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Discorso sopra la Chimica: The Paracelsian Philosophy of Antonio Neri

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Abstract

Discorso sopra la Chimica is an early seventeenth-century manuscript on alchemy written by the Florentine priest Antonio Neri, best known as the author of the first published treatise on glassmaking – *L'Arte Vetraria* (1612) – which was widely read for centuries. The *Discorso* shows a different face of Neri, that of the alchemist with a profound knowledge of Paracelsian doctrine, dedicated to the transmutation of metals, and an advocate of iatrochemistry. This picture is apparently incompatible with that of the technical glassmaker and the champion of knowledge based on experience. However, even in his *Discorso* the author affirms the value of experimental practice, and the *experimentum* has the all-important benefit of legitimizing the validity of alchemical doctrines. Knowledge does not come from reading the books of the sages of antiquity, but from the “practice of many experiences.” This emphasis on experimentation constitutes a unique feature of the *Discorso*. It was perhaps the ‘modernity’ of Neri’s discussion of alchemy that made the manuscript the object of plagiarism. Careful comparison reveals that an entire chapter of *Prodomo*, written by the Jesuit Francesco Lana Terzi in 1670, was copied from Neri. In the *Discorso* old and new are intertwined and validate one another, showing how Neri was a quintessential representative of his time, when scientific models that now appear irreconcilable coexisted, often forming a complex web.

In this paper I discuss Antonio Neri and the background to his important work, reflecting on its impact and what it tells us about a fascinating and complex period in the birth of modern science. This is followed by a translation of the complete text of *Discorso sopra la Chimica*.

Keywords

Antonio Neri, alchemy, Paracelsian chemistry

Introduction

The *Discorso sopra la Chimica, che cosa sia, e sue Operazioni* [Discourse on Chemistry, What It is, and Its Operations] is a short manuscript by the

priest Antonio Neri, best known as the author of *L'Arte Vetraria* – the first systematic codification and popularization of the recipes and 'secrets' relating to the production and coloring of glass.¹

Thanks to the success of this treatise, which up until the middle of the eighteenth century was considered the most comprehensive technical work in the area of glassmaking, the most widely held image of Neri has been that of the technical expert. He emphasized the authoritativeness of experience and the importance of practical activity for the growth of knowledge, and he chose to use a language that was 'clear' and 'distinct' – and therefore intelligible to everyone – in making public the results of his research, with the aim of being 'beneficial to the world'.²

Neri's work fits into the vast literature that during the sixteenth century saw the publication of a succession of treatises which contributed to the gradual unification of scientific knowledge and technical skill – craftsmanship. Among the works from this period that stand out are *De la Pirotechnia* (1540) by Vannoccio Biringuccio³ and *De Re Metallica* (1556) by Giorgio Agricola,⁴ both of which were characterized by careful attention to the technical processes involved in the mechanical arts. We are no longer moving in the realm of 'natural histories', but of a technical literature that would exert considerable influence on the subsequent development of applied chemistry. There was a new appreciation of manual work – that is to say, the separation of practical knowledge from theoretical knowledge and the concept of subordinating manual to mental labor were replaced by the recognition of their union and mutual dependence. Man was

¹ Antonio Neri, *L'Arte Vetraria distinta in libri sette del R. P. Antonio Neri Fiorentino. Ne quali si scoprono, effetti maravigliosi, et insegnano segreti bellissimi, del vetro nel fuoco et altre cose curiose*, edited by Rosa Barovier Mentasti (Milan: Il Polifilo, 1980), sec. 4, facsimile copy of the first edition (Firenze: Nella Stamperia de' Giunti, 1612). This technical manual became vastly popular and was widely read, as is reflected in the numerous reprints and translations that have appeared over the centuries in English, Latin, German, French, Spanish, and recently even Japanese. Among the more recent efforts, see the accurate English translation by Paul Engle: Antonio Neri, *L'Arte Vetraria, the Art of Glass*, edited and translated by Paul Engle (Hubbardston, MA: Heiden & Engle, 2003–2007), vols. 1–3. For a study of *L'Arte Vetraria*, see Maria Grazia Grazzini, *Antonio Neri e L'Arte Vetraria: conoscenze tecniche e motivi ermetico-paracelsiani* (Università degli Studi di Firenze, BA thesis in philosophy, 1983).

² Neri, *Arte Vetraria* (cit. note 1), p. iii.

³ Vannoccio Biringuccio, *De la Pirotechnia libri X* (Venezia: Venturino Roffinello, 1540).

⁴ Giorgio Agricola, *Opera di Giorgio Agricola de l'arte de metalli, partita in XII libri. Tradotti in lingua toscana da Michelangelo Florio Fiorentino* (Basel: per Hieronimo Frobenio et Nicolao Episcopio, 1563).

equipped with both a pair of hands and an intellect and therefore, as Giordano Bruno urged, “Do not contemplate without action, do not act without contemplation.”⁵

This re-evaluation of the mechanical arts can be found in *L'Arte Vetraria*, which was not and did not seek to be a theoretical work; it was rather an exhibition of technical expertise founded on personal experience and confirming the value of practical activity in the broadening of knowledge. The *Discorso* shows a different side of Antonio Neri, one seemingly at odds with the image of the technician–glassmaker; it reveals the figure of the alchemist deeply committed to Hermetic and Paracelsian doctrine. This manuscript was not the only unpublished work by Neri.⁶ Alongside it one may cite, given the similarity of the subject matter, *Ragionamento dell'arte Chimica*, a short unsigned treatise that has been attributed to the Florentine priest together with all of the other material contained in the same codex.⁷

Despite the international fame achieved by his glassmaking treatise through numerous translations and reprints, we still know little about Antonio Neri himself. A biographical trail can be reconstructed thanks to the information that the author provides in *L'Arte Vetraria*, but even more details are obtainable from an invaluable file of manuscripts at the Biblioteca Nazionale of Florence (BNCF).⁸ It contains twenty-seven letters received by Neri between 1601 and 1603 from his friend Emanuel Ximenes, a Portuguese of noble birth and a citizen of Antwerp.⁹ All of the letters are dominated by a passion for science. In them accounts of experiences with glassmaking alternate with information about medicaments, in which repeated references to the works of Paracelsus and the therapeutic validity of his chemical remedies are made. In a letter sent from Antwerp on 15 November 1601 we find a detailed recipe, compiled partly in Italian and partly in Latin, for the “laudanum of Paracelsus” which can be used to treat

⁵ Giordano Bruno, *Spaccio della Bestia trionfante* (Parigi, 1584) in *Giordano Bruno, Opere italiane* (Bari: Laterza, 1908), p. 144.

⁶ Pieter Boer and Paul Engle, “Antonio Neri: An Annotated Bibliography of Primary References,” *Journal of Glass Studies*, 2010, 52:51–67, p. 55.

⁷ Biblioteca Nazionale Centrale di Firenze (BNCF), Ms. Palat., Serie Targioni, II. Antonio Neri (1613).

⁸ BNCF, Fondo Nazionale, II, I, 391 (formerly Magl., cl.XVI, cod. 116), Emanuel Ximenes, *Lettere ad Antonio Neri* (from 17 August 1601 to 31 March 1611).

⁹ Emanuel Ximenes lived for an extended period of time in Florence with his sister Beatrice, who had married Alamanno Bartolini, for whom Antonio Neri may have served as secretary. In 1601 Ximenes returned to Antwerp where – after repeated invitations – Neri joined him and lived from late 1603 to January 1611.

cysts, induce sleep, and restore strength.¹⁰ In a letter dated 7 February 1603 Ximenes refers to “grains of antimony,” writing that “Paracelsus says that it ought to purge ‘substantial humidity’ without vomiting.”¹¹ The recognition of the superiority of chemical remedies over traditional Galenic medicine is present in a letter that Neri wrote from Antwerp on 21 February 1608, in which he affirms that the “theriac of mummy” is a remedy for any poison and more effective than the “theriac magna” of Galen.¹²

Neri’s interest in Paracelsian thought was not limited to medical doctrine, but also concerned alchemy proper, and a few letters from Ximenes demonstrate Neri’s familiarity with key Paracelsian texts.¹³ The experienced practitioner in the field of glassmaking had a profound knowledge of Paracelsian chemical philosophy, and was a firm supporter of its universal scope. This apparent dichotomy can be surmounted if we consider the cultural environment in which Neri was trained and worked. *L’Arte Vetraria* is dedicated to Don Antonio de’ Medici, the son of Francesco I and Bianca Cappello, and ruler of Capestrano, whose interest in alchemy has been thoroughly documented in the important essay on the spread of Paracelsian thought in Tuscany by Paolo Galluzzi.¹⁴ In this dedication Neri expressed his intention to publish the results of his research “on the subjects of chemistry, and medicine.”¹⁵ It therefore seems likely that the “Ecc.mo Signore” [Most Excellent Lord] to whom the *Discorso* is addressed was none other than Don Antonio. Neri worked in the foundry of the Casino di San Marco in Florence,¹⁶ which in the late sixteenth century was also a busy alchemical laboratory where, in addition to the practical and operational interest in Paracelsianism, awareness was developing of the importance of

¹⁰ Ximenes, *Lettere* (cit. note 8), f. 8v.

¹¹ *Ibid.*, f. 35r-35v. *Radicaliter humidum* or *humidum radicale* was considered to be an imbalance of the bodily humors. Cf. Plinio Prioreschi, *A History of Medicine: Byzantine and Islamic Medicine* (Omaha: Horatius Press, 2001), vol. 4, p. 234.

¹² Biblioteca Nazionale Marciana di Venezia, Codice Italiano, cl. IV, cod. 55 (formerly Codice Naniano), Antonio Neri, *Lettera* (1608), ff. 389r-392v.

¹³ Ximenes, *Lettere* (cit. note 8), f. 6r-6v; 7v.

¹⁴ Paolo Galluzzi, “Motivi paracelsiani nella Toscana di Cosimo II e di Don Antonio dei Medici: alchimia, medicina ‘chimica’ e riforma del sapere,” in *Scienze, credenze occulte, livelli di cultura* (Firenze: Olschki, 1982), pp. 31-62.

¹⁵ Neri, *Arte Vetraria* (cit. note 1), p. iv.

¹⁶ Built by Francesco I (1541-1587), this Medici palace became the home of his son Don Antonio in 1597. The Casino included an atelier for the cutting of *pietre dure* or semi-precious stones (this workshop was moved to the Uffizi in 1586) and a foundry where Francesco I used to conduct experiments in various areas. In this regard, see G. Bencivenni Pelli, *Saggio storico della Real Galleria di Firenze* (Firenze: Cambiagi, 1779), pp. 107-111.

Paracelsus's theoretical philosophy and of his revolutionary ideas in the realm of chemistry.

In the inventory of Don Antonio's library of works on chemistry the name of Neri can often be found,¹⁷ showing that he not only worked in the grand ducal glassworks, but also collaborated with the prince in his alchemical studies. Perhaps the pragmatic bent of Paracelsian philosophy was the impetus that stimulated Neri's artisanal activity in the glassmaking field. As has been clearly underlined by the recent studies of Marco Beretta on materials that have made a significant contribution to the history of science,¹⁸ the close link between glass and alchemy is unveiled by Neri in the first pages of *L'Arte Vetraria*. Glass is an artificially-produced compound that "resembles all kinds of minerals and semi-minerals,"¹⁹ and "like the perfect shining metal Gold, the fire refines it, polishes it and makes it beautiful."²⁰ Fire is thus an essential element both for the production of glass and for the transmutation of metals. The author's propensity is not to see it as a destructive force, but rather to emphasize its creative power and the changes it produces in substances, which can be read as transmutations.²¹ Neri speculates that glass may have been invented by alchemists in the attempt to imitate precious stones and we must not forget that, alongside the processing of glass, in the Medici Casino the art of carving semiprecious stone (*pietre dure*) and of imitating natural gems in glass were perfected and used to create jewelry and decorative objects, including the grand duke's splendid and much sought after *pietre dure* mosaics.²²

However, it would be simplistic to limit our consideration to the continuity of the experimental vocation born of alchemy, which would eventually be liberated from its magical and hermetic framework and flower into the practical procedures described in *L'Arte Vetraria*. Instead the figure of Neri embodies the complex and sometimes contradictory cultural context

¹⁷ Archivio di Stato di Firenze, Guardaroba 399, *Inventario di oggetti appartenenti all'eredità di Don Antonio dei Medici* (1621), f. 9r (no. 63); f. 9v (nos. 65 and 66).

¹⁸ Marco Beretta, *The Alchemy of Glass: Counterfeit, Imitation, and Transmutation in Ancient Glassmaking* (Sagamore Beach: Watson Publishing, 2009).

¹⁹ Neri, *Arte Vetraria* (cit. note 1), p. v.

²⁰ *Ibid.*

²¹ Pliny the Elder claimed that by means of fire a substance could be changed into something completely different and concluded that: "Fire is a vast unruly element, and one which causes us to doubt whether it is more a destructive or a creative force." Pliny the Elder, *Naturalis Historia*, 36:68, translated by D.E. Eichholz, Loeb Classical Library (Cambridge, MA – London: Harvard University Press – Heinemann, 1962), vol. 10, p. 159.

²² See Willemijn Fock, "Francesco I e Ferdinando I mecenati di orefici e intagliatori di pietre dure," in *Le Arti del Principato Mediceo* (Firenze: SPES, 1980), pp. 317-363.

of late sixteenth-century Florence, characterized by the presence of ‘images’ of knowledge and thought patterns that may seem incompatible. The city that witnessed the spread of Neoplatonic and Hermetic thought through the translation of the *Corpus Hermeticum* by Ficino was also the Florence of many flourishing arts and crafts guilds.

Thus, the technical expert who made his knowledge of glassmaking procedures available to the public was also the alchemist who wrote about the transmutation of metals and the secret of making gold in his incomprehensible recipe *Donum Dei*,²³ declaring overtly “*scripsi enim verbis peregrinis ne intelligar*”²⁴ [I wrote the words so strangers will not understand.] Laid out in a hermetic cipher without a key to its comprehension, this secret ignited the curiosity of Don Antonio, to the point that upon Neri’s death an investigation was instituted in the attempt to decrypt *Donum Dei*. There are many manuscripts regarding this singular inquiry,²⁵ which demonstrate that the alchemist Neri enjoyed a considerable reputation among his contemporaries, undoubtedly superior to that derived from his glassmaking activity.

Neri’s adhesion to Paracelsian doctrine, his acknowledgement of its medical and pharmacological validity, and his conviction that it should be possible to realize alchemical transmutations by following the teachings of Paracelsus, are all confirmed in *Discorso*, where the picture of the obscure alchemist involved in occult activities gives way to that of the alchemist – scientist. While Neri recognizes that the ‘art’, i.e. the operational aspect, of Paracelsian chemical philosophy “is said to be a singular gift that God gives to whom he most likes”²⁶ (a notion that does not diverge greatly from what

²³ Descriptions of this secret, not accompanied by the name of the author, can be found in many of the alchemy manuscripts preserved in the Biblioteca Nazionale in Florence. Among these, see BNCF, Ms. Palat., Targioni, II, *Variorum Opuscula Chimica*, f. 2r. The term ‘*Donum Dei*’ was often used in the alchemical literature. Perhaps the most famous work bearing this title is *Pretiosissimum Donum Dei*, which is accompanied by twelve illustrations. Its widespread use is testified to by the many manuscript copies extant (about eighty), some of which indicate Georgius Aurach de Argentina as the author and 1475 as the year. For an Italian edition, see Georg Aurach, *Prezioso Dono di Dio*, edited by S. Andreani (Roma: Edizioni Mediterranee, 1983). Regarding alchemy as a gift from God, see Tara E. Nummedal, *Alchemy and Authority in the Holy Roman Empire* (Chicago: University of Chicago Press, 2007), pp. 27–28.

²⁴ *Variorum Opuscula Chimica* (cit. note 23), f. 2r.

²⁵ Agnolo della Casa, a Florentine alchemist of whom little is known, wrote nineteen codices containing thousands of pages devoted to the investigation of *Donum Dei*. See BNCF, Ms. Palat. 867, Agnolo della Casa, *De notabili sopra la Donum Dei del R.do P. Antonio Neri scritti in penna per il Sig. Agnolo della Casa* (1610).

²⁶ BNCF, Ms. Conv. Soppr., B.3.16, Antonio Neri, *Discorso sopra la chimica (che cosa sia, e sue Operazioni del R. P. Antonio Neri Sacerdote Fio.o)* (1613), f. 14b.

is to be found in the Hermetic literature), it is also true that the ‘revealed’ nature of this knowledge is often overshadowed by the appeal to experience. The alchemist who has studied the ‘great book of nature’ needs only to be “favored by divine providence.”²⁷

Thus the traditional reliance on the authority of ancient wisdom gradually lost its character and legitimacy. Neri asserts that “we should not so easily give credence to all the histories”²⁸ and that it is best “to prove the possibilities of this art of transmutation with certain [...] experiences.”²⁹ Even in alchemy therefore Neri emphasized the primary value of experience. Knowledge does not come from reading books, and understanding is acquired “with the practice of many experiences.”³⁰ Alchemy is doing and working; its scope is to intervene in nature to help improve upon it.

In the *Discorso* we sense a continuity with the Hermetic-Paracelsian tradition, but at the same time there is a change in mindset; the old and the new are intertwined and legitimize one another. The *Discorso* appears ostensibly to be just one of the many treatises on philosophy and chemistry that proliferated during the sixteenth century. It follows a similar structure, with an introduction defining the subject, a list of procedures, and timely responses to the objections raised against the validity of chemistry. Within this framework, however, the emphasis on experimentation creates the image of the scientist-engineer who does not rely on theories, but on the results that can be achieved through experience. Neri was consistently a man of the laboratory, whether it was the glass workshop or the alchemy laboratory did not matter. To observe the ways of nature, to proceed and experiment in the light of deductions based on observation was Neri’s approach.

References to the manual nature and to the manual operations of alchemy are present in traditional treatises, but in them the *experimentum* often assumed a magical character and a mystical meaning. In contrast, Neri believed that alchemy was not a ‘miracle’ but a ‘science’. In addition, the tone adopted by him was conversational, presenting itself in the form of a chat or ‘discourse’ that did not pretend to teach eternal truths, but only to indicate the path that might be taken to achieve greater knowledge; everything lay in the “understanding of the *modus operandi* of nature.”³¹

Neri had intended to publish “the effort of many years in the arts of chemistry and spagyrics, made in various parts of the world,”³² and perhaps was

²⁷ Neri, *Discorso* (cit. note 26), f. 19a.

