sect. 19-22.

²³ Principe, “Chymical Corpuscularianism,” pp. 546-53.

²⁴ *Oeuvres diverses de M. de Fontenelle*, 3 vols. (Paris, 1724), 1:1-35 (not paginated), “Sur l’utilité des mathématiques et de la physique,” on sig. Aiiiiv.

²⁵ Wilhelm Homberg, “Observations sur la quantité d’acides absorbés par les alcalis terreux,” *Mémoires de l’Académie Royale des Sciences* (hereinafter *MARS*) 2, (1700):64-71; Bernard de Fontenelle, *HARS* 2, (1700):50.

²⁶ *Oeuvres de Fontenelle*, 1:117-20.

²⁷ Homberg, MS 130, fol. 112v; on Homberg’s view of the status of chemistry, see Rémi Franckowiak et Luc Peterschmitt, “La chimie de Homberg: Une vérité certaine dans une physique contestable,” *Early Science and Medicine* 10, (2005):65-90.

²⁸ Niedersächsische Landesbibliothek Hannover, Leibniz Briefe 768, fols. 53r-54v; Remond to Leibniz, 23 December 1715; on fol. 54r: “toute la philosophie selon lui étoit dans l’usage de la pincette et ainsi il faisoit peu de cas des anciens et des modernes.”

²⁹ NLM, Leibniz Briefe 420, fols. 3r-v; Leibniz to Homberg, 10 March 1711.

³⁰ Wellcome Institute Library, MS 2298, “Essai pour développer la science & la pratique de l’Oeuvre des Philosophes chimiques”; another copy is Université de Bordeaux, MS 23.

³¹ Etienne-François Geoffroy, “Maniere de recomposer le soufre commun,” *MARS*, 5, (1704):278-286, on pp. 284-86.

³² Bernard Joly, “Quarrels between Etienne-François Geoffroy and Louis Lémery at the Académie Royale des Sciences in the Early Eighteenth Century: Mechanism and Alchemy,” pp. 203-14 in *Chymists and Chymistry: Studies in the History of Alchemy and Early Modern Chemistry*, ed. Lawrence M. Principe, (Sagamore Beach, MA: Science History Publications, 2007); “Chimie et mécanisme dans la nouvelle Académie royale des sciences: les débats entre Louis

Lémery et Etienne-François Geoffroy,” *Methodos: Savoirs et textes* 8, (2008) at <http://methodos.revues.org/>

³³ Fontenelle, “Sur la nature du fer,” *HARS* 9, (1708):61-65.

³⁴ Louis de Rouvroy, duc de Saint-Simon, *Mémoires*, ed. Yves Coirault, 8 vols. (Paris: Gallimard, 1983-88), 4:456.

³⁵ J. F. Helvetius, *Vitulus aureus, quem mundus adorat et orat* (Amsterdam, 1667).

³⁶ Saint-Simon, *Mémoires*, 4:459-66; *Aus der Briefe der Herzogin Elisabeth Charlotte von Orléans an die Kurfürstin Sophie von Hannover*, ed. Eduard Bodemann, 2 vols., (Hannover, 1891), 2:302-303, 307.

³⁷ Fontenelle, “Éloge de M. Homberg,” *HARS* 17, (1715): 82-93 on pp. 87-88.

³⁸ Fontenelle, “Éloge de M. Lemery,” *HARS* 17, (1715): 73-82 on p. 73.

³⁹ Wilhelm Homberg, “Observations sur la matiere fecale,” *MARS* 13, (1711) pp. 39-47.

⁴⁰ Alice Stroup, “Wilhelm Homberg and the Search for the Constituents of Plants at the Seventeenth-Century Académie Royale des Sciences,” *Ambix* 26, (1979): 184-202, on pp. 185-86.

⁴¹ Principe, “Wilhelm Homberg: Chymical Corpuscularianism and Chrysopoeia”; my forthcoming *Transmutations of Chymistry*, ch. 1, completely rewrites Fontenelle’s account of Homberg.

⁴² NLB, Leibniz Briefe 768, fols. 53r-54v, on fol. 54r; Remond to Leibniz, 23 December 1715.

⁴³ Stroup, “Censure ou querelles.”

⁴⁴ Étienne-François Geoffroy, “Des supercheres concernant la pierre philosophale,” *MARS* 24, (1722): 61-70.

⁴⁵ Wolfgang Beck, *Michael Maiers Examen Fucorum Pseudo-chymicorum: eine Schrift wider die falschen Alchemisten*, Ph.D. 1992, Technische Universität München; Robert Halleux, “L’alchimiste et l’essayeur,” in *Die Alchemie in der europaischen Kultur- und Wissenschaftsgeschichte*, ed. Christoph Meinel (Wiesbaden: Otto Harrassowitz, 1986); Michael Maier, *Examen fucorum pseudo-chymicorum detectorum et in gratiam veritatis amantium succincte refutatorum* (Frankfurt, 1617); Heinrich Khunrath, *Treuhertzige Warnungs-Vermahnung* (Magdeburg, 1597).

⁴⁶ *Catalogus librorum Stephani-Francisci Geoffroy*, (Paris, 1731); I warmly thank Dr. Brigitte Van Tiggelen for kindly bringing the existence of this source to my attention.

⁴⁷ Fontenelle, *HARS* 24, (1722): 37-39.

⁴⁸ *Mercure Galant* (April 1722), pp. 96-97; (May 1722), pp. 122-25.

⁴⁹ Reported by Johann Thomas Hensing (1683-1726) in his “Dissertation sur la pierre philosophale,” pp. 121-54 in *Mémoires littéraires*, ed. Marc Antoine Eidous (Paris, 1750), pp. 122-23: “M. le Régent a voulu que les Membres de l’Académie qui s’appliquent à la Chymie, travaillent de tout leur pouvoir à découvrir la Pierre Philosophale.”

⁵⁰ National Archives, State Papers 78/166, fols 339-41; the text is excerpted from Fontenelle’s eulogy of Homberg.

⁵¹ *Journal des Sçavans* 1723 (8 March), pp. 147-51.

⁵² Gustavo Costa, “Un Collaboratore italiano del Conte di Boulainviller: Francesco Maria Pompeo Colonna (1644-1726),” *Atti e Memorie dell’Accademia Toscano di Scienze e Lettere* 29, (1964):207-95, on pp. 218-19.

⁵³ Noël Antoine Pluche, *Histoire du ciel*, 2 vols. (Paris, 1757), 2:9-10.

⁵⁴ Kevin Chang, “Georg Ernst Stahl’s Alchemical Publications: Anachronism, Reading Market, and a Scientific Lineage Redefined,” pp. 23-43 in *New Narratives in Eighteenth-Century Chemistry*, ed. Lawrence M. Principe, (Dordrecht: Springer, 2007).

⁵⁵ Hjalmar Fors, “Occult Traditions and Enlightened Science: The Swedish Board of Mines as an Intellectual Environment 1680-1760,” pp. 239-52 in *Chymists and Chymistry*.