²⁸ *Ibid.*, f. 7a.

²⁹ *Ibid.*, f. 8b.

³⁰ *Ibid.*, f. 6r.

³¹ *Ibid.*, f. 5r.

³² Neri, *Arte Vetraria* (cit. note 1), pp. vii.-viii.

only prevented by his premature death in 1614.³³ His *Discorso* therefore existed only in manuscript form, but it must have circulated widely. The history of its diffusion still remains to be explored, but it clearly made itself felt in many unexpected fields, gaining the appreciation of scholars with other scientific and philosophical interests. Careful study has in fact revealed that Neri's text was plagiarized by the Jesuit Francesco Lana Terzi (1631-1687), a well-known figure in Italian scientific circles in the late seventeenth century. In Lana Terzi's *Prodromo*,³⁴ published in 1670, the contents of *Discorso* are presented as chapter 20, entitled "L'arte maestra di chimica mostra la tramutazione dei metalli e addita la strada per ritrovare la Pietra filosofale, con il modo di fare le vere Quint'essenze" ["The Teacher of the Chemical Arts Shows the Transmutation of Metals and Points the Way to Find the Philosopher's Stone, With the Way to Make True Quintessence"]. A comparison of the two texts demonstrates that the author appropriated the entirety of Neri's manuscript. His modifications to the text were insignificant, beyond the omission of the last two paragraphs and the insertion of some brief personal comments. The chapter contains only about three pages written by Lana Terzi himself, in which he presents the example of 'mixed anatomy' [*anatomia di misto*] in a discussion of roses. It would be interesting to discover how the Jesuit came into possession of Neri's paper. Perhaps it was the Florentine priest's 'modernity' that attracted him; in the pages following the discussion of alchemy, Lana Terzi introduced sections dedicated to thermometers, perpetual motion machines, and some scientific studies. Chemistry and alchemy were not covered in the traditional curriculum of the Jesuits.

As stressed by Martha Baldwin in her analysis of the views of the Jesuit order with regard to alchemy,³⁵ only a handful of its members cultivated such esoteric interests, and they did not write books devoted exclusively to the subject but, like Francesco Lana Terzi, sought to present their research within the broader context of works dedicated to different aspects of natural philosophy. This approach of combining the old with the new can be seen as a manifestation of Baroque culture, but it could also represent a form of 'political culture' within the Jesuit order.³⁶ Lana Terzi

³³ For accounts of the death of Neri, see BNCf, Ms. Cirri, Sepultuario, 4; BNCf, Ms. Gargani, Poligrafo, 1387.

³⁴ Francesco Lana Terzi, *Prodromo ovvero saggio di alcune inventioni nuove premesse all'Arte Maestra* (Brescia: per li Rizzardi, 1670), pp. 105-123.

³⁵ Martha Baldwin, "Alchemy and the Society of Jesus in the Seventeenth Century: Strange Bedfellows?" *Ambix*, July 1993, 40, part 2, pp. 41-64.

³⁶ Paolo Rossi, *La nascita della scienza moderna in Europa* (Bari: Laterza, 2002), pp. 234-237.

expressed a general inclination toward experimentation and the manual arts and, while the *Discorso* belonged to the alchemical tradition, it also strongly emphasized the value of experimentation. Its appropriation could have been seen by Lana Terzi as a way of addressing the topic of alchemy without being accused of ‘magism’.³⁷

The figure of Antonio Neri provides a significant example of the extremely complex and sometimes contradictory cultural reality that marked the birth of modern ‘science’. The apparent dichotomy noted at the beginning of this study between Neri the ‘glass technician’ and Neri the ‘alchemist’ is by now outdated. Only if we abandon the tendency to search for unique and linear processes in past developments can we begin to understand ways of thinking that are profoundly different from our own. Neri was a product of his time and, through his works, represents a culture in the making, one in which scientific models could coexist that now seem irreconcilable. Magic and science formed a complex interwoven fabric, as Paolo Rossi³⁸ has pointed out, and many members of the ‘scientific revolution’ embraced elements of the Hermetic tradition and Paracelsian philosophy. Kepler knew the *Corpus Hermeticum* and his thesis of the music of the spheres echoes Pythagorean mysticism, while Newton took an interest in alchemy, devoting many manuscripts to this topic.

Neri, like other better known protagonists of seventeenth-century science, demonstrates that different notions of knowledge can coexist and intertwine, that reason follows circuitous and difficult pathways, and that the “science of the seventeenth-century was, together and simultaneously, Paracelsian, Cartesian and Baconian.”³⁹

Below I present the complete text of Antonio Neri’s *Discorso sopra la Chimica* followed by its annotated translation.

Edition of Neri’s *Discorso sopra la chimica*: Italian text

DISCORSO

Sopra la Chimica, che cosa sia, e sue Operazioni Del R. P. Antonio Neri Sacerdote Fiorentino: con diverse dichiarazioni, sopra La sua Ricetta del

³⁷ On the value of knowledge ‘practices’ in Francisco Lana Terzi, see Cesare Vasoli, “Sperimentalismo e Tradizione negli ‘schemi’ enciclopedici di uno scienziato gesuita del Seicento,” *Critica Storica*, 1980, 17, pp. 101-127.

³⁸ Rossi, *La nascita* (cit. note 36), pp. 29-33.

³⁹ *Ibid.*, p. xix.

Donum Dei et altri Segreti Chimici suoi proprij e di altri virtuosi de suoi tempi.

Ecc.mo Signore.

L'Operazioni appartenenti alla Chimica, non consistono solamente, come stimano alcuni, nella Tramutazione de Metalli; poiché ella è un Arte, molto più universale, la quale in certo modo abbraccia La Medicina, o almeno se gl'accosta molto da vicino per aiutarla; e si può definire.

Essere un Arte, la quale risolvendo, e riducendo tutti i Corpi Misti, ne suoi primi Elementi, va rintracciando la natura di essi, e separando il puro dall'impuro, e di quello si serve a perfezionare i medesimi Corpi, et anco a tramutare un Corpo in un altro.

Dalla qual Definizione resta manifesto quanto ampiamente si stenda la Chimica per tutte le sorte de i Corpi nati, di cui quella parte, che s'aspetta alli soli metalli ha il suo proprio nome di Alchimia preso dal vocabolo Greco, che significa Sugo di Sale; imperciò che nello Spirito sugoso del Sale, risiede tutta la virtù, et efficacia de Corpi Misti.

La Chimica poi vien detta anco Spagirica dal verbo Greco Spao, che vale quanto dire Scegliere, e separare; poi che come si è detto, separa l'impuro, e sceglie il puro.

Altri la chiamano Cabala, perché anticamente si comunicava da Padri alli figlioli solamente in voce propagandosi a i Posterì, non per historia, ma per semplice tradizione. Altri finalmente le diedero nome di Sapienza, perché non senza ragione stimarono impossibile senza tal Arte, il poter conoscere perfettamente la Natura, e le virtù de Corpi Naturali.

Per giungere al fine da loro preteso, che è il perfezionare i Corpi, con la separazione del puro dall'impuro, esercitano i Chimici varie operazioni, le quali tutti si possono ridurre, a sei sorti, che sono le principali.

La prima, è la Calcinazione, con la quale i Corpi si riducono in Calce, ovvero in Cenere.

La seconda si chiama Soluzione, con cui si dissolvono nell'umido i Corpi già calcinati.

La terza, è la Distillazione, mediante la quale, si purga, e si rettifica l'humido già dissolto, con distillarlo, una o più volte.

La Quarta vien detta Putrefazione con la quale si dispongono i corpi, acciò finalmente si possano separare le parti pure dall'impure, che sono in essi mescolati.

La Quinta chiamasi Sublimatione per mezzo della quale, le parti più sottili, e volatili, sono forzate a salire in alto, acciò in tal modo si separino dalle parti più fisse, che rimangono nel fondo del vaso da cui si fa la sublimazione.

La Sesta finalmente, è l'Unione delle Parti pure, spiritose, e volatili, con le parti similmente pure ma fisse; acciò tutte insieme unendosi, si coagulino, e divenghino fisse, onde vien chiamata Coagulazione, e Fissazione; poi che in tal modo le parti pure separate dall'Impure, ancor che altre siano Volatili altre Fisse, si uniscono però insieme amichevolmente, e si congiungono con un fisso, et indissolubil legame, et allora acquistano virtù maravigliose, et efficacissime nell'operare; là dove prima tal'efficacia di operazioni veniva impedita dalle parti impure, nelle quali stavano, come imprigionate, e legate.

Nel che si deve avvertire, come diffusamente, trattando de gl'Elementi conforme la Filosofia de Chimici si discorre che tutti li Corpi Misti da quest Arte si scoprono esser composti di cinque sorti di sostanza impura, cioè dal tutto morta e senza alcuna virtù, o proprietà efficace all'operare; dua di sostanza impura, e tre di sostanza pura, nelle quali è posta tutta la forza, e virtuosa efficacia, propria di ciascun misto: Di queste due, l'una si chiama flemma, che è quanto dire, una sostanza aquea, senza alcun odore, o sapore; E l'altra si chiama Corpo Morto, e terra dannata, cioè una sostanza terrea parimente senza alcun sapore, e senza alcuna virtù: dell'altre tre poi, l'una si chiama Sale, et è la sostanza più fissa così detta, perché resiste ad ogni violenza di fuoco, né si distrugge, né vola, o svanisce per l'Aria; la Seconda, vien detta Oglio, o vero Zolfo, perché a similitudine di essi, è pingue, e viscosa; la Terza chiamasi Spirito perché, è più di tutte l'altre spiritosa, e volatile, et ogni benché minimo calore la dissiparebbe per l'Aria, se non fusse unita con il Sale, che è la parte fissa mediante l'Oglio, che per ciò è di sua Natura tenace, e viscido, atto a legare il volatile col fisso.

Queste tre sorti di sostanza pura son quelle, che con altri molti nomi, si chiamano Corpo, Anima, Spirito, amaro, dolce, Acido, Sale, Zolfo, Mercurio etc. Et in esse sole, è posta tutta la virtù et efficacia delli minerali, delli Vegetabili, e delli Animali, con tutto che in ciaschun misto la quantità della Sostanza pura, in paragone dell'impura sia menomissima.

Ma ritornando alle operazioni de Chimici in ordine alla trasmutazione de Metalli, per li quali innumerabili sono gl'Instrumenti che adoperano, tanto di Vasi, quanto di Fornelli, con li quali, benché facciano molte cose utili alla Medicina, in ordine però alla Pratica Filosofica, se conoscessero la vera strada, per la quale imitando la Natura, si deve camminare, lascerebbono da parte tante sorte di Lambicchi, Vasi Circulatorij, Ovi filosofici, Vasi d'Ermete, Forni Atanor, Forni, di Fusione, di Reverbero, di Calcinazione, di Digestione, et molti altri che forse dimostrerò; né si servirebbono d'alcun foco violento, con cui vanno in fumo i denari, e le speranze di molti restandoli la sola Caligine nel volto, e la tristezza, nell'animo d'haver, con i

mantici soffiato via dal Crocibulo il Mercurio, et il Sole, o Oro dalla borsa, mentre pazzi credono al Nume delle bugie, e stimano che un Dio de Ladri sia per arricchirli.

Due poi sono le strade, per le quali procede la Chimica, in ordine alla trasmutazione de Metalli, l'una chiamasi Generale, l'altra Particolare.

Per la prima strada cercano una materia purissima, la quale sia come una Quintessenza Celeste, et Universale, cioè non ancora specificata, o determinata ad alcuna specie di Corpo Sublunare, con la qual materia, (che se si trova, conviene che sia simile a quella de Raggi Solari) stimano di poter perfezionare, non solo i Metalli, ma ogn'altro Corpo imperfetto tramutando l'uno in un altro di diversa specie, della qual sostanza o quintessenza Universale, gl'Autori più celebri dottamente ne libri loro ne discorrono.

La Seconda strada chiamasi particolare, nella quale si separa, una sostanza pura d'alcuna specie particolare di misto, e mediante quella sola si perfezionano gl'altri Corpi, che partecipano la medesima Natura; e se si tramutano, ciò si fa solo in quella Natura determinata, della quale, è quella Sostanza pura con cui si tramutano; perciò che essendo questa già determinata ad una Specie Particolare, non può mutare le altre cose, se non con farle simili, a se medesima; là dove nella Strada Generale, nella quale si ha una materia Pura Universale, cioè non per anco specificata, quando vogliono tramutare (per esempio) un Cristallo, in un Rubino, pigliano una parte di quella Sostanza non ancora Specificata, et unendola al Rubino, prima la specificano, e si prende virtù di convertire in Rubino ogn'altra sostanza più vile, che nella Natura si accosta al Rubino, come saria il Cristallo di monte etc.

Così anco volendo convertire i Metalli imperfetti in Oro, congiungono con l'Oro una parte di quella Sostanza pura, e la specificano sì, che sia atta a tramutare ogni cosa, che partecipa la Natura dell'Oro, come Ferro, il Mercurio, il Rame, il Piombo, l'Argento, et simili.

Di più nella Strada Particolare si sogliono distinguere due Arti Chimiche, l'una si chiama Arte Grande, l'altra Arte Piccola; ma l'Arte sudetta che cammina per la via Universale si può chiamare Massima. L'Arte piccola è quella la quale, con qualche notevole guadagno perfeziona i Metalli, o in parte li tramuta, così alcuni cavano dall'Argento, con certi Cimenti qualche particella d'Oro altri aumentano l'Oro medesimo; Altri con molta fatica, e spesa cavano Argento dal Rame e dallo Stagno; Altri fissano qualche piccola parte di Mercurio, e questa vien detta Arte Piccola; poi che quando bene alcuno la possieda, non però potrà in breve tempo procacciarsi immensità di ricchezze.

L'Arte Grande, è quella che mediante la Pietra Filosofale facilmente e presto tramuta ogni imperfetto Metallo in Oro, o vero in Argento.

Queste due Arti della Via Particolare sono quelle per le quali oggi di camminano gl'Alchimisti; E della Strada Universale per la quale camminavano gl'Antichi appena si fa alcuna menzione, e pure questa stimo che sia la più piana, e che più facilmente possa condurre all'acquisto del Vello d'Oro; Anzi anco nella Via Particolare pochi sono quelli che si applichino all'Arte Grande, con tutto che questa sia più facile, e più sicura dell'altra Piccola; opure se alcuno lavora in essa, ciò fa senza alcuna cognizione del modo di operare della Natura, e fidato in certe antiche ricette, o Segreti cammina, a tentone, con far prova, hora dell'una, hor dell'altra.

Due poi sono le sorti della Pietra, l'una che chiamano al Bianco, e l'altra al Rosso; quella converte ogni metallo in Argento, e questa in Oro, e dell'una, e dell'altra, ne sono pieni i Libri Chimici, li quali con mille favole, Enigmi, Caratteri Stranieri, e Zifere hanno ora nascosto la verità, et ora inorpellata la bugia, che il farci studio per intenderle, spesso confonde maggiormente l'intelletto, a chi non ha una perfetta cognizione del loro modo di parlare, e della vera, e Naturale Filosofia, e particolarmente intorno alla formazione de Misti. Onde eserto ciascuno a non far studio in detti Libri, prima di havere un'esatta notizia della Naturale Filosofia, acquistata con la Pratica di molte esperienze; et avverto che quanto più è perfetta l'Arte tanto, è più semplice; onde gl'Autori più approvati concordemente asseriscono, che la prima Materia della Pietra, è cosa sì vile, che non comprasi con denari, ma ritrovasi facilmente. E che nel modo di operare si deve imitare la Natura, la quale per produr l'Oro si serve d'una sola, o semplice materia, che è semenza dell'Oro, d'un sol Vaso, che è il Seno della Terra, e di un sol Fuoco naturale, e vitale, che è quello del Sole.

Ma perché molti stimano impossibile quest Arte, accennerò brevemente alcune cose a favore di essa, et insieme mostrerò la vera strada per acquistarla.

E primieramente, che i Metalli siano tramutabili, per mezzo della Pietra filosofica, o elisire, si prova con l'autorità di molte Istorie, nella quali si narra essere stato fatto vero oro con quest Arte da Raimondo Lullio, et Arnaldo di Villa nuova, del quale dicono asseverantemente che pubblicamente vendeva in Roma Lamine d'Oro, fatte per mezzo della Pietra filosofica. Doppo di loro il Trivigiani ala presenza del senato veneto fece l'istessa prova di quest Arte, la quale parimente raccontasi fosse praticata da Paracelso, da un tal Alessandro Scoto, da Anselmo Boezio, e da molti altri, per tacere, ciò che da alcuni testimonij di veduta, e degni di fede mi è stato referito. Et ancor che non si debba dar fede così facilmente a tutte l'Istorie sapendosi che in ciò i Chimici sono troppo creduli, come quelli che per tali cose vanno dolcemente nutrendo le loro speranze; nulla di meno non pare, che quest'Istorie siano da riprovarsi, e disprezzarsi.

Che poi Moisè Trismegistro, Salomone, et altri grand'huomini dell'Antichità possedessero, quest'Arte, come comunemente si persuadono i Chimici, non ardisco di Asserirlo: è ben si cosa certa, che vanno sotto a loro Nomi alcuni scritti, come anche di Aristotile, e di S.Tommaso, li quali sono del tutto appocrifi, e molto affatto indegni d'essere attribuiti a quei grandi ingegni particolarmente, perché l'Arte Chimica solo doppo Galeno incominciò ad essere in uso, al meno nella nostra Europa; ma nella China studiosissima di tal Arte, molto prima fu praticata, si come appresso quei Popoli, molto prima che in Europa, fu in uso l'inventione della stampa, e dell'Artiglieria, Ed è anco certo che l'antiche favole del Vello d'Oro, de Pomi Esperidi, del Ramo d'Oro, et altre simili appresso i Poeti, falsamente vengono interpretate della Pietra filosofica; poi che per altro, è manifesto, che sotto la corteccia di tali favole gli Antichi nascosero la midolla della filosofia morale, et i precetti della politica.

Alcuni stimano, di mostrare evidentemente la possibilità di quest Arte, con l'esperienza di quel Chiodo, che si vede nella Galleria del Granduca di Toscana, di cui una parte, è per anco tutta ferro, e l'altra la quale fu immersa in un certo liquore si riconosce essere Oro purissimo; Come similmente ancora ciò conprovano con quella libbra di Argento Vivo, che si vede in Praga, appresso un certo Taddeo Hagecio, la quale fu convertita in Oro, da un tale Kaelleio Inglese, con una sola goccia di un rubicondissimo liquore restandovi impresso il Segno, in quella parte sopra cui ella fu gettata.

Ma queste e simili cose, non provano sufficientemente quella Tramutazione di cui si parla; essendo che ho esperienza certa potersi da una gran Massa di Oro cavare una poca quantità di Sostanza che chiamasi Anima d'Oro, la quale gettata di nuovo sopra metalli imperfetti, li converte quasi in altr'e tanto Oro quanto era quello di cui fu cavata l'Anima; ma questo Artificio non arreca altra utilità, se non che un viandante, può con poco peso portar seco un gran Tesoro, e ciò che più si deve stimare senza molto pericolo, che li sia rubato, non essendo così facile il riconoscerlo.

Meglio dunque si prova la possibilità di quest'Arte Tramutatoria, con altre esperienze certe, e da me sperimentate con cui si tramutano Varij Metalli d'una in un'altra specie meno, o vero anche più perfetta delle quali ne accennerò qui alcune, come da me sono state trovate vere.

Tramutazione dell'Argento Vivo in Piombo

Si calcini il Piombo, il che si fa con andar gettando a poco a poco il Salnitro sopra il Piombo liquefatto; sopra questa cenere di Piombo si ponga Aceto stillato per una notte intiera, lasciandolo in infusione; poi si dissolva

nell'Acqua forte. Argento vivo, ed in esso così dissolto, si gettino alcune gocce del sopradetto aceto, poi si precipiterà, e calerà in fondo il mercurio come polvere, il quale posto in un Crocibulo, a fondere, ritroverassi mutato tutto in Piombo: Si tramuta ancora, se si congelerà il Mercurio, con l'odore del Piombo, che il modo di congelarlo, e la manipolazione, ti insegnerò altrove.

Tramutazione del Piombo in Argento Vivo

All'incontro volendo tramutare il Piombo in Argento vivo, si metterà il piombo in un vaso di Terra, che non sia vetriato, ma molto bene lutato, vi si metta sopra il Cappello, nella parte suprema del quale sia un picciolo forame, e se gli unisca un gran recipiente, in cui sia buona quantità di Acqua; Si colloca sopra di un fornello a vento, e quando dal supremo forame predetto, incomincia ad uscire il fumo, subito si chiude con diligenza, e si accresce il fuoco potentemente, poi che in tal modo, il Piombo si distilla convertito in Argento vivo, ma da una libbra di Piombo non si cava più di quattro once di Argento Vivo. Overo, se piglierai Calcina di Piombo fatta come sopra, con il Sale, o Salnitro, e la getterai in Acqua Bollente sin che la Calce deponga tutto il Sale, e poi disseccata la metterai, in Acqua di Sale Armoniaco dissolto, in cui sia alquanto di Calce di Scorze di Vuovo, e chiusa ogni cosa in Vaso di Vetro, si seppellisca sotto il fimo per dodici giorni, e ritroverassi il Piombo mutato in Argento Vivo.

Tramutazione di Stagno in Argento

Piglia un poco di Stagno d'Inghilterra fino e purgato, si chiuda in una Palla di Creta tenace, cioè si luti tutto d'intorno lo Stagno, con luto fortissimo, che non crepi al fuoco, poi si liquefaccia una buona quantità di Argento in un Coreggiolo; allora si metta la Palla di Creta, ovvero il sopradetto Stagno lutato, e prima ben caldo, acciò non crepi dentro l'Argento et acciò si sommerga nell'Argento liquefatto, e con un ferro vi si prema dentro a poco a poco, e vi si tenga immerso per mezzo quarto d'ora in circa; si levi di poi il Luto, e ritroverassi lo Stagno mutato in vero Argento; ma si avverta, che quello argento, in cui vi fu immersa, la Palla, resta talmente infettato da maligni vapori dello Stagno, che poi purgandolo, e coppellandolo, se ne perde altr'e tanto, e più di quello, che si è guadagnato. Non resta però che questa non sia vera tramutazione; poiché non si può dire, che lo Stagno penetri per la Creta nell'Argento, né che l'argento penetri nella Palla ove sta rinchiuso lo Stagno; ma il solo odore dell'argento, comunicato allo stagno,

penetrando, lo muta in Argento, e l'Argento vicendevolmente ricevendo i Vapori dello Stagno, resta infettato da quelli; Onde chi sapesse trovare il modo, di riparare a questo danno, con purgare prima lo Stagno, da quelli aliti maligni, o con aggiungere all'Argento alcuna cosa che, reprimesse tali Vapori, haverebbe un grandissimo Segreto.

Tramutazione d'Argento Vivo in Vero Argento

Si pigli il Minio, o vero altra Calce di Piombo, si mescoli con essa Cinabro overo Argento vivo, e Zolfo, de quali si compone il Cinabro; si metta in Coreggiuolo, e se li dia fuoco prima moderato, ma quando comincia a fumare, e volar via l'Argento vivo con il Zolfo, se li dia fuoco potentissimo, che resterà consumato tutto il Zolfo, e la maggior parte dell'Argento vivo, restando nel Coreggiuolo, il Piombo, il quale se si metterà alla coppella, consumato che sia, resterà qualche parte di Argento, ma non però tanta, che l'opera sia compensata dal guadagno.

Questa et altre simili esperienze ho provate, e vedute con gli occhi miei, onde non mi rimane alcun dubbio intorno alla possibilità della tramutazione de metalli.

Tramutazione di Ferro in Rame

Si prendino lastre di ferro, e si ponghino in Acqua Vitriolata, nella quale stando immerse, si irrugginiscono; Si rada quella Ruggine, che sarà polvere rossa; si fonda in un Coreggiuolo, e troverassi esser Rame perfetto. Fanno il medesimo effetto diverse Acque che naturalmente sono Vitriolate, perché passano per miniere di Vetriolo, come sono quelle di un fonte molto lontano da Leiden, e di un altro appresso il castello di Smollentzchi della Moscovia, del quale Giorgio Agricola lib. V. de Natura Fossilium dice queste parole ex Puteo extrahitur Aqua, et in canales triplici ordine locatos infunditur, in quibus positae portiones Ferri, vertuntur in Aes. Minutum enim Ferrum, quod in fine canalium collocatur talis aqua ita exedit, ut fiat quasi lutum quoddam; id vero omne postea excoctum in fornacibus fit Aes. purum bonumque.

Stimano alcuni non senza ragione, che questa esperienza solita appor-tarsi, per provare la tramutazione de Metalli non sia opportuna a tale effetto, per che dicono, che l'Acque Vitriolate divengono tali, perché essendo prima gravide di spiriti Zulfurei corrosivi passano per Miniere di Rame, o di ferro, e corrodano esso Rame, come l'Acqua forte corrode l'Argento, onde realmente in quell'Acqua rimane la Sostanza del Rame, la quale

attaccasi alla superficie del ferro, che sempre resta ferro. Ma se ciò fusse vero, il ferro, o non si consumerebbe, o se si consumassi si mescolerebbe con la sostanza del Rame corrosivo dall'Acqua, et alla fusione resterebbe, un misto di ferro, e di Rame, e pure si ha dall'esperienza, che tutto il Ferro consumato, dall'Acqua Vitriolata si riduce in Polvere, come accenna anco il sopradetto Agricola, la quale, alla fusione resta Rame puro, onde non deve restar dubbio, che questa non sia vera tramutazione.

La terza ragione per prova della possibilità della tramutazione de Metalli può essere il considerare, che molti Animali anche perfetti, si generano con l'Arte, da cose etiam Dio inanimate, come le api dal fimo Bovino; i Serpenti da i capelli, e simili; Si che argumentando a forziori, pare che se le Api, si formano da una sostanza tanto dissomigliante da sé, quanto è il fimo de Bovi, o Tori, molto più l'Oro si potrà formare, dal ferro, o dal Rame, a cui non è tanto dissomigliante.

In questo luogo serva per prova, la vera tramutazione che si fa de metalli per mezzo dell'Anima dell'Oro, o dell'Argento; poi che se si fa questa tramutazione, senza accrescimento d'Oro, non sarà possibile, il perfezionare quell'anima, sì che possa tramutare maggior quantità di metallo. E ciò si conferma, con l'esempio delle Semenze, delle quali un sol grano, è atto, a produrre cento, e mille, purché si semini in luogo proporzionato: E con l'esempio ancora del fermento, di cui una picciola parte, è sufficiente a fermentare, una gran massa. Né vale incontrario il dire, che i metalli non producono la Semenza come l'Erbe, e le Pianta; perché se bene la Natura, da se sola non ha virtù di cavare dall'Oro la semenza di esso; aiutata però e promossa dall'arte, potrà fare ciò che non fa da se stessa, sì che l'Arte incominciando dove la Natura finisce, perfezionerà quella Semenza, che nell'Oro, è solamente principiata; nel che si avverta che alla produzione, e moltiplicazione dell'Oro, non è necessario che la Natura cavi dall'Oro la Semenza; Imperciò che molte Pianta, non producono Semenza, e pure dalla sua medesima Sostanza putrefatta rinascono, e si moltiplicano; ed il sale medesimo cavato da qualsivoglia Pianta, e seminato, produce e moltiplica la pianta medesima; perché dunque non si potrà cavare, anco dall'oro questo sale, o Sostanza più fina, ed efficace, che è come una semenza di esso; e seminarla in un campo conveniente, cioè in una Sostanza aurifera, onde produca frutto moltiplicato.

Dico dunque, che tutta l'Arte consiste in saper estrarre, dall'Oro, o dall'argento la sua semenza, ed unirla ad una materia proportionata nella quale dopo che sarà putrefatta, e corrotta possa produrre frutto centuplo: Onde quelli li quali cercano la materia della pietra filosofica nell'altre cose, traviano dal retto sentiero, né seguitano, o imitano la Natura come

doverebbono, e particolarmente si allontanano dalla vera strada coloro, che cercano tal materia nell'Erbe, e nelli Animali, poi che operano al contrario, mentre vogliono fare che la Natura ritorni indietro dalle cose perfette, che sono i viventi, all'imperfette che sono i metalli, il che repugna al modo, con cui cammina la natura, che non sa ritornare in dietro. Più tosto dunque si deve cercare tal materia ne minerali, o metalli imperfetti, quali la Natura haveva per fine di condurre alla perfezione dell'oro; ma perché non gl'ha potuti perfezionare per mancamento di sufficiente materia Seminale; quindi è che questa materia, benché in parte resti anche ne minerali imperfetti, ella pero è poca in quantità, ed infetta da molta altra sostanza indigesta, ed impura, si che più espedito sarà cercarla nell'Oro, e nell'Argento ove è più copiosa, e pura. Imperò che come asserisce un Poeta Chimico.

In Auro Semina sunt Auri

Ed è piu facile il produrre le Api da un Alveario, che dal fimo de Bovi, e de Tori.

Ardisco dunque dire, che quest Arte non solo sia possibile, ma che di più ella sia molto facile. Né vale l'opposizione che può farsi, con dire che se agevol cosa fosse il far questa Pietra, tra tanti che non hanno perdonato, né a Spese, né a fatiche, alcuno sarebbe giunto al bramato fine; per cio che altro è che alcuna cosa sia facile a farsi, altro è che sia facile il modo per trovare di farla: Onde vediamo, che ogni giorno si ritrovano bellissime invenzioni nuove, che sono facilissime a farsi, e pure per molti Secoli niuno le seppe mai ritrovare; Sì che quando ben fosse vero che niuno sin ora habbia ritrovato la detta Pietra, il che stimo esser falso, non ne segue però, che sia impossibile, anzi ne anco difficile il farla; Et aggiungo ancora che Iddio per la provvidenza che ha sopra le cose humane, non deve facilmente permettere, che molti acquistino quest'Arte, e particolarmente i Precipi grandi, e che si faccia palese, e comune al volgo; poiché in tal modo, l'Oro, e l'Argento, e per conseguenza le monete perderebbero del loro prezzo, nel che si sconcerterebbe in gran parte il buon ordine del traffico humano, e converrebbe ritornare a quell'antico Cambio delle cose necessarie al vivere Civile con grande pregiudizio, e confusione, nel contrattare. Per confermazione del che potrei addurre molt' Istorie, nelle quali si è veduta manifestamente la Singolar Providenza del datore d'ogni bene, in non permettere che quest'Arte concessa da lui ad alcun particolare si palesasse ad altri. Onde con ragione dicono molti che ella è un Dono Singulare, che iddio fa a chi più li piace, non permettendo però mai, che si faccia comune

a molti. Aggiungasi che a ciò concorre il pericolo di chi la possiede, se per avventura si risapesse da altri, e particolarmente da Principi, onde benché forse taluno sappia quest'Arte e la pratici, è sforzato a tenerla nascosa e dissimularla; et io so quel che mi dico.

Hor per dire alcuna cosa del modo che si ha da tenere per acquistarla, si deve avvertire, anzi tener per fermo, che ella tutta consiste in quelli due precetti, che comunemente danno i maestri di essa cioè *Fixum fiat volatile*, et *iterum volatile fixum*: e vogliono dire, che dall'Oro, e dall'Argento si cavi la semenza, dissolvendo l'Oro, o l'Argento, che sono corpi fissi e permanenti al fuoco, e riducendoli in prima materia per tal modo, che così distrutti, se ne possa cavare quella pura sostanza, che è il seme in essi nascosto, per il che è necessario, che questi corpi, che prima erano fissi si distruggano talmente che non si possino più ridurre in Oro ma posti al fuoco svanischino talmente, che allora si potranno dire di esser fatti volatili; Poi che se bene con Acque forti si possino ridurre in minute particelle, si che paino distrutti, non si distinguendo dall'Acque medesime; nulla di meno essi ritengono l'istessa Natura, e quelle piccole parti divise, restano ne pori dell'Acque corrosive, le quali al fuoco svaporando, lasciano in fondo l'Oro fisso come era prima. Quindi è che s'ingannano coloro, i quali per mezzo di Acque corrosive, o con violenza di fuoco, pensano di ridurre l'oro in prima materia, poi che, o non gli riesce di poterlo distruggere, o pure se lo distruggono, la violenza del fuoco, e la malignità corrosiva di quell'Acque distruggono, e consumano quella sostanza umida, e viscosa, che teneva fissamente legate le parti dell'oro, la qual sostanza, è quell'Anima medesima, che si cerca, e però nel distruggere l'Oro si deve conservare, e separare netta e pura dall'altre parti. Perciò tutta la difficoltà si riduce a ritrovare un mezzo, o come dicono un Maestro, il quale sia atto a ridurre l'Oro in prima materia conservando quella sostanza humida, e pingue che chiamasi anima, e da altri vien detta Zolfo; per il che, è necessario che esso Mestruo, e liquore apra i Pori dell'Oro, e vi penetri dentro amichevolmente separando una sostanza humida dall'altre parti pura ed illesa, e per conseguenza, il mestruo, se ha da operare in questo modo, conviene che sia una sostanza tenuissima, acciò, accio possa entrare per i sottilissimi Pori dell'Oro, acciò non l'offenda né la distrugga, ma amichevolmente, e simpaticamente penetrando si unisca con essa, e la separi dall'altre parti in tal modo questa sostanza, che unita prima alle parti impure restava fissa, e pertinace al fuoco, slegata da esse diventa volatile, et a fuoco leggiero ascende, e distilla per il Lambicco, come più d'una volta io stesso ho veduto per esperienza. E questo è far diventar volatile, quello che era fisso, nel che stimasi essere la maggior difficoltà di tutte le altre, mentre che

asseriscono comunemente, esser più difficile il distruggere l'Oro che il farlo; poi che quando alcuno habbia ritrovato questo mestruo, e ridotto l'Oro in prima materia distruggendolo, con mantenere intatta la sua Anima, o vero Semenza, riesce facile l'adempire il Secondo precetto, che consiste in fissare di nuovo quest'Anima, che di fissa, è stata fatta volatile il che si fa in questo modo.

Pigliasi Oro finissimo, si riduce in Calce cioè in polvere impalpabile rubicondissima il che si fa in molti modi, come diremo altrove, ma particolarmente distillandoli da dosso più volte l'Argento Vivo prima purgatissima, sopra questa calce di Oro purissima, si va mettendo ci poco a poco la sopradetta Anima, o sia semenza, o prima materia d'Oro tenendolo in un calore moderatissimo dentro un vaso Sigillato Ermeticamente; questa imbibizione che chiamano incerazione si deve continuare sin che la Calce d'Oro, non possa più bere altr' Anima, il che sarà doppio che una parte ne haverà bevute cinque più o meno conforme sarà più o meno pura; in questo modo quell'anima che era volatile unita a poco a poco, con il Corpo fisso ancor essa si va fissando, ma si deve avvertire diligentemente distillarla a poco, a poco lasciando fissare la prima parte avanti che si aggiunga l'altra, altrimenti in vece di fissarsi farebbe diventar volatile anco la parte fissa, cioè la Calce suddetta, così resta nutrito l'Infante come parlano i Chimici per poi pigliar forze, e coronarsi Monarca, di tutti i Metalli, il che fa mentre si va continuando, et accrescendo graduatamente il calore, sin tanto che la Materia diventi rubicondissima come un Rubino, se ella è pietra fatta con l'Anima dell'Oro, o vero candidissima come una Perla, e se ella è Pietra fatta con l'Anima d'Argento et allora questa Pietra non teme più alcuna violenza di fuoco, anzi da esso piglia maggior vigore che però la chiamano Salamandra.

Essendo che dunque in questa Pietra cinque parti di sostanza Seminale purissima sono perfettamente unite ad una sola parte di oro puro, come cinque anime in un sol corpo; ella acquista virtù di moltiplicare, e produrre frutti copiosi sì, che una sola parte, può tramutare cento, et anco mille e più parti di altri metalli imperfetti; non puol già però tal virtù moltiplicativa crescere in infinito, come asseriscono comunemente, ma della moltiplicazione della Pietra in virtù, et in quantità ne parlerò altrove.

Resta dunque solo di ritrovare un mestruo proporzionato alla Soluzione, e riduzione dell'oro in prima materia, il quale dico che non è altro, che una Semenza dell'oro medesimo, cioè un Umido radicale metallico sottile, e penetrante, e pingue, il quale si ritrova in molti corpi metallici, ma difficile a separarsi puro, netto, ed intatto. Nell'Argento vivo solamente si ha più copioso, e più puro, che in alcun'altro Corpo eccetto che nell'oro, e nell'argento medesimo, onde chi vuole operare più avvertentemente, e camminare per la vera strada, non si serva d'alcuna altra cosa, che del

mercurio, e dell'oro, perciò che questi sono i corpi più amicabili, sì come in Cielo, così anco in Terra, che però uno si accosta volentieri all'altro, e l'abbraccia, e se l'insuncia, come vedesi per esperienza; E ciò è così vero, che alcuni hanno con fondamento stimato, potersi fare la Pietra, con il solo mercurio volgare amalgamato con Oro, nel che però richiedesi una lunghissima deicozione, di alcuni Anni; là dove se alcuno si servirà del puro umido minerale cavato con arte dal mercurio, et unito all'Oro, prima purgato, e preparato, compirà l'opera grande in pochi mesi.

Questo è quanto mi è parso bene di manifestare in quest'Arte, non solo per far vedere la possibilità di essa, ma anco giovare a molti, se non in altro, almeno con levarli d'inganno, mentre consumano la fatica, et il denaro, in una gran moltitudine di vasi, di fornelli, di minerali, e mezzi minerali, Piante, Animali, e Strumenti del tutto alieni dal modo semplice di operare, con cui si deve imitare la natura. E tenga pure ognuno per certo, che l'opera, è facilissima gioco da fanciulli e faccenda da Donne; che una sola è la materia della Pietra, uno solo il vaso, un solo il Calore, anzi una sola operatione, la quale prende diversi nomi cioè di Putrefazione, Sublimazione, Circolazione, Precipitazione, fissazione, etc. dalli diversi effetti, che nel medesimo, con il medesimo calore dalla medesima materia, si manifestano dal principio sino al tempo del compimento dell'Opera.

Voglio per fine di questa materia, manifestare il maggior Segreto che in quest'arte si possa trovare, e benché io sia stato perplesso, se dovevo manifestare e scrivere, una cosa di tanta considerazione; ma alla fine vinto dal desiderio di giovare altrui, e dar tal lume a quelli che possiedono i primi principij della Chimica, che possono facilmente giungere alla meta delle sue brame, quando non si contraria ai fini della divina Provvidenza, che come si è detto assiste in modo particolare a queste faccende.

Dico dunque che riuscendo difficile il distruggere l'Oro, e cavarne da lui la pura semenza, potiamo prendere una strada assai più facile in cui ritroveremo la detta Semenza, la quale non sia per anco convertita in oro; poi che le miniere d'Oro, non tutte sono di una medesima condizione, il che si deve intendere anco di quelle di Argento, e di tutte le altre; ma alcune sono già perfette, nelle quali la Natura, ha operato quanto poteva operare, et ha ridotto l'Oro alla sua maturità, et altre sono ancora imperfette, e nel suo primo nascere et in queste la Natura ha ben si disposta la semenza, ma non ha ancora per mezzo di essa maturato il frutto; Per ciò non essendo ancora quella Semenza, o prima materia dell'Oro strettamente legata all'altre sostanze con cui formasi l'Oro perfetto, e maturo; ci sarà facile di ottenerla, estraendola da ogni altra sostanza minerale impura.

Non direi questo se io medesimo non havessi havuto fortuna d'havere alquanta di una simile miniera dalla quale, con molto artificio fu cavata,

una poca quantità di Certo liquore aureo, che era la vera Semenza dell'Oro, ma per non esser conosciuto, tutto fu consumato, con gettarlo sopra una quantità di Argento vivo bollente il quale subito congelossi, et accresciuto il fuoco, restarono cinque parti di esso perfettamente fisso, cioè a dire una mezza oncia di quel Liquore fisso e ii $\frac{1}{2}$ di Argento vivo, che se fusse stato maggiormente depurato, e poi congiunto come Anima al suo corpo proporzionato, sarebbesi con esso potuto formare la vera Pietra; ma sin ora non ho mai potuto ritrovare altra miniera simile a quella, e però atta a questo fine. Chi intende bene quanto sin qui si è detto non ha bisogno di altro, che di esser favorito dalla Divina provvidenza, sì che gli permetta il ritrovare una simile miniera d'Oro, o vero d'Argento; ma ricordisi, che questo è Dono di Dio singulare, che suole concederlo solo a persone di retta intenzione, acciò non ne naschino quei disordini, che come si è detto sarebbero contrarij a fini della sua provvidenza.

Resta che per ultimo si risponda alle obiezioni che sogliono farsi contro la possibilità della tramutazione, benché qui non sarebbe necessario, havendone già veduta la manifesta esperienza.

Dicono primieramente con S.Tommaso 2. Sent. Distin. 7:8. Averroe in primo lib. De generat. Anim., et Avicen. in comm. Metheor, Che l'oro fatto per Arte Chimica, non è vero oro, poi che la vera forma dell'Oro, non si può introdurre nella materia, se non per mezzo del Calor celeste, e Solare, onde essendo il calor del fuoco di cui si servono i Chimici molto diverso da quello seguita che non possa generare oro vero.

Al che si risponde primieramente, che il Calore del nostro foco, non è in specie diverso da quello del Sole, e delle stelle, essendo che produce molti effetti del tutto simili, e per conseguenza può produrre ancor l'Oro. S'aggiunge ancora, che con i raggi del Sole discende sino alla nostra terra una purissima sostanza Celeste, la quale, se alcuno troverà modo di pescarla in questo vasto Oceano dell'Aria e ridurla in Liquore visibile, egli haverà la chiave di tutti i Segreti, e sarà quasi dissi il Padrone della Natura, che di una tal sostanza si serve per fare tutti gl'effetti, e mutazioni che noi vediamo maravigliosi che noi vediamo in questa bassa terra.

In Secondo luogo oppongono con Egidio che quelle cose le quali sono perfette in alcun genere, hanno una sola determinata causa della sua generazione. L'Oro tra tutti i Metalli, è perfettissimo, dunque in un sol modo si potrà generare, cioè in quello, che adopra la Natura; dunque non si può generare dall'Arte. Si risponde che l'Arte Chimica, non fa che l'Oro, a cui ella coopera, non proceda da quella causa prossima, ed immediata, poiché questa è la semenza dell'Oro, la quale opera naturalmente anco quando l'Arte vi coopera, onde il Chimico altro non fa che cavare dall'Oro la

semenza, et applicarla a i corpi proporzionati, con i quali unita possa rendere, il frutto moltiplicato, in quel modo che l'Agricoltore, non produce egli i frutti, ma dispone, e prepara la Terra, e la semenza, unendoli in modo, che fruttifichino.

Terzo oppongono che il luogo della generazione de metalli, è determinato in tal modo, che la Natura li produce sempre nelle viscere della terra, dove concorrono tutti gl'influssi Celesti come a Centro comune a tutti, e per conseguenza l'Oro non potrà generarsi fuori delle viscere della Terra.

Si risponde che il luogo della generazione dell'Oro, non è tanto determinato, che non si possa produrre anco fuori della Terra, purché vi sia materia disposta, e proporzionata, a ricevere, in sé la Semenza dell'Oro, così le altre semenze, di Erbe, o Piante portate sopra i tetti delle case, purché ritrovino terreno, o materia in cui germogliare producono i suoi soliti frutti.

Quarto Dicono che l'Arte non può mutare una sostanza in un'altra diversa in specie; poichè il far ciò appartiene alla sola natura.

Rispono alcuni che un metallo non è diverso in specie dall'altro, ma ben che sia diverso, dico non esser l'Arte che lo tramuta, ma la Natura aiutata dall'Arte; poi che l'Artefice altro non fa che applicare una materia all'altra dalla quale debita applicazione proviene, che una sostanza muti in se stessa l'altra a cui fu congiunta dall'Artefice. Così la semenza dell'Oro congiunta come conviene al Mercurio lo tramuta in Oro in modo che la semenza di grano cognita alla terra tramuta la Terra medesima in grano. Quindi si dice che l'Arte non fa l'opere, che fa la Natura, ma solo modifica la Natura medesima, determinandola ad operare più presto, o più tardi, in questo o in quell'altro modo, come vedesi in molte Arti e particolarmente in quella dell'innestare un Albero sopra l'altro.

Così parimente quando dicono non potersi dall'Artefice far l'Oro, per non sapere egli la proporzione degl'Elementi, che lo compongono, né il temperamento delle qualità, né gli Strumenti de quali la Natura si serve.

Si deve rispondere, non esser necessario sapere tali cose, poi che l'arte non opera immediatamente gl'effetti che sono della Natura, ma solo li porge la materia, la quale se prima sia stata preparata, e disposta dall'Arte, la Natura opera in essa più facilmente, et in modo straordinario.

Finalmente oppongono alcuni, che noi non potiamo sapere, se l'Oro Chimico sia vero Oro, con la vera forma sostanziale dell'Oro; Poi che dicono potrebbe essere che fossero mutati solo gl'accidenti, e però fosse solo Oro apparente.

Al che si risponde che nelle cose fisiche non si può avere maggior certezza che quella che ci danno concordemente tutti i Sensi, i quali

conoscono le sostanze dalli soli accidenti; onde quando appariscono tutti gl'accidenti di vero Oro, l'Intelletto naturalmente deve asserire, che egli sia vero Oro.

Si aggiunga che l'Oro si conosce assai più intimamente, che da gl'Accidenti esterni, facendone di esso varie prove e saggi che da Gebr, si riducono a nove, e sono l'Infocarlo, l'Estinguerlo, il Fonderlo, l'Unirsi che egli fa con l'Argento vivo, poi che il vero oro si unisce ad esso più facilmente, il Mescolarlo con materia Adurenti, il Porlo sopra vapori acuti, il metterlo alla Coppella, il darli il Cimento Reale, et il ridurlo doppo la Calcinazione, con l'altre prove solite da farsi da gl'Artefici, e Partitori.

E questo basti haver detto sopra l'Arte della Chimica, e sopra la tramutazione de metalli, e del potersi far l'Oro.

Seguiterò ora a dimostrare alcune esperienze fatte da me, vere verissime, ma però da me descritte oscuramente, ancor che io le trovassi chiarissime, ma non voglio scriverle, e darle fuori in altra maniera perché non è dovere che il volgo le sappia, e l'apprenda, ma i virtuosi in quest'arte con lo studio, benissimo verranno in Cognizione, del modo come va fatta e come vadia manipolato tal Segreto, purché ci concorra ancora la volontà di Dio.

Edition of Neri's *Discorso sopra la chimica*: Translation Criteria

Every effort has been made to present an English language translation that is both faithful and idiomatic to the original seventeenth-century Italian. Below is a short specification of the conventions used in the text.

Syntax: Priority is given to maintaining the original order of words, clauses, voices and tenses. In cases where this strategy might hinder comprehension or violate the norms of English usage, minimal rearrangements are made, but never at the cost of fidelity. A number of excessively long sentences have been broken into multiples, with the original arrangement of words and clauses maintained to the highest degree possible. Where appropriate, commas and periods are used where, in the original, clauses were separated by colons or semicolons.

Grammar: Hereafter, in these criteria 'quotes' should be understood to refer to single quote characters, and [brackets] should be understood as square bracket characters. Where clarity is at risk, object, subject or other parts of speech left out by ellipsis are enclosed in brackets, e.g. "preserving [this knowledge] for posterity." Latin passages are quoted verbatim, in *italics*, followed by the English in brackets. Words in Italian are put in italics. Numbers spelled out in the original are spelled out in the translation. Roman numerals are converted to Arabic.

Terminology: The alchemical lexicon of the original presents a number of challenges. Special terms that have direct English equivalents, but have distinct meanings in the text, are enclosed in quotes, e.g. ‘sweet’, ‘acid’, ‘salt’, ‘sulfur’, ‘mercury’ etc. Where the meaning is unambiguous, these terms appear as plain text. Words in Italian are put in italics. For the first use of special terms without a common English equivalent, the translation is put in quotes followed by the original Italian in brackets, e.g. ‘mixed bodies’ [*corpi misti*]. Thereafter, the special term appears as normal text: mixed bodies. In general, when an English equivalent does not exist, calques (borrowed terms literally translated) have been given preference to loanwords (borrowed terms un-translated). Happily, in some cases the use of phono-semantic matching is possible, e.g. ‘petite art’ [*arte piccola*].

Quotations: Where a direct quotation appears in the native language, it is followed by the English translation in square brackets. In cases where the meaning is obvious, the bracketed translation is omitted. For all attributed direct quotations, the extant original sources and previous authoritative translations were consulted.

Proper nouns: The names of historical figures are translated into their most well known English appellations, e.g. Jason, Aristotle and Ramon Lull. The names of authors cited in the annotations retain their native spelling. Place names in the text are translated to their English equivalents, while in citations, place of publication is in the native language.

The translation was done by Paul Engle, a native speaker of American English, who was greatly aided by close consultation with the author of this paper.

Edition of Neri’s *Discorso sopra la chimica*: Annotated Translation

DISCOURSE

On chemistry, what it is and its operations. By Reverend Priest Antonio Neri, Florentine clergyman: with various declarations on the recipe for *Donum Dei* and other chemical secrets of his own and of other virtuosi of his time.

Most Excellent Gentlemen,

The operations belonging to chemistry do not only, as some estimate, involve the transmutation of metals. It is a much more universal art, which in some ways also embraces medicine (or at least it comes very close in assisting) and it can be defined. It is an art, which resolves and reduces all

'mixed bodies' [*corpi misti*] into their primary elements, it searches out their nature and separates the pure from the impure and it makes use of the pure to perfect these bodies and even to transform one body into another.⁴⁰

From this definition, it becomes evident how broadly chemistry can be applied in all the kinds of created bodies. That part which pertains only to metals has its own name, 'alchemy', taken from the Greek word that means 'essence of salt' [*sugo di sale*], because in the moist spirit of salt lies all the virtue and efficacy of all mixed bodies.⁴¹

'Chemistry' [*chimica*] is also called '*spagyrica*' from the Greek word '*spao*', which is how we say 'to select' or 'separate'; because as was said above, it separates out the impure and selects the pure.⁴²

⁴⁰ The definition of chemistry [*chimica*] provided by Neri shows unequivocally his adherence to the doctrine of Paracelsus, in which chemical operations do not only concern the limited field of the transmutation of metals, but extend into the medical and pharmacological fields as well. Chemistry that 'embraces' medicine in order to assist it is in fact 'iatrochemistry' or medicinal chemistry founded by Paracelsus (1493-1541), which considers the human organism to be a set of elements in a state of flux and interprets disease as chemical abnormalities. Cf. Walter Pagel, *Paracelsus. An Introduction to Philosophical Medicine in the Era of the Renaissance* (Basel – New York: Karger, 1958); Allen G. Debus, "The doctor-chemical world of the Paracelsian," in *Changing Perspectives in the History of Science*, edited by Mikuláš Teich and Robert Maxwell Young (London: Heinemann Educational, 1973), pp. 85-89.

⁴¹ The Greek etymology evoked by Neri refers to the word '*chimo*' which means 'juice' or 'sauce' (*Apò tū Chymū*). On the uncertain etymology of the word 'alchemy', see Giovanni Carbonelli, *Sulle fonti storiche della chimica e dell'alchimia in Italia* (Lavis: La Finestra Editrice, 2003), pp. 6-11, reprint of the first edition (Roma: Istituto Nazionale Medico Farmacologico, 1925).

This meaning of '*sugo*' is also present in a southern Chinese dialect where '*Kim-ya*' signifies 'the juice that makes gold', and in a Chinese word that during the T'ang dynasty was pronounced '*Kiam-iok*' and indicated 'the sperm or juice of gold'. Cf. Marcello Fumagalli, *Dizionario di alchimia e di chimica farmaceutica antiquaria. Dalla ricerca dell'oro filosofale all'arte spagyrica di Paracelso* (Roma: Edizioni Mediterranee, 2000), p. 5.

The salt that Neri is referring to is sulfur, the universal seed of nature. The same etymological explanation is given by Kircher in *Mundus Subterraneus*, vol. 2, book 12, sec. 1. Cf. Anna Maria Partini, *Athanasius Kircher e l'alchimia* (Roma: Edizioni Mediterranee, 2004), pp. 163-165.

⁴² '*Spagiria*', in Greek terminology, means to separate and then reunite (from *spao* = to separate, and *ageiro* = reunite). Paracelsus first used the term 'Spagyric Art' to indicate the new medical connotations of alchemy (see Fig. 1). Chemistry as the art of separation is present in all the Paracelsian literature. In the *Lexicon Alchemiae* by the German physician and alchemist Martin Ruland (1569-1611), we read that "*Chemia est ars separandi, ex quolibet mixto essentias, concinnandique magisteria artificium*" [Chemistry is the art of separating essences in every kind of mixed body, and the ability to prepare magisteries]. Cf. Martini Rulandi, *Lexicon Alchemiae sive Dictionarium Alchemisticum* (Frankfurt: apud Johannem Andream & Wolfgangi Endreri Junioris haeredes, 1661), p. 145.

Some call it Kabbalah: in ancient times fathers communicated it to their children only by voice, preserving [this knowledge] for posterity, not for history, but as simple tradition.⁴³ Others finally gave it the name of ‘wisdom’ [*sapienza*] because they rightly believed it was impossible, without this art, to know perfectly the nature and the qualities of natural bodies.

In order to achieve the end they wanted, which was the perfection of the bodies, they separated the pure from the impure through various chemical operations, which can all be reduced to six principal phases.⁴⁴

The first is ‘calcination’ through which the bodies are reduced into lime (really into ash).

The second phase is called ‘solution’ whereby one dissolves in water the bodies already calcined.

The third is ‘distillation’ by means of which the ‘soluble part’ [*humido*] already dissolute is purged and corrected by distilling one or more times.

The fourth is called ‘putrefaction’ in which the bodies are arranged such that the pure parts can finally be separated out from the impure in which they are mixed.

The fifth phase is called ‘sublimation’ by the means of which the more subtle and volatile parts are forced to rise to the top, thereby separating them from the more fixed parts, which remain at the bottom of the sublimation vessel.

The sixth and last step is the reunion of the pure, spirit and volatile parts with the other parts similarly pure but fixed. When they are all joined together, they coagulate and become fixed, from which come the names

⁴³ Although this definition of alchemy as Kabbalah, esoteric knowledge handed down orally only to the elect, was widespread in the alchemical literature, Martin Ruland writes that “*Cabala est scientia occultissima, quae divinitus una cum lege Mosi tradita fuisse fertur (...)* Vox est Hebraea, latine dicitur *Receptio quam scribere nefas erat: sed ordinariis revelationum successione. Alter ab altero, q. hereditario iure reciperet, neque profhana multitudine divina mysteria cognita vilescerent aut violarentur*” [Kabbalah is the most secret knowledge, which together with the laws of Moses are said to have been divinely handed down... The language used was Hebrew, in Latin it is called ‘received wisdom’ (*Receptio*), and it was a sacrilege to write: but through an ordinary series of revelations, one man received it from another only by inheritance, so that the divine mysteries were retained and not profaned or corrupted by the uninitiated multitudes]. Cf. Rulandi, *Lexicon* (cit. note 42), p. 108.

⁴⁴ Neri lists and explains the steps or phases of the *Magnum Opus* or ‘great work’ (*grande opera*). In the alchemical literature, the number of steps could vary from three to twelve and was linked to the magic symbolism of numbers. In alchemical treatises, numerology also influenced the amounts of each component used, the size of the vessels employed, the intensity of the fire, and the time required to accomplish the work. On the metaphysical significance of numbers, see Jean Pierre Brach, *La symbolique des nombres* (Paris: Presses Universitaires de France, 1994).



Figure 1. Small furnace for the simultaneous separation of the four elements where earth, water, air and fire are arranged in suitable vessels, inserted into each other. Antonio Neri, MS Ferguson 67 (1598-1599), f. 87r. Glasgow University Library, Special Collections.

‘coagulation’ and ‘fixation’. In this way, the pure parts are separated from the impure, still others are volatile or fixed but they join with each other amicably and are conjoined by a fixed and insoluble bond. They acquire marvelous virtues and are very effective in their work; while before their effectiveness was hindered by the impure parts, where it was imprisoned and bound.

It should be noted in general, that in dealing with the [Aristotelian] elements in accordance with chemical philosophy⁴⁵ we can say that all mixed bodies in this art are discovered to contain five kinds of impure substances, which are completely dead and without any virtue or properties effective to [alchemical] operations. Two are from impure substances and three from pure substances, where all the strength, effectiveness and virtue are located specific to each mixture. Of the two [derived from the impure] one is called ‘phlegm’, which is to say a watery substance with no odor or taste and the other is called ‘dead body’ [*corpo morto*] or ‘damned earth’ [*terra dannata*], an earthy substance that is equally tasteless and without virtue.⁴⁶ Of the other three [derived from the pure] one is called ‘salt’ and it is the

⁴⁵ The chemical philosophy to which Neri refers is Paracelsian, which in addition to the four Aristotelian elements introduces the principal triad (*tria prima*) of salt, sulfur, and mercury. References to sulfur and mercury were already present in Arabic alchemy, which explains the formation of metals through the combination of different proportions of philosophical sulfur and mercury (which were much purer than common sulfur and mercury). The sulfur-mercury theory seems to be a modification of the doctrine contained in two passages of Aristotle’s “*Meteorologica*”, in which he explains the birth of metals and minerals within the earth (book 4). It was only later that mystical alchemists such as Basil Valentine, Khunrath, and Paracelsus added a third, and somewhat less important principal – salt. These three principals embodied the qualities of a material. For a metal, sulfur indicated its color, hardness, and combustibility; mercury its volatility, luster, and malleability; and salt was what made possible the union of sulfur and mercury. On the Paracelsian triad of principals, see Allen G. Debus, *The Chemical Philosophy* (New York: Science History Publication, 1977); Pagel, *Paracelsus* (cit. note 40); “Paracelsus: Traditionalism and Medieval Sources” in *Medicine, Science and Culture: Historical Essays in Honor of Owser Temkin*, eds. Lloyd G. Stevenson and Robert P. Multhauf (Baltimore: Johns Hopkins Press, 1968), pp. 51–76.

⁴⁶ In a manuscript by Agnolo della Casa, a Florentine alchemist considered to be the most outstanding among Neri’s pupils and followers, is the report of an interesting conversation that he had with the priest Neri “*alli XI di Aprile nel 1611 in Firenze*” [dated 11 April 1611 in Florence] (BNCF, Palat. 867, 3 ff. 128v–134r). Regarding the “*parte impura delle cose*” [impure part of things], Neri stated that it is not “*il flemma aquoso ma la parte che non si solve ma che resta insoluta, et dal resolvente non incorporata per cosa che se gli faccia essendo incapace di soluzione et di incorporatione col dissolvente che è la terrestreità delle cose di che ne mancano le cose convertite in quinta essentia*” [the phlegm in solution but the part that does not dissolve, which remains insoluble and unincorporated with the dissolved, for things that are made incapable of being dissolved and incorporated with solvent are the terrestrial part of things, which lack the converted fifth essence]. See Grazzini, *Antonio Neri* (cit. note 1), p. 214.

so-called most fixed substance because it is resistant to the violence of fire; it does not flee or vanish into the air. The second is called 'oil' or 'true sulfur' because of the similarity to it, fatty and viscous. The third is called 'spirit' because it is more spiritual and volatile than all the others and even the slightest heat will cause it to dissipate into the air if it has not been bound to the salt, which is the component fixed by the oil. By its tenacious, slimy nature, [oil] acts to bind the volatile to the fixed. These three types are those of the pure substances, which are called by many other names; 'body', 'soul' [*anima*], 'spirit'; 'bitter', 'sweet', 'acid'; 'salt', 'sulfur', 'mercury' etc. In them alone are placed all of the virtue and effectiveness of the minerals, the vegetables and the animals, even if the quantity of pure substance is very small in comparison with the impure in any kind of mixed body. These [three] are found in each mixed quantity of pure substance, in comparison with the ineffectual found in the impure.

Returning to the chemical operations required for the transmutation of metals, this is an endeavor for which there are innumerable instruments, many vessels as well as furnaces, with which many useful things are made for medicine. However, when applied to philosophical practice, if they [alchemists] knew the true path that must be walked by imitating nature they would then leave behind all of their various alembics, circulatory vessels, philosophical eggs, jars of Hermes, athanor furnaces, furnaces for melting, reverberation, calcination, digestion and the many others they use. They would not need a violent fire in which their money goes up in smoke along with their hopes, leaving only soot on the face and sadness in the soul; having with the bellows blown away crucibles of mercury and sun, or gold from the purse. But then, they are fools who believe the deity of lies, and estimate that a god of thieves will enrich them.

So there are two roads along which one may proceed in chemistry, with respect to the transmutation of metals, one is called the 'general' path, the other 'specific.'

Those on the first path seek an extremely pure material, which is like a celestial quintessence, universal, which has not yet been 'specified' or assigned to any species of sublunary body. This material (if it is found, should be similar to a ray of the sun)⁴⁷ they estimate to have the ability

⁴⁷ According to Aristotle, quintessence was ether, the fifth element, the essence of the celestial world – eternal, immutable, and transparent. Alchemists identified it with the philosopher's stone. It is significant that Neri associates quintessence with sunlight, since Hermetic philosophy focuses on the fertility of the sun, which as a creative force generates life and determines the infinite variety of forms. Cf. F. Sherwood Taylor, *The Idea of the Quintessence in Science, Medicine and History* (Oxford: E.A. Underwood, 1953).

to perfect not only metals, but every other imperfect body, transmuting one into another of different species. This substance or universal essence is learnedly discussed in books by the most renowned authors.

The second path is called 'specific' and separates a pure substance from any specific species of mixed [body], and by means of that alone, perfects the other bodies participating in the same nature. If they are transmuted this is done only within the determined nature, which is of the pure substances that transmute them, therefore, since it is already committed to a particular species it cannot change other things if they are not similar to it. With the 'general path', there is a universal pure material, which is to say 'unspecified'. When they want to convert (for example) a crystal into a ruby, they take a part of that unspecified substance and unite it to ruby, initiating the specification. It [the unspecified substance] takes on the virtues to convert into ruby every other substance that is more vile, which in nature approaches the ruby, as would rock crystal etc.

Thus wishing to convert the imperfect metals into gold, some of the pure substance is conjoined with gold and through the 'specification' it becomes capable of transmuting everything which participates in the nature of gold, such as iron, mercury, copper, lead, silver and similar.

Moreover, the 'specific path' is in turn distinguished by two chemical arts; one is called the 'grand art' [*arte grande*], the other the 'petite art' [*arte piccola*], but the above mentioned art that walks down the universal [general] path can be called the 'highest art' [*massima*]. The petite art is that which perfects metals through incremental gains or partially transmutes them. So, some manage to extract from silver, by certain endeavors a particle of gold, which increases the gold; others, with great effort and expense, extract silver from copper and tin; still others fix [extract] a small amount of mercury and this is called the petite art. Even if someone practices this [method] well, he cannot quickly procure immense wealth. The grand art, by means of the philosopher's stone, quickly and easily transmutes any imperfect metal truly into gold, or silver.⁴⁸

These two arts of the 'specific path' are those for which the alchemists walk today and the 'universal path' on which the ancients walked is barely mentioned. Yet, the [universal] path I estimate is the clearest and most

⁴⁸ It is interesting to note the way Neri describes the paths of chemistry (see Fig. 2). His description is, in fact, more complex than is generally to be found in alchemical treatises. Neri distinguishes between a 'universal path' – which allows any type of transmutation and the perfectibility of any imperfect body regardless of its species (a panacea) – and a 'specific path' that is limited to metals, which in turn encompasses the *grand art* as well as the *petite art*. While the latter only partially transmutes imperfect metals, the *grand art* can transform any metal into gold or silver.

likely will lead to the acquisition of the ‘golden fleece’.⁴⁹ Nevertheless, on the specific path there are very few who apply the grand art, which is easier and safer than the petite [art]. Moreover, those who do work in it do so without any understanding of the *modus operandi* of nature, trusting in some ancient recipes or secrets, groping about, testing one or another.

There are two kinds of the [philosopher’s] stone; one they call white and the other red;⁵⁰ the first converts any metal into silver and the other into gold. One and the other fill the books on chemistry with a thousand tales, puzzles, strange symbols and ciphers, which have now hidden the truth and embellished the lie. The endeavor to understand them more often confounds the intellect of those who have a full understanding of the parlance, the truth, natural philosophy, and particularly about the formation of mixtures. I urge everyone that study of these books should not

⁴⁹ In the Hermetic literature the myth of the Argonauts and the Golden Fleece is interpreted as a tale of alchemy, where the fleece is a papyrus that contains the secret of transmutation. Aurelio Augurelli (1454-1537), in his poem *Chrysopoeia et Vellus Aureum* (1515) writes: “*Uno (Giasone) da una sommità conosciuta, l’aureo vello/ ha mostrato come principio da assumere/ l’altro (Ercole), di che gran fardello ti caricherai, che gran fatica/ supporterai sulla crassa mole, e che rude peso/ ti ha insegnato. Infatti, non è gran cosa trovare/ ciò che devi prendere, ma il rendere adatta la massa/ questa è l’opera, qui la fatica, qui si sforzano in vane ricerche gli artefici*”

[One (Jason) at a well known summit, the golden fleece
Has demonstrated the wisdom to recruit
The other (Hercules), what a great burden you to take, the great strain
Of that rough boulder you endure, and that raw weight
You have learned. Indeed, it is not difficult to find
What you must take, but to render suitable substance
This is the work, here the difficulty, here is the struggle, in vain quest for the artificial].

See Jean-Jacques Manget, *Bibliotheca Chemica Curiosa* (Geneva: Chouet, De Tournes, Cramer, Perachon, Ritter & De Tournes, 1702), vol. 2, book 3, sec. 2.7.

On Augurelli and the allegorical poem that he dedicated to Pope Leo X, see Robert Weiss, “Augurelli Giovanni Aurelio,” in *Dizionario Biografico degli Italiani* (Roma: Istituto dell’Enciclopedia Italiana, 1962), vol. 4, pp. 578-581.

Cf. Dom Antoine Joseph Pernety, *Dictionnaire Mytho-Hermetique* (Paris: Chez Bauche, 1758), p. 44 (Argonauts), and p. 498 (Golden Fleece). For more works by Pernety, see Antoine-Joseph Pernety, *Fables Egyptiennes et Grecques dévoilées et réduites au meme principe* (Paris: Chez Declain, 1786).

⁵⁰ This distinction was also known to Greek alchemists, according to whom the first elixir whitened metals while the second turned them yellow. There was, however, a single ‘philosopher’s stone’, identical in its preparation in both cases and varying only in color. Cf. Marcelin Berthelot, *Les Origines de l’Alchimie* (Paris: Georges Steinheil, 1885), pp. 238-247. On the properties attributed to the philosopher’s stone, see Louis Figuier, *L’Alchimie et les Alchimistes: essai historique et critique sur la philosophie hermétique* (Paris: Librairie de L. Hachette, 1856), pp. 8-35.

be started before having a precise account of natural philosophy is acquired with the practice of many experiences.⁵¹ (Fig. 3) I feel that the more perfect the art the most simple it is; so the authors most unanimously agree that the ‘primordial material’ [*prima materia*] of the stone is something vile and not bought with money, but easy to find. Moreover, the manner of work must imitate nature, which in order to produce gold makes use of the singular or simple material, which is the seed of gold, of a single vessel, which is the ‘womb of the earth’ [*seno della terra*] and of a single natural and vital fire, which is the sun.

Nevertheless, because many cannot fathom this art I will briefly touch upon some things in favor of it and also show the true way to acquire it.

First of all, that the metals are transmutable through the philosopher’s stone or elixir is proved through the authority of many histories in which it is said that real gold has been made with this art by Ramon Lull.⁵² They also categorically say that Arnold Villanova publicly sold gold foil in Rome, made by means of the philosopher’s stone.⁵³ After them, Trevisan⁵⁴ made the same proof of this art in the presence of the Venetian Senate, which

⁵¹ In all of his discussions of alchemy, Neri was the ‘technician’ and never the ‘philosopher’. He banished the use of the chemical books, full of barely decodable and quite incomprehensible symbols and characters, and instead urged the “practice of many experiments.” On the question of the secrecy of knowledge and the Hermetic tradition, see: Paola Zambelli, *L’ambigua natura della magia* (Milano: Il Saggiatore, 1991); Georg Simmel, “The Sociology of Secrecy and of Secret Societies,” in *American Journal of Sociology*, 1906, XI, pp. 441–498; Frances A. Yates, *Giordano Bruno and the Hermetic Tradition* (London: Routledge and Keegan Paul, 1964); William Eamon, *Science and the Secrets of Nature: Books of Secrets in Medieval and Early Modern Culture* (Princeton: Princeton University Press, 1994).

⁵² On this legendary transmutation, see Nicolas Lenglet-Dufresnoy, *Histoire de la Philosophie Hermétique* (Paris: Chez Coustellier, 1742), p. 168: “By order of the king, Ramon Lull had made real gold in the Tower of London.” This gold was called ‘oro di Raimondo’ and gold coins obtained with it were called “raimondini.” The same news was reported by Jean Chrétien Ferdinand Hoefer, *Histoire de la Chimie* (Paris: Hachette, 1842), vol. 1, p. 398. The most likely source for this story is Olaus Borrichius, *Conspectus Scriptorum Chemicorum Celebriorum, Libellus Postumus* (Havniae: Garmanni, 1697), p. 43.

⁵³ On the transmutations that were performed by Arnold Villanova (1240–1312), alchemist and physician, in Rome see the testimony of Joannes Andreae: “For several days we had at the Roman Curia Master Arnold Villanova, a great physician and theologian who, being also a great alchemist, has consented to submit the rods of gold he had fabricated for testing.” Cf. *L’Arte Dorata: storia illustrata dell’alchimia*, ed. Andrea De Pascalis (Roma: L’Aironi, 1995), p. 68.

⁵⁴ The transmutation indicated by Neri was also reported by Giovanni Francesco Pico della Mirandola (1463–1494) in *Opus Aureum de Auro* where we read: “Some years ago in Venice there was a man who made a big quantity of gold from an amount of quick-silver as small as a granule of pepper, in the presence of many noblemen” in Manget, *Bibliotheca* (cit. note 49), book 2, p. 579.



Figure 2. Symbolic representation of the “ways” to achieve the Great Work and the respective times required for its realization. Neri, *Ferguson* (cit. Fig. 1), f.xxviii(v). Glasgow University Library, Special Collections.



Figure 3. Furnace used for the Bain Marie, a system for heating and distillation used to treat particularly delicate substances, that would deteriorate if subjected to a direct flame. Neri, *Ferguson* (cit. Fig. 1), f. 29r. Glasgow University Library, Special Collections.

likewise is said, was practiced by Paracelsus, a certain Alexander Scotus,⁵⁵ Anselmo Boezio⁵⁶ and many others (not to mention that which I was told about by certain trustworthy eyewitnesses). Even though we should not so easily give credence to all the histories, given that chemists are so gullible as are those who gently nurture their hopes with these stories, nevertheless it does not seem that this is to criticize and despise the histories themselves.

Moreover, that [*Moisè*] Hermes Trismegistus, Solomon and other great men of antiquity possessed this art as commonly the chemists convince themselves of, I dare not assert it; what is quite certain is that some writings do go under their names, as well as of Aristotle and St. Thomas. These are all apocryphal⁵⁷ and very much unworthy of being attributed to those great minds, particularly because it was only after Galen that the art of chemistry began to be used, at least within our Europe. However, in China this art was

There are problems of identification between the alchemist Bernardus Trevisanus (1406-1490) and Bernardinus Trevisanus (ca. 1526 -1583), professor of logic at Padua and then successor to Falloppio. Trevisanus was born in Padua, and from an early age devoted himself to alchemy. Of noble birth, he spent his wealth in pursuit of the 'philosopher's stone'. He traveled extensively and only at the age of 73 did he discover the secret of transmutation. He is thought to be the author of *La Philosophie Naturelle de Métaux e L'Oeuvre secret de la Chimie*. Cf. Nicolas Lenglet-Dufresnoy, *Histoire* (cit. note 52), vol. 1, ch. 35, pp. 233-246, and Jean Jacques Fillassier, *Dizionario storico di educazione* (Venezia: Fratelli Gattei, 1844), pp. 881-884. Some believed Bernard was of German origin, because he is often cited as "Bernardo della Marca Trevigiana." Historians, however, seem forced to admit the existence of two distinct persons, Bernardus Trevisanus and Bernardus Trevirensis. As for Bernardinus Trevisanus, Lenglet-Dufresnoy, *Histoire* (cit. note 52), p. 369, writes that "he was versed with full knowledge of herbs and minerals" and "advantaged chemistry to find the philosopher's stone."

⁵⁵ The alchemist Alessandro Setonius Scotus, also known as Sethon (? -1604), a native of Parma or Piacenza, traveled to Prague in the summer of 1590. He was imprisoned by Christian II, Elector of Saxony, for performing a transmutation in public and was released by the well-known Polish alchemist Michele Sendivogius (1566-1636). Detailed information about Scotus's life is presented in Danielis Morofi, *De Metallorum Transmutatione* (Hamburg: ex Officina Gothofredi, 1673), where one may also read: "In Amsterdam I saw a gold foil (...) which Scotus himself had (...) made from lead. He had written with his own hand, the exact date: 13 of March 1602, fourth hour in the afternoon." Cf. Manget, *Bibliotheca* (cit. note 49), vol. I, ch. 13, p. 189.

⁵⁶ Anselmo Boezio De Boot (1550-1630), also known as "Budeo," was a Flemish physician and alchemist born in Bruges, who studied medicine and is known to have been working as a physician at the court of Rudolph II in 1558. His masterpiece, *Gemmarum et Lapidarum Historia*, published in 1609, is considered to be the most important seventeenth-century book on gems.

⁵⁷ Neri here condemns the practice of attributing alchemical writings to the "great men of antiquity," a ruse that was widespread among chemical philosophers who sought thereby to give greater credence to their own theories.

greatly studied and practiced long before,⁵⁸ as only follows, since the invention of the [printing] press as well as artillery were in use by these people much earlier than in Europe.⁵⁹ Yet it is certain that the ancient fables of the Golden Fleece, the Apple of the Hesperides, the Golden Branch and other similar [stories], (hereinafter referred to as [by] the poets), are falsely interpreted as the philosopher's stone, in which it is otherwise obvious that under the bark of such tales the ancients hid the marrow of moral philosophy, and precepts of politics.⁶⁰

Some argue that the possibilities of this art are demonstrated clearly through the experience of the 'nail' [*chiodo*], which is seen in the Galleria [dei Lavori] of the grand duke of Tuscany, of which one part is solid iron and the other which was immersed in some sort of liquor is recognized to be pure gold.⁶¹ The same is confirmed by the experience with quicksilver,

⁵⁸ The Chinese alchemical tradition appears to date as far back as the fourth or third centuries BC, but the first documentation is a commentary written in 142 BC by Ts'an T'ung Ch'i. From the beginning Chinese alchemy had close links with medicine and it diverged into two schools: one external, which sought immortality through elixirs made of plants, and the other internal, which through physical and mental practices sought to achieve the transmutation of the body. On the characteristics of Chinese alchemy, cf. Henry M. Leicester, *Storia della Chimica* (Milano: ISEDI, 1978), pp. 56-65; Natan Sivin, *Chinese Alchemy: Preliminary Studies* (Cambridge: Harvard University Press, 1968); Joseph Needham, "Artisans et Alchimistes en Chine et dans le Monde Hellénistique" in *La Pensée*, 1970, note 152, pp. 2-24.

⁵⁹ *Sutra del Diamante*, dating from the year 868, is considered to be the very first printed book, produced using wood type. Cf. Albertine Gaur, *A History of Writing* (London: The British Library, 1984).

On the origins of Chinese artillery, see Jacques Gernet, *A History of Chinese Civilization*, translated by J.R. Foster & Charles Hartman (New York: Cambridge University Press, 1996).

⁶⁰ Neri recognized the existence of an allegorical meaning to the many stories of classical mythology, but denied their alchemical significance, suggesting instead that they might be read from an ethical and political perspective.

⁶¹ Several sources provide accounts of the golden nail in the Grand Ducal Gallery, obtained by the transmutation of a long nail in some kind of oil. The alchemist responsible for this miracle was Leonhard Thurneysser (1531-1596), a follower of Paracelsus, personal physician to the Elector John George of Brandenburg, and the editor of many Paracelsian writings. He himself wrote only one treatise, *De trasmutatione Veneris in Solem*. Cf. Edward Thorpe, *Storia della Chimica* (Torino: STEN, 1911), p. 97; Tara E. Nummedal, *Alchemy and Authority in the Holy Roman Empire* (Chicago: Chicago University Press, 2007), p. 33; Włodzimierz Hubick, "Thurneysser L." in *Dictionary of Scientific Biography*, ed. Charles C. Gillispie (New York: Scribner's & Sons, 1976), vol. 13, pp. 396-398.

Leonhard Thurneysser could be the "German Paracelsian" from whom Antonio Neri learned the secret of transmutation. There is a manuscript in the BNCF, entitled *Relazione di Guido Antonio Melani Partitore* [Report of Guido Antonio Melani, metals refiner] (Palat., Targioni II, ff. 9v-10v), in which we read that Neri performed a transmutation using "una metallina di color ferrigno (...) la quinta essenza del vetriolo" [a metallic piece the color of

which was seen in Prague and witnessed by a certain Taddeo Hagecio.⁶² There a conversion into gold was performed by Kaelleio Inglese,⁶³ by waiting for the sign in the item that was treated with a single drop of deep red liquor. (Fig. 4)

However, these and similar things do not sufficiently prove the transmutation of which we speak. I have some experience being able to draw a large mass of gold from a small amount of substance, which is called the 'soul of gold' [*anima d'oro*]. This is cast over imperfect metals, converting them into almost as much gold as was [originally] extracted by the soul, but this artifice does not bring other benefits except that a traveler may carry a great treasure with him in a small weight and what's more, it can be held without much danger of it be stolen since it is not so easy to recognize.

It is better therefore to prove the possibilities of this art of transmutation with certain other experiences. I myself have experimented with a variety of metals that are transformed into other lesser species, or even to ones more perfect, of which we will discuss here, which I have found to be true.

iron (...and) the quintessence of vitriol" obtained from "tal todesco" [a German] into whose confidence he entered, and who would reveal the secret of transmutation learned from the works of "Paracelso autore moderno." This is a hypothesis that may be plausible, since Thurneysser was in Florence around 1590 and attended the royal court, where Neri could have witnessed a demonstration.

On Neri's transmutation, see Galluzzi, "Motivi Paracelsiana" (cit. note 14), p. 53; Grazzini, *Antonio Neri* (cit. note 1), pp. 214–216. On Thurneysser in Florence, cf. Galluzzi, "Motivi Paracelsiana" (cit. note 14), p. 34.

⁶² Taddeo Hagecio (also known as Tadeáš Hájek or Thaddeus Hagecius, 1525–1600), astronomer and physician to Emperor Rudolph II, studied medicine in Vienna and then in Bologna, and in 1555 became professor of mathematics at Prague. In addition to *Aphorismi Metaposcopici* published in 1561, he was the author of many astrological predictions. More detailed information on his life can be found in Zdeněk Horský, "Thaddeus Hagecius" in *Rise hvezd*, 1975, v. 56, pp. 228–229.

⁶³ Edward Kelley (1555–1597) was an alchemist and one of the most celebrated figures in Bohemia during the rule of Rudolf II. Also known as "Engelender," i.e. English, he claimed to know how to decipher the secrets of alchemy and turn base metal into gold in a quarter of an hour, using a substance produced by him called '*Mercurius Solis*'. In 1585 he performed a transmutation at the home of the imperial doctor Taddeo Hagecio (cf. note 62), converting a pound of mercury into gold through the use of a single drop of a red oil, but due to the application of an excessive dose of philosopher's stone, he also produced a small ruby. This story was reported by many authors. Cf. Daniel Georg Morhofi and Joel Langellott, *De Metallorum Transmutatione* (Hamburg: Joannem Janssonium, 1673), p. 152.



Figure 4. Furnace for the distillation of wine, characterized by the particular position of the fire which is not in contact with the container, but is placed at the top, above a copper lid. Neri, *Ferguson* (cit. Fig. 1), f. 32r. Glasgow University Library, Special Collections.

The Transmutation of Quicksilver into Lead

We calcine lead, which is done by sprinkling saltpeter⁶⁴ over molten lead little by little. Distilled vinegar is poured over this ash of lead, leaving it to infuse for an entire night; then we [separately] dissolve quicksilver in aqua fortis.⁶⁵ Into the quicksilver dissolved in this way we sprinkle in a few drops of the above [infused] vinegar, it will precipitate and the mercury will descend as fine particles. If placed into a crucible and melted, it would be completely changed into lead. It transmutes once again, if you congeal the mercury with the scent of lead, a method to congeal and manipulate it, which I will teach you elsewhere.

Transmutation of Lead into Quicksilver

In wanting to transmute lead into quicksilver, you will place the lead into a terracotta pot, which is not glazed but is very well luted. You put on the lid, at the top part of which there is a small opening, and combine it with [place it in] a large bowl that has a good amount of water, which is placed on top of a wind furnace.⁶⁶ When the smoke starts to come out at the above-mentioned top opening, immediately close it down with diligence, which increases the fire powerfully. Then in this way, the lead is distilled and converted into quicksilver. However, from a pound of lead you will not extract more than four ounces of quicksilver. Indeed, if lead calx is used, made as above with salt or saltpeter, throw it into boiling water since the calx will give up all its salt. Then after drying put it in water in which sal ammoniac has been dissolved, in which is [also] a bit of lime from eggshells. Put everything into a closed glass jar, bury it under dung for twelve days and you will find the lead has changed into quicksilver.

⁶⁴ Saltpeter is potassium nitrate (KNO_3), also known in Italian as ‘sale infernale.’ A powerful oxidant, it was regarded as a ‘hidden fire’ whose nature, according to alchemists, was similar to that of ‘celestial fire.’

⁶⁵ Aqua fortis is nitric acid (HNO_3), a powerful solvent. It was already known to medieval alchemists and was mentioned by Albertus Magnus (ca. 1200–1280) in *Compositum de compositis*, where he provided a recipe and said that it “separates gold from silver and it calcines mercury and Mars.” Hofer in *Histoire* (cit. note 52), vol. 1, p. 182, said that Geber was the first to speak of strong water. Cf. Gabriele Rosa, *L’Alchimia dalla sua origine fino al secolo XIV e la Compostella, opera di Frate Bonaventura d’Iseo* (Brescia: Minerva, 1846), pp. 38–40.

⁶⁶ The wind furnace was used to transform lead and to melt metals with a very high melting point (see figs. 3–5). The wind, entering through various openings, fanned the flames and kept them strong. The furnace was loaded from above through an aperture that also served as the chimney.

Transmutation of Tin into Silver

Take a little English tin,⁶⁷ fined and cleaned. Enclose it in a hard ball of clay, which is luted all around the tin with very strong lute that will not crack in the fire. Then liquefy a good amount of silver in a crucible. Take the ball of clay discussed above, of luted tin, first heat it well in order that it will not crack in the silver and then submerge it in the liquefied silver. With an iron, press it under little by little, keeping it fully immersed for about a quarter of an hour and then take the lute out. You will find the tin changed into true silver. I must point out that the silver, in which the ball was immersed, becomes infected with evil vapors of the tin. Although the tin has been purged and cupellated,⁶⁸ we lose the same quantity we gained and more than that. There is no doubt, however, that this is a true transmutation since we can say that the tin does not penetrate through the clay into the silver, and the silver does not penetrate the ball in which the tin is locked. However, the smell of the silver is transmitted to the tin, penetrates it, and it turns the tin into silver. The silver reciprocally receives the vapors of the tin and remains infected by them. Those who could find a way to repair this damage, by first purging the tin of those malignant fumes, or by adding something to the silver that would repress these vapors would have a very great secret.

Transmutation of Quicksilver into True Silver

Take some minium⁶⁹ or other true lime of lead, mix it with cinnabar⁷⁰ or with true quicksilver and sulfur, of which cinnabar is composed. Put it in a

⁶⁷ Tin mining probably began in the classical era in the region of Cornwall. The tin from England was renowned for its purity.

⁶⁸ The *cupel* was a container made of a porous refractory material, often using powdered bone ash, that was calcined and compressed into a mold. Precious metals were refined by placing them in the cupel, which was then heated in a special furnace. When exposed to the heated air inside the oven, the impurities present in the metal were oxidized and absorbed by the porous walls of the cupel.

⁶⁹ The name of this mineral is derived from the Minius [Minho] River in northwest Spain. It was formerly used as a paint pigment and was called red lead, red Saturn, sandix, or sandaraco.

⁷⁰ Cinnabar (also called 'vermilion' due to its distinctive red color) is mercury sulfide (HgS). Already known to the Greeks, it was widely used by alchemists because when heated it transformed itself into mercury. Central elements in Chinese alchemy were cinnabar, in ancient times regarded as the soul of the metals and minerals, and sulfur and mercury, 'co-souls' which when combined in certain proportions could produce gold. Cf. S. Mahdihassan, *Alchimia Indiana. Rasayana. Arte della lunga vita*, (Roma: Ed. Mediterranee, 1998), pp. 55-56.

crucible and at first give it a moderate fire, but when it starts to smoke and the quicksilver flies away with the sulfur it will ignite most powerfully, and all the sulfur will be consumed with most of the quicksilver. Left in the crucible is lead, which if put in a cupel will be consumed leaving the part that is silver, but not enough that the work is compensated by the gain.

This and other similar experiments I have tried and seen with my own eyes, such that there did not remain any doubt about the possibility of the transmutation of metals.

Transmutation of Iron into Copper

Take some iron sheets and lay them in vitriol water,⁷¹ being immersed in that, they will rust. Scrape off this rust, which will be a red powder, melt it in a crucible, and you will have perfect copper. The same effect can be had from various waters which are naturally vitriolated, because they flow through mines of vitriol, such as those of a source some distance from Leiden, and another below the fortress of Smollentzchi [Smolnik, now in Slovakia] in Moscovia [Eastern Europe], of which Georgius Agricola, in book 5 [9] of *Nature Fossilium* says these words: *ex Puteo extrahitur Aqua, et in canales triplici ordine locatos infunditur, in quibus positae portiones Ferri, vertuntur in Aes. Minutum enim Ferrum, quod in fine canalium collocatur talis aqua ita exedit, ut fiat quasi lutum quoddam; id vero omne postea excocutum in fornacibus fit Aes. purum bonumque.* [Water is extracted from a well, and it is poured into a group of three channels, in which are set the portions of iron, which is turned into copper. In fact, this water eats away small particles of iron, which are located at the bottom of the channels and the iron becomes almost a mud. When it (the iron) is melted in the furnace, it becomes copper, pure and good].⁷²

Some estimate, and not without reason that this experiment, being used to prove the transmutation of metals, is not suitable for this purpose.

⁷¹ Vitriol is an acidic sulfate in concentrated aqueous solution. It was known to medieval alchemists as 'oil of vitriol' and 'spirit of vitriol' obtainable through the dry distillation of minerals containing iron (green vitriol = FeSO_4) or copper (blue vitriol = CuSO_4). The transmutation of iron into copper could be achieved in different ways. In addition to the method described by Neri, iron filings could be cooked in vitriolated water, iron sheets could be cemented (layered) with calcined iron vitriol, or red-hot iron sheets could be immersed in oil of vitriol. See Partini, *Athanasius Kircher* (cit. note 41), p. 104.

⁷² Georgius Agricola, *De Natura Fossilium*, translated from the first Latin edition of 1546 by Mark Chance Bandy and Jean A. Bandy (New York: Mineralogical Society of America, 1955), p. 188.

They say that the vitriolated waters become such because they are already heavy with the corrosive spirits of sulfur, having passed through the copper or iron mine, these waters corrode copper in the same way aqua fortis corrodes silver. So that really the substance of the copper remains in the water, which attacks the surface of the iron, which always remains iron. However, if that were true then the iron would not get consumed, or if it were consumed it would mix with the substance of the corroded copper in the water, and if it were fused, it would remain a mixture of iron and copper. And yet in this experiment, all the iron is consumed; it is reduced by the vitriolated water into powder, as mention in the above quote by Agricola, which in the fusion is still pure copper, so there should remain no doubt that this is a true transmutation.⁷³

Consider a third argument to prove the possibility of transmutation of metals, that many animals, which are also perfect, are generated by the art from inanimate things, just as inanimate things are. Like bees from cattle dung, snakes from hair and the like, therefore by arguing ‘a fortiori’, it seems that if the bees are formed out of a substance so dissimilar, as is the dung of cows, or bulls, then much gold can form from iron or copper to which it is not so very dissimilar.⁷⁴

⁷³ Many contemporary writers spoke of “*stamazione*” rather than transmutation. The copper precipitated into the vitriol and penetrated into the pores of the corroded iron. “Copper is therefore in the vitriol and the iron is not transformed.” Cf. Agostino Soderini, “Lettera II” in *Giornale de’ letterati d’Italia* (Venezia: appresso Gio. Gabbriello Hertz, 1717), vol. 27, pp. 186–214.

The city of Smolnik mentioned by Agricola (in present-day Slovakia) became famous for its demonstrations of the transmutation of iron into copper. This procedure involving vitriol, as reported by Neri, caused puzzlement among scientists for nearly a century, until the beginning of the 1700s. Blue vitriol water is a transparent saturated solution of copper sulfate (CuSO_4). In the presence of solid iron, the liquid dissolves the iron and solid copper is deposited in its place. Therefore the two metals, copper and iron, change places; the iron dissolves, forming green vitriol (FeSO_4) while copper is expelled from the solution. The result is a reduction in the quantity of iron, which is replaced by a proportional deposit of pure copper. For the alchemists of Neri’s period this appeared to provide certain proof that the transmutation of iron into copper was taking place.

⁷⁴ The spontaneous generation or abiogenesis that Neri refers to is the belief that life could form spontaneously from inanimate matter. This theory was based on the writings of Aristotle. Cf. Aristotle, *De Generatione Animalium*, edited and translated by Arthur Platt (Oxford: Clarendon Press, 1910), book 1, ch. 1, 715b:25; book 1, ch. 16, 720b:5. Aristotle was actually reviving an earlier theory of Democritus with some modifications; it was not the heat of the sun that caused the birth of life in water and on land, but a psychic heat combined with the spirit of life in the universe, which created a bubble of organic material from mud (water plus earth). Spontaneous generation from mud was different from that caused by putrefaction and fermentation; according to Democritus, the process of putrefaction

The true transmutation of metals made by use of the soul of gold or silver is another proof, because if you do this transmutation without growing the gold, it will not be possible to attain perfection of its soul, which can transmute a greater amount of metal. This is confirmed by the example of seeds, of which a single grain is capable of producing a hundred or a thousand, as long as you sow them in a commensurate place.⁷⁵ Take the further example of fermentation, in which one small part is sufficient to ferment a large mass. Nor is it contradictory to say that the metals do not produce seeds, like herbs and plants, because even though nature by itself has no power to take the seed out of gold, however, aided and encouraged by art, [nature] will do that which it does not do by itself. So that art begins where nature ends, and art will perfect the seed, which in gold is merely begun.⁷⁶ In order to produce and multiply gold, it is not necessary that nature extracts the seed of gold, since many plants do not produce seeds, and yet they are reborn and multiply from their own putrefied substance. The salt extracted and sowed from any plant, multiplies and produces the same

occurs in mud. Cf. Giuseppe Armocida, *Storia della Medicina* (Milano: Iaca, 1993), pp. 191–192. Plato poses the question “Are living creatures nurtured when the hot and the cold undergo putrefaction, as some people used to say?” Cf. Plato, “Phaedo,” translated by R.S. Bluck (1955) in *The Dialogues of Plato*, ed. Erich Segal (New York: Bantam, 1986, 2006), p. 121. Lucretius describes the spontaneous generation of plants and living creatures from the earth (*De Rerum Natura*, book 5, vv. 783–825) and Virgil recounts an episode of bugonia in *Georgics* (IV, vv. 528–558), where a swarm of bees rises from the carcass of a dead animal. Ovid relates this same story in *Fasts* (book 1, vv. 363–380), while a similar motif can be found in the Bible (Judges 14:14), when Samson says that “Out of the eater came forth meat, and out of the strong came forth sweetness” referring to the swarm of bees found in a dead lion.

On spontaneous generation, see also Charles Webster, *From Paracelsus to Newton. Magic and the Making of Modern Science* (Cambridge: Cambridge University Press, 1982), Italian translation: *Magia e Scienza da Paracelso a Newton* (Bologna: Mulino, 1984).

⁷⁵ This is the magical-hermetic conception of nature as a living whole, where everything has its own ‘seed’, a principle of internal and spontaneous activity. The universe is conceived of as a great organism and the fundamental law is that of the unity of matter. In the words of Basil Valentine in the *Char triumphal de l'antimoine* (1671): “*Tutte le cose nascono da uno stesso seme; in origine sono state tutte partorite dalla stessa madre*” [All things born from the same seed, originally arose from the same mother] in Albert Poisson, *Teorie e simboli dell'Alchimia. La grande opera* (Milano, Moizzi, 1976), p. 37.

The metals therefore, like all living things, have a seed from which they grow and this seed is common to all, but perfect maturity is only reached in gold. This ‘seminal’ quality is known as *philosophical mercury*.

⁷⁶ According to Neri art is not an imitation of nature, but its perfect realization. Alchemical transmutation crowns humanity's confidence in its ability to change nature, improving it through propitious interventions. Thus, there is no separation between nature and art, confirming Bacon's credo that “*ars est homo additus naturae*” [Art is man added to nature].

plant. Therefore, this salt could be extracted from gold, or a finer and more effective substance, which is its seed, and sown in a convenient field, which is in a gold-bearing substance, in order to produce the fruits multiplied.

Therefore, I say that the entire art consists of knowing how to extract the seed out of gold, or silver, and to join it to a suitable material. After it is putrefied and corrupted, it can produce fruit a hundredfold. Those who seek the material of the philosopher's stone in other things, they stray from the right path, they neither follow nor imitate nature as they should do, and particularly those who seek such material in herbs and in animals walk away from the true path. They work to the contrary, wanting to turn nature back from living things, which are perfect, into the metals that are imperfect. This is repugnant to the way of the 'walk of nature', which cannot return back.

Rather you should try it on those minerals or imperfect metals, which nature has intended to lead to the perfection of gold, but could not improve due to the lack of sufficient seeding material.⁷⁷ Therefore, this is the material [to use]; although in part, it also remains as imperfect minerals. However, this has only a small quantity [of seed] and is infected by many other indigestible and impure substances, it will be more expedient to seek it [seed] in gold and silver, where it is most abundant and pure. This is claimed, as well, by the chemical poet.

*Gold's Seeds are in Gold.*⁷⁸

⁷⁷ By embracing the teleological conception of nature, Neri was supporting a generally accepted idea in the Hermetic literature: Nature, aspiring to the full perfection of everything it produces, tends spontaneously to form gold, although accidental disorders can occur in the formation of this body, resulting in the birth of the other, imperfect metals. The same notion can be found in Roger Bacon: "I must tell you, that nature always intends and strives to the perfection of gold: but many accidents coming between, change the metals, as it is evidently to be seen in various of the Philosophers books." See Roger Bacon, *The Mirror of Alchimy* (London: Richard Oliue, 1597), p. 2; also cf. Poisson, *Teorie e simboli* (cit. note 75), p. 48.

Metallic transmutation is seen from an evolutionary perspective, typical of Hermetic and Neoplatonic philosophy, according to which all nature tends to return to the initial perfection that had been lost as a result of original sin. The Hermetic philosophers all shared the belief that the material for the philosopher's stone should be sought in metals. Arnold Villanova in *Flos Florum* (attrib.) wrote: "A human begets nothing other than humans, and a horse begets none but horses, thus metals can also be produced only by their seed" in Poisson, *Teorie e simboli* (cit. note 75), p. 93.

⁷⁸ Here Neri is citing a line from a poem by Giovanni Aurelio Augurello (1456-1524) (see note 49), *Chrysopoeia* (Venezia: 1515), book 1 (Latin poem in hexameters in three books): "*Hordea cui cordi, denum serit hordea, ne tu/ Nunc aliunde pares auri primordia: in auro/ semina sunt auri, quamvis abstrusa recedant/ Longius, et multo nobis quaerenda labore*" [In barley is a 'heart' which sows eighteen barley plants. In gold are gold's seeds, although they are hidden. We must search with difficulty, and for a longer time], in Manget, *Bibliotheca* (cit. note 49).

It is easier to produce bees from a hive than from the dung of cows and bulls.

Therefore, I dare say that this art is not only possible, but it is far easier. It is a fair argument to put forth, to say that if it was easy to make this [philosopher's] stone, that among the many who have spared neither expense nor labor, someone would surely have arrived at this coveted end, but asserting that something is easy to do does not mean that it is also easy to find a way to do it. In fact, every day we find wonderful new inventions, which are most easily done and yet for many centuries no one ever knew of the discovery. It may well be true that no one so far has found the above stone, [an assertion] which I estimate to be false, it does not follow, however, that it is impossible, but yet rather difficult to do. I would add that God's providence over human affairs must not easily allow many to acquire this art, particularly [not] the great princes. It should [not] be made clear and common to the vulgar, because in this way, gold and silver and consequently coins lose their value, so that the good order of human trade will be disrupted and we should go back to the ancient barter of things that are necessary to a civil life, creating great disruption and confusion. For confirmation, I could cite many stories, in which we can see the singular providence of God who does not let this art, given to someone in particular by him, become clear to others. Therefore, rightly this art is said to be a singular gift that God gives to whom he most likes, never allowing it to become common to many people. We must also consider the danger to its possessor if it became known to others and particularly to the princes. For that reason even if someone knows and practices this art, he is obliged to keep it hidden and to conceal it: and I know of what I speak.⁷⁹

Now to say something about the way to follow, in order to acquire [this art], take it for certain that the whole art lay in the two precepts, commonly given by the teachers: *Fixum fiat volatile, et iterum volatile fixum* [the fixed becomes volatile and again the volatile becomes fixed].⁸⁰ This means that

⁷⁹ This passage is particularly significant, because it seems that Neri is alluding to his recipe for making gold, but makes it inaccessible by means of Hermetic symbols. It is appropriately titled *Donum Dei* [Gift of God] to convey that this knowledge was the fruit of divine revelation and could not be widely disclosed (see *Variorum Opuscula Chimica* (cit. note 23), f. 2r).

⁸⁰ Neri cites a maxim popular among alchemists; it is attributed to Pseudo-Geber, who in his *Summa Perfectionis*, writes: "*Et nos quidem, ne mordeamur ab impiis, narramus totum huius magisterii sub brevitate sermonis completa et nota. Et est illius intentio ut per sublimationem mundetur perfectissime lapis et illius additamentum, et abhinc quidem ingeniorum cum modo volativum ex eis figatur. Dehinc vero fixum volatile fiat et iterato volatile fixum,*

the seed is extracted from gold and silver by dissolving the gold or silver, which are fixed bodies and impervious to fire. They must be reduced into primordial material so that after destroying the pure substance, the seed hidden in it can be extracted. These bodies, which at first were fixed must be destroyed so that they can not reduce themselves [back] into gold anymore, but if they vanish when they are put on the fire, then it can be said they are made volatile. Although they can be reduced by aqua fortis into minute particles, so that they seem destroyed since they cannot be distinguished from the waters, nevertheless they do retain their old nature. The small particles remain in the pores of the corrosive waters that evaporate by the fire and leave the gold, on the bottom fixed as it was before. Therefore those who think gold will reduce into primordial material by means of corrosive waters or with the violence of fire, they deceive themselves because either they can not destroy it, or, if they do destroy it, [both] the violence of fire and the corrosive malignancy of those waters destroy and consume the wet and viscous substance that fixedly held the particles of gold together. That substance is the soul that we are seeking, but in destroying the gold, we must preserve and keep it clear and pure, separated from the other parts. Therefore, all the difficulty is in finding a means, that we could call teacher, which is suitable for reducing the gold into primordial material, preserving that wet and stout substance called soul or sulfur. This menstruum⁸¹ and liquor must open the pores of gold and penetrate into it amicably, separating a wet substance, pure and unscathed, from the other parts. Consequently, in order to work in this way the menstruum,

et totiens fiat volatile fixum et fixum volatile et volatile fixum quosque fusionem prestat facilem cum ignitione. Et in hoc ordine completur arcanum pretiosissimum quod est super omne huius mundi scientiarum arcanum, et thesaurus incomparabilis [From now on we will all talk about this 'magisterium' with few known words, so as not to be bashed by wicked people (...) Therefore in truth the fixed becomes volatile and again the volatile becomes fixed and every time the volatile becomes fixed and the fixed becomes volatile, one can easily perform fusion with ignition. And in this way the most precious arcanum, which is the highest secret of the sciences of this world, and an incomparable treasure, can be accomplished], in: William R. Newman, *The Summa Perfectionis of Pseudo-Geber. A Critical Edition, Translation & Study*, (Leiden: Brill, 1991), p. 587.

⁸¹ The term '*menstruum*' is often used in Hermetic writings to refer to the universal solvent that can transform the fixed into the volatile and extract the soul of gold, reducing it to its primary seed. Alchemists believed that perfect dissolution required about a month. In addition to this interpretation derived from Neri, there is another: after searching for the philosopher's stone in metallic substances, the alchemists turned their attention to the various products of excretion, convinced that these substances, having remained for long periods inside the body's cavities, were impregnated with special vital forces. Cf. Fumagalli, *Dizionario* (cit. note 41), p. 132.

should be a very tenuous substance to enter the very small pores of the gold, in order not to offend or destroy it [the soul of gold], but amicably and sympathetically penetrating, it unites with the soul and separates it from the other parts. In this way that substance, which first joined the impure parts and remained fixed and persistent to the fire, when unbound from them, becomes volatile and it goes up with a gentle fire and it distills in the alembic, as I saw more than once by my own experience. That which was fixed is made to become volatile, which is estimated as the most difficult [operation] of all. While this is commonly asserted, it is actually more difficult to destroy the gold, because once one has discovered this menstruum and destroyed the gold, reducing it into the primordial material, while keeping its soul or true seed intact, it is then easy to fulfill the second precept, which consists of again fixing this soul, made volatile from the fixed, which is done this way:

The finest gold is taken and reduced to calx, which is a fine deep ruby red powder. This may be done in many ways as is explained elsewhere, but particularly by distilling several times, the above calx of pure gold with purified quicksilver. It [the quicksilver] is put there, little by little, the aforesaid soul, or seed, or primordial material of the gold. Keep it on a very moderate heat in a hermetically sealed vessel. (Fig. 5) This imbibition is what they call 'ceration' [*incerazione*], and should be continued until the gold calx can no longer 'drink' any more soul. This will be after one part of it has drunk five [parts quicksilver] and will be more or less pure. In this way the soul that was volatile, united little by little with the fixed body even as it was fixing, but you must attend to it diligently, distilling it a little, leaving a little fixed; the former to be later added [back] to the other. Otherwise, instead of fixing itself it would make volatile even the fixed part, which is the calx. In this way the infant is fed, as the chemists say, and later it gets stronger and it is crowned monarch of all the metals, and this is done while the heat is gradually increased.⁸² This material becomes a deep red ruby, if it is a stone made by the soul of gold, or it becomes a very white pearl,

⁸² The alchemists tended to be somewhat vague regarding the fire necessary to execute the 'great work', for a knowledge of the different levels of heat required during the various stages of the transmutation process was considered to be one of the most important secrets of alchemy. The first level was about 60°C (140°F). The others were multiples (doubling or tripling) of this, and in total there were four levels. The second lay somewhere between the temperature of boiling water and the melting point of sulfur (100–119°C or 212–246°F); the third was the melting temperature of tin (232°C or 450°F); and the fourth was more or less the melting point of lead (328°C or 622°F). Cf. Poisson, *Teorie e simboli* (cit. note 75), pp. 114–119.

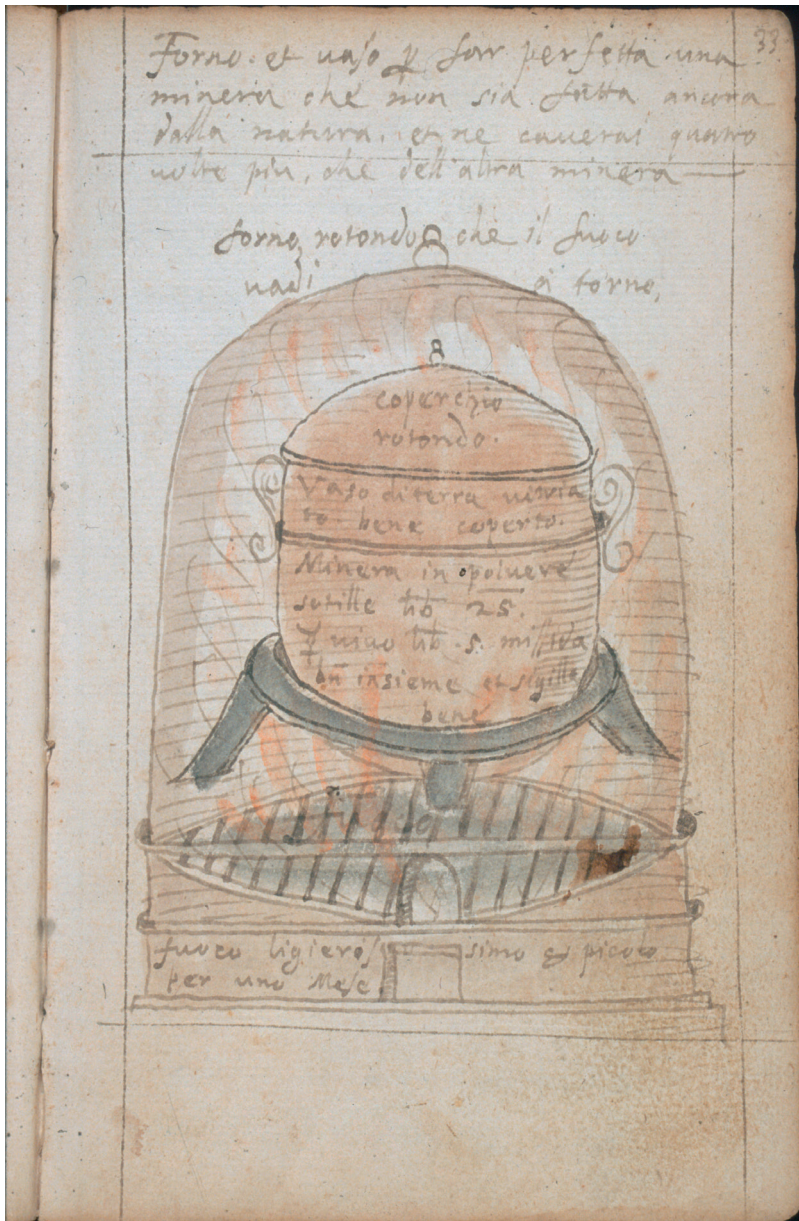


Figure 5. Circular Furnace in which a small fire, situated at the base, propagates uniformly around a glazed earthenware vessel with a lid. Neri, *Ferguson* (cit. Fig. 1), f. 33r. Glasgow University Library, Special Collections.

if it is made with the soul of silver, then this stone no longer fears any violence of the fire. In fact, it takes even more strength and for that reason, it is called 'salamander'.⁸³

Since in this stone, five parts of pure seed substance are perfectly united to one part of pure gold like five souls in one body, and it has acquired the virtue to multiply and to produce abundant fruit so that a single part can transmute a hundred, or a thousand or even more parts of other imperfect metals. However, this virtue of multiplication cannot grow to infinity as commonly asserted, but of the multiplication of the stone in virtue, and quantity I shall speak elsewhere.

It therefore remains only to find a menstruum suitable for the solution, and a reduction of gold into the primordial material, which I say is nothing more than the seed of gold itself, which is to say a fundamentally wet, subtle metallic [material], penetrating and stout, which is found in many metallic bodies, but is difficult to separate out, pure, clean and intact. Only quicksilver has it in more copious [amounts] or purer than in any other body, except in gold and silver. Therefore, those who want to work more purposefully and walk the true path must not make use of anything else but mercury and gold, because these bodies are the most amicable on earth as they are in heaven.⁸⁴ Thus, one approaches the other willingly, and

⁸³ The salamander is an amphibian somewhat similar to a lizard. It is the only animal among the vertebrates that is capable of regenerating its limbs or other body parts. According to ancient mythology the salamander could live in the heart of fire without being consumed by its flames. In alchemy, the symbol of the stone is sulfur and the 'secret of fire' indicates transformation and purification. The image of a salamander can be found in *Atalanta Fugiens* (1618) by Michael Maier. For medieval representations of the salamander, see Florence McCulloch, *Medieval Latin and French Bestiaries* (Chapel Hill: University of North Carolina Press, 1962), pp. 161-162. A Renaissance image of the salamander accompanied by a detailed description is contained in Conrad Lycosthenes, *Prodigiorum ac Ostentorum Chronicon* (Basel: H. Petri, 1557), p. 23.

⁸⁴ In the alchemistic tradition, gold and silver are often represented as the sun and moon, light and darkness, male and female, which come together in the 'great work'. Neri affirmed the hermetic parallels between the macrocosm and the microcosm, which were based on the belief that "what is below is like what is above." As Hermes Trismegistus wrote in the *Tabula Smaragdina*: "Quod est inferius, est sicut quod est superius/ et quod est superius, est sicut quod est inferius: ad perpetranda miracula rei unius" [What is below is like what is above, and what is above is like what is below: in order to accomplish the miracles of a single unity]. Postulating a unitary and indivisible reality, the macrocosm pertains to the whole and the microcosm is a reproduction of the macrocosm in miniature (see Fig. 6). The relationship between 'earth' and 'heaven' is founded on the principle of analogy. On the different interpretations of the term 'microcosm,' see Rudolf Allers, "Microcosmus from Anaximandros to Paracelsus," in *Traditio. Studies in Ancient and Medieval History, Thought and Religion*, 1944, vol. 2, pp. 318-407.

embraces it, intrigued, as can be seen by experience. It is very true, as some have rightly conjectured that the stone may be made with common mercury amalgamated with gold, but a very long concoction is necessary, of some years. Conversely when somebody employs the pure wet mineral artfully extracted from mercury and united with gold, which has been first purged and prepared, he would complete the 'great work' in a few months.

This is what I thought right to make known about this art; not only to show its possibilities, but also to benefit many and if nothing else, at least to remove them from the deception, consuming fatigue and expense of a wide variety of vessels, stoves, minerals, and semi-minerals, plants, animals, and instruments [which are] far from the simple way to operate by which you must imitate nature. Take also for certain that the work is very easy child's play and women's work, that the nature of the 'stone' is unitary, only a single vessel, a single heat, indeed only a single operation, which takes the various names of 'purification', 'sublimation', 'circulation', 'precipitation', 'fusion', etc. These names derive from the different effects that are manifested from the beginning to the end of the [great] work.⁸⁵

I want to end this discussion, by revealing the greatest secret in this art that one can find, and although I was conflicted, if I should reveal and write on a matter of such great consideration, I was eventually won over by a desire to benefit others and to give light to those who possess the basic principals of chemistry, who can easily reach the goal of their desire, if it is not contrary to the purposes of divine providence [God], who as was said attends especially to these matters.

I say then that in managing the difficulty of destroying the gold, and extracting the pure seed from it, we can take a shorter much easier path in which we will find the said seed, which is not as yet converted into gold. The gold mines are not all in the same condition, which is well understood for those of silver and all the other [metals]. Some are already perfect, in which nature has done what it could do and reduced the gold to its maturity, while other [mines] are still imperfect and in their infancy. In these nature has prepared the seed well, but through its means has not yet matured the fruit, for it is not yet any more than seed, or primordial material and the other closely related substances from which the gold forms itself, perfect and mature. There it will be easy to obtain, extracting it from all the other impure mineral substances.

⁸⁵ Avicenna as well wrote in "Declaratio lapidis physici Avicennae filio suo Aboali": "There is but one stone, a single mode of operation, a single fire, and a single method to fire in order to come to the white and the red, and everything is done in a single vessel," in *Teathrum Chemicum*, ed. Lazarus Zetzner (Strasbourg: Argentorati, 1613), vol. 4, p. 880.

I would not say this had I myself not had the good fortune of being in such a mine from which, with much artifice, was extracted a small quantity of real gold liquor, which was the true golden seed. However, since it was not recognized [as such], it was completely consumed by sprinkling it over a quantity of boiling quicksilver, which immediately congealed. When the fire was increased, five parts of it remained perfectly fused, which is to say, half an ounce of the liquor fused with 2 ½ [ounces] of quicksilver, which if it had been more purified and then joined in proportion as a soul to its body, we could have formed the real stone with it. To this day I have never found another mine like it, and therefore suitable for this purpose. Anyone seeking what has so far been described needs no other [assistance], than that of being favored by divine providence, which permits that we find such a mine of gold or true silver. But remember this is a singular 'gift of God' [*Donum Dei*], who usually only grants it to people of the right intentions, in order that unrest does not ensue, which as we said would be contrary to the purposes of His providence.

Finally we must answer to the usual objections against the possibility of transmutation, although this should not be necessary, already having had the experience of seeing it. We begin with what St. Thomas said in *Sent.* 2, *Distin.* 7:8⁸⁶ Averroë in *p.mo lib. De generat. Anim.*,⁸⁷ and Avicenn. in *comm. Metheor.*,⁸⁸ that gold made by the chemical arts is not real gold, because the true form of gold cannot be introduced into a material except by celestial

⁸⁶ Neri is referring to Saint Thomas's discussion in the second of *The Sentences* (*Scriptum super libros Sententiarum*, distinction 7, question 3, article 1, ad quintum) of Averroës's remarks on *De Generatione Animalium*. This passage is cited by Athanasius Kircher in *De Alchimia Sofistica*, Book 1, where in Chapter 2 entitled "Decisiones Juridico-canonicae. De Auro Chimico, falso, et vero" on p. 104 we read: "*D. Thomae, de auro vero Alchymico sic dicit. 2 sent., dist. 7, q. 3, ar. 1: 'forma substantialis auris non est per calorem ignis, quo utuntur Alchymistae, sed per calorem solis in loco determinato, ubi viget virtus mineralis'*" [The substantial form of gold is not produced by the heat of fire, as the alchemists suppose, but by the heat of the sun, in the specific places where the mineral property flourishes].

⁸⁷ Cf. Resianne Fontaine, *Averroë's Commentary on Aristotle's De Generatione Animalium and Its Use in Two Thirteenth-Century Hebrew Encyclopedias* (Leiden: Brill, 2008).

⁸⁸ This is a reference to Avicenna and his commentary on Aristotle's "Metereologica," the fourth book (Metals) of *De Caelo*. In it Aristotle describes the phenomena that occur between earth and sky as well as on the surface of the earth – not only meteorological processes, but also geological phenomena. The fourth book is a separate treatise which explains the origin of metals and minerals, and was originally intended to follow Book 2 of *De Generatione et Corruptione*. Once considered spurious, it is now acknowledged to be authentic. At the end of *Metereologica*, Aristotle promises a treatise on stones and metals, and this opened the way for the Apocrypha.



Figure 6. In the Hermetic vision of nature the world is conceived as fully alive, consisting of an infinite correspondence between the macrocosm and microcosm. For each celestial body there is a corresponding metal, which reproduces its characteristics. Neri, *Ferguson* (cit Fig. 1), f. 1r. Glasgow University Library, Special Collections.

and solar heat, as the heat of the fire that serves chemists is very different and it follows that it cannot generate real gold.

To which the first reply is that the warmth of our fire is not especially different from that of the sun and stars, since it produces many effects that are similar and therefore can produce even gold. In addition to that, with the rays of the sun, a pure celestial substance descends until [falling upon] our earth.⁸⁹ If anyone finds a way to capture it in this vast ocean of air and reduce it into visible liquor, he will have the key to all secrets and I say will almost be the lord of nature, which uses such a substance to produce all the effects and marvelous mutations that we see in this low land.

In the second objection, raised by Giles⁹⁰ that those things of any kind that are perfect, have a single specific cause of their generation. Of all the

At the beginning of the thirteenth century, Alfred of Sareshel translated into Latin and summarized parts of the first and fourth sections of the Second Discourse in the Fifth Argument of “Libro del Rimedio” [Book of Remedies] written by Avicenna between 1021 and 1023 and inserted into the fourth book of “Metereologica.” This short text, known in Latin as *De Congelatione et Conglutinatione lapidum*, acquired the authority of an Aristotelian work with the title *De Mineralibus*. It describes geological processes and the formation of metals, which Avicenna believed came about through the combination of mercury and sulfur in different quantities and of different degrees of purity. According to Avicenna, natural and artificial products were inherently different; alchemists could produce imitations of precious metals by inducing superficial characteristics, but they could not transform one metal into another.

In the Middle Ages, *De Caelo* was printed along with *De Mineralibus* (see Griet Galle, *Questions on Aristotle's De Caelo* (Leuven: Leuven University Press, 2003); *Aristotle*, translated by William David Ross and edited by John L. Ackrill (London: Psychology Press, 1995); Italian translation by Altiero Spinelli, *Aristotele* (Milano: Feltrinelli, 1976).

⁸⁹ To the first objection – that only the sun's heat could introduce the true form of gold into other materials – Neri replied that the heat of fire is not substantially different from that of the sun because it had many of the same effects. He also reaffirmed the Hermetic doctrine that the fertility of the sun was what generated all life. Through the sun, creative power passes from the celestial world to the terrestrial world in the form of a quintessence (see note 47). On the fertility of the sun and its centrality to Renaissance – and not only magical – thought, see Betty J.T. Dobbs, *Isaac Newton scienziato e alchimista. Il doppio volto del genio* (Roma: Ed. Mediterranee, 2002), original title *The Janus Faces of Genius* (Cambridge: Cambridge University Press, 1991).

⁹⁰ Giles of Rome (born Rome 1247 – died Avignon 1316) studied in Paris and became a philosopher and a theologian of the Order of the Hermits of St. Augustine. Considered to be a disciple of Saint Thomas Aquinas, he also incorporated Augustinian doctrines into his thought. Giles wrote extensively on both philosophical and theological matters, adopting firm and clear positions on the most widely debated issues of his time. He was the author of, among other things, a short treatise entitled *De erroribus philosophorum* (1270), in which he argued that nature always proceeds with an efficient cause, a material cause, and a specific place in the generation of things. He furthermore insisted that only nature could create gold, and did so through the heat of the sun. Cf. Giuseppe Donzelli, *Teatro Farmaceutico*,

metals, gold is the most perfect, therefore in only one way can it be generated, which is that adopted by nature, therefore it cannot be generated by art.⁹¹

The response is that the chemical art lets the gold proceed from that present and immediate cause, because this is the seed of gold, which acts naturally when art cooperates. The chemist does nothing but extract the seed from gold and apply it to suitable bodies, with which it is united to render the fruit multiplied in the same way that the farmer does. He does not produce the fruit, but provides and prepares the earth and the seed, uniting them in such a way so that they bear fruit.

The third objection is that the place of the generation of metals is determined in this way: that nature always produces them in the bowels of the earth, where all the competing celestial influences come together and consequently cannot generate gold outside of the bowels of the earth.

The reply is that the place of generation of gold is not so well determined [such] that it cannot be produced outside of the earth. As long as there is suitable material, ready to receive the seed of gold just like other seeds of herbs, or plants, brought up to the rooftops of houses, they produce their usual fruit provided that they find soil or material in which to germinate.⁹²

The fourth [objection] says that art cannot change one substance into another of a different species, because this [ability] belongs solely to nature.

dogmatico, e spagirico (Napoli: Barone di Digliola, 1726), Part 2, p. 101; on the thought of Giles of Rome, see Battista Mondin, *Storia della Teologia: Epoca Scolastica* (Bologna: Ed. Studio Domenicano, 1996), vol. 2, pp. 461–463.

⁹¹ The second objection raised against alchemy concerns the relationship between art and nature. Neri argued that art is not a substitute for nature, but collaborates with it. There is no conflict between nature and art, because the latter is simply the completion of the former. Transmutation is therefore not the result of a violence committed against nature, but of actions designed to support its processes.

An example of this objection is expressed in the pages of *Pirotechnia*, where Biringuccio argues that nature proceeds 'intrinsically', while art tries 'feebly' to imitate it 'by paths external and superficial'. Cf. Vannoccio Biringuccio, *De la Pirotechnia* (Milano: Ed. Il Polifilo, 1977), f. 5v. Most of the arguments against the efficacy of the alchemical process were based on this idea of the relationship between art and nature. Nevertheless, Neri firmly opposed any notion of the 'weakness' of art in comparison to nature. Cf. in this regard: Paolo Rossi, *I filosofi e le macchine. 1400-1700* (Milano: Feltrinelli, 1980), Appendix I, pp. 139–147.

⁹² The third objection contended that metals can only be generated in the bowels of the earth. Avicenna stated that "*natura in visceribus terrae consuevit generare*" [nature is accustomed to creating in the bowels of the earth], cf. '*Declaratio Lapidis*' in Manget, *Bibliotheca* (cit. note 49), p. 634. The heat of the sun and astral influences, by penetrating the earth, gave birth to the different metals. These then came up through the metal-bearing veins, congealed and hardened, by means of a sort of 'maturation'.

The reply is less that a metal is no different from another species, but more that it is different. Do not say that the art transmutes, but that it is nature assisted by art. The artisan does nothing but apply one material to another, by which proper application provides that one substance is mutated into the other to which it was united by the artisan. Therefore, the seed of gold when it is joined to mercury in a proper way transmutes it into gold in the same way that the seed of wheat joined to the soil transmutes the soil itself into grain. So it is said that art does not do the work that makes nature, but only amends nature, causing it to act sooner or later, in this or in that way, as seen in many arts and particularly in the grafting of one tree onto another.⁹³

Similarly, when it is said [argued] that gold cannot be made the by the artisan, for he does not know the proportion of the elements, which compose it nor the temperament of the qualities, nor the tools which nature uses.

The reply must be that it is not necessary to know these things, since the art does not immediately work the effects of nature, but only gives it [nature] the material, which if it has first been prepared and readied by art, nature works in them more easily and in an extraordinary way.

The final of these few objections is that we do not know if [al]chemical gold is real gold, of the same form and substance as true gold. Then they say that the changes could be only superficial, and only appeared to be gold.⁹⁴

⁹³ To the fourth objection – that only nature can transform one substance into another of a different species – Neri replied by invoking a popular motif in the alchemical tradition – that of the graft, which bridged the gap between two parallel activities, chemistry and agriculture. Both of these arts require the interaction between the acts of nature and the acts of man. The theme of the graft was a topical motif which demonstrated that products could be at one and the same time natural and artificial. Significant in this regard is an observation by Roger Bacon: “*Dico ergo quod in plantis est duplex agens: immediatum, ut natura intra, agens extra ut occasio solum: est homo plantans, quod est artifex*” [Therefore I say that in plants there are twin agents: an immediate one, proper of nature, and an external agent, only occasional: man who plants, who is the artisan]. See Roger Bacon, *Opera hactenus inedita Rogeri Baconi. Fasc. XI, Quaestiones supra de Plantis*, ed. R. Steele (Oxford: Clarendon Press, 1932), p. 252. Also in *Liber Hermetis*, partially present in Newman, *Summa Perfectionis* (cit. note 80), Appendix 2 of ch. 1, pp. 53–54: “*Arbor spontaneus naturalis et insists artificialis utraque arbor arbor east Nec... ars haec omnia facit, sed naturam faciendam adiuvat*” [The natural spontaneous tree and the tree that is cultivated artificially, both of them are trees... and the art does not produce them, but it helps nature to make them].

⁹⁴ The objection that chemical gold has only the superficial ‘*accidenti*’ [appearance] and not the substantial form of gold was posed by Saint Thomas (Second Judgment, dist. 7, q. 3, art. 1) in Manget, *Bibliotheca* (cit. note 49), vol. 1, p. 104: “*Sunt tamen quaedam formae, quas nullo modo ars potest efficere, quod propria activa, et passiva principia earum non potest*

To which the reply is that for physical things you cannot have any greater certainty, than that given to you by the mutual agreement of all the senses. They [the senses] know substances only through appearance, so that when they all present the appearance of real gold, intellect naturally must assert that it is real gold.

In addition, gold is known much more intimately, rather than by external appearance, by applying to it the various tests and assays⁹⁵ reduced to nine by Geber:⁹⁶ Making red-hot [ignition]; extinguishing [quenching]; melting; uniting that is done with quicksilver [amalgamation], because the true gold is united to it more easily; mixing with burning material [sulfur]; putting it into acid vapors; placing [heating] in a cupel; giving it the 'cement royal'; and reducing after calcination; with the other usual tests to be done by artisans and refiners.

Enough has been said about the art of chemistry and the transmutation of metals and [the fact] that gold can be made.

I will keep on demonstrating several experiments performed by me, as quite true, but I have described them obscurely even if I [myself] found them very clear, but I will not write of them, nor give them out in any other manner because it is not the place of the common man to know or learn. Nevertheless, the virtuous in this art, with study will learn very well the way this must be done and how this secret must be handled, provided that there is concurrence in the will of God.

invenire, et adhibere, sed bene aliquid simile illis efficere, sicuti Alchymistae faciunt aliquid simile auro, quantum ad accidentia exteriora, sed tamen non faciunt verum aurum [There are some forms that art cannot produce at all because it cannot find and use their own active and passive principles, but it (art) can produce something similar].

⁹⁵ Up until the mid-1500s, alloys of gold and silver were assayed at the Mint with antimony sulfide or using 'cement royal': a mixture of common salt, vitriol [sulphate of iron or copper], and brick powder, as explained by Neri. Towards the end of the sixteenth century antimony sulfide was replaced by aqua fortis (nitric acid), but this process was far from satisfactory (see Louis Figuier, *L'Alchimie* (cit. note 50), pp. 77-87).

⁹⁶ At the end of the *Summa Perfectionis Magisterii* by Geber tests for assaying gold are discussed, and nine are listed: "cineritium, cementum, ignitio, fusio, super vapores acutorum expositio, extinctio adurentis, sulphuris in mixtione probatio, calcinationis et reductionis reiteratio, et argenti vivi facilis aut difficilis susceptio" [cupellation, cementation (cement royal), ignition, melting, exposure to acid vapors, extinction of mixture with burning sulfur, repeated calcination and reduction, and the ability to (easily) amalgamate with mercury], which Geber goes on to describe in more detail. Cf. Manget, *Bibliotheca* (cit. note 49), vol. 1, pp. 553-557. On tests for assaying gold, see William R. Newman and Lawrence M. Principe, *Alchemy Tried in the Fire* (Chicago, The University of Chicago Press, 2002), pp. 43-44; Robert Halleux, "L'Alchimiste et l'Essayeur" in *Die Alchemie in der europäischen Kultur und Wissenschaftsgeschichte* ed. Christoph Meinel (Wiesbaden: In Kommission bei O. Harrassowitz, 1986), pp. 277-291.