

# REASON TRIED BY FIRE: THE *ROTA ALPHABETALIS* AND OTHER LOGICAL AND MNEMONIC DEVICES IN THE PSEUDO-LULLIAN ALCHEMICAL *CODICILLUS*

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**Abstract:** This article explores the *Codicillus*, a pivotal yet understudied text within the pseudo-Lullian alchemical corpus, dating back to the mid-fourteenth century. The aim is to present the conceptual development of the alchemical doctrine contained in the work by elucidating its key logical and mnemonic devices. These include the three alchemical principles (material, demonstrative and operative), the division of the *opus* in four stages, the so-called ‘science of middles and extremes’, and an alphabetical wheel of the elements. Through this analysis, the *Codicillus* emerges as a remarkable instance of operational rationality in medieval experimental science, as well as an early application of the ‘Art of Memory’ to alchemy.

**Keywords:** Pseudo-Lullian corpus; *Codicillus*; Alchemical diagrams; Medieval experimental sciences; Art of Memory; Operative rationality; *Rota alphabetalis*; Diagrammatics; *Ars combinatoria*.

## The Pseudo-Lullian Alchemical *Codicillus*

The pseudo-Lullian corpus is a large collection of alchemical texts in Latin written between the 14<sup>th</sup> and 17<sup>th</sup> centuries and attributed to the catalan philosopher Ramon Llull as early as around 1370.<sup>1</sup> Today, however, it is well-established that this is a pseudo-epigraphic attribution – partly a result of tradition and partly a deliberate forgery. Llull did not write any alchemical work and, in fact, opposed the very idea of metal transmutation. The author who initiated the corpus around 1332 with the *Testamentum* – if not the oldest work in the collection, certainly the most significant – remains anonymous and is often referred to as the *Magister Testamenti*.<sup>2</sup> He was likely a Catalan physician trained at the scho-

1 On the pseudo-Lullian alchemical corpus – its composition, origin, and catalog of works – see PEREIRA 1989. For the most recent retrospective of Michela Pereira’s decades-long work on the subject, see PEREIRA 2022.

2 On the alchemical doctrine of the *Testamentum*, sources, manuscript tradition, and a possible profile of its author, see PEREIRA 1992; Ps.-LLULL 1999. The latter is the reference, albeit not critical, edition of the *Testamentum*; therefore, I will quote from it here. In a recent contribution, RODRIGUEZ GUERRERO 2019–2023 proposed identifying the author of the *Tes-*

ol of Montpellier, and well-versed in the works of Ramon Llull and Arnau de Villanova. In fact, the central motif of the corpus from its inception, beyond the transmutation of metals, is the elaboration of the elixir of long life (*elixir vitae*).<sup>3</sup> It is through the elixir that the pseudo-Lullian works are tied to the preceding medico-chemical tradition, while their influence extends forward to Paracelsus and beyond.

Within this collection, we find the *Codicillus*, likely written shortly after the *Testamentum* and possibly by the same author.<sup>4</sup> The *Codicillus* is presented as a compendium of the *Testamentum*,<sup>5</sup> with a length approximately one-third that of the major work.<sup>6</sup> Like the *Testamentum*, the *Codicillus* is divided into a theoretical section of a speculative nature (*Theorica*) and a practical part focused on laboratory operations (*Practica*). The contents of the two works are similar and coherent, to the extent that the author of the *Codicillus* explicitly quotes the *Testamentum* on several occasions, continually urging the reader to consult it for comparison and to complete his exposition.<sup>7</sup> Furthermore, among the approximately 50 manuscripts preserving the *Codicillus* (none predating the 15<sup>th</sup> century), nearly half also include the *Testamentum*.<sup>8</sup>

*tamentum* as Ramon de Termens.

3 In addition to the works by Michela Pereira already mentioned, cf. PEREIRA 1995; PEREIRA 2016.

4 Alternative titles: *Clausula testamenti*; *Compendium Testamenti*; *Thesaurus infinitus*; *Vademecum de numero philosophorum*. Incipit/Explicit: “Deus in virtute trinitatis qua unitas divinitatis non taeditur.../...facere potes dum tamen intelligas magisterium.” In Michela Pereira’s catalogue of pseudo-Lullian works (PEREIRA 1989), the *Codicillus* has the signature MP I.10. Due to the lack of a critical edition, in this work I will quote the *Codicillus* from Prague, National Library of the Czech Republic, ms. XXIII.D.132, ff. 100r-129v, whose edition and study, together with the marginal notes by Nicholas of Cusa, constitute the work in progress for my doctoral dissertation. I reserve for another time the question, if the author of the *Codicillus* is the same as the author of the *Testamentum*; it is worth mentioning, however, that from my own study of both works, I have noted significant differences between them regarding their sources, as well as a notable difference in style.

5 *Codicillus*, f. 100r: “Deus, in virtute Trinitatis, qua unitas divinitatis tuae non laeditur neque confunditur in aliquo, incipimus praesens compendium, quod aliter *Vademecum de numero philosophorum* sive *Clausula Testamenti per modum codicilli* nominari iubemus...”

6 In the Prague manuscript, the *Testamentum* consists of about 180 folios, while the *Codicillus* comprises 58 folios, i.e., almost exactly one third of the former.

7 See, for example, *Codicillus*, f. 104v: “Intellige ergo hanc *Theoricam* et incipias operari, nam cum illa corriges errores cum fueris in opere, et sine illa non. Nec distet a te *Testamentum*, nam cavernas tuas huius theoricae aperit et revelat cum certis operationibus notis. Habeas cor ad practicam.”

8 See a simple cross-reference to the *Testamentum* in the manuscripts containing the *Codicil-*

The later composition and certain subaltern status of the *Codicillus* in relation to the *Testamentum* are likely the reasons why it has received relatively little scholarly attention, studied almost exclusively as a means to clarify difficult points in the major work.<sup>9</sup> It is worth noting, however, that despite its subordinate position, the *Codicillus* enjoyed considerable independent success in modern times. In addition to the aforementioned large number of manuscripts, the work saw three printed editions in the sixteenth and seventeenth centuries and was included in the *Bibliotheca Chemica Curiosa*, the renowned alchemical miscellany published in 1702.<sup>10</sup> The *Codicillus* notably differs from the *Testamentum* through its much greater pedagogical focus, organizing the alchemical *opus* in a highly schematic manner that results in a clear and synthetic exposition of the *Testamentum's* doctrine. While some aspects of theoretical originality can certainly be attributed to the work, it is its effective use of – what we might today call – cognitive and diagrammatic<sup>11</sup> tools that secured the *Codicillus* a lasting place in the alchemical tradition and makes it particularly significant in the context of the history of rationality. The purpose of this article is, therefore, to present the conceptual elaboration of the alchemical doctrine contained in the *Codicillus* by describing the main logical and mnemonic instruments that articulate its theoretical proposal: the three types of alchemical principles (material, demonstrative and operative), the division of the *opus* into four stages, the science of ‘middles’ and ‘extremes’, and the so-called alphabetical wheel. In this exposition, I aim to demonstrate that the *Codicillus* offers a notable example of operational rationality in the experimental sciences of the Middle Ages, as well as an intriguing and early application of the ‘art of memory’ to alchemy.<sup>12</sup>

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*lus* in the LullDB database: <https://www.ub.edu/llulldb/obres/MP+I.10>.

9 This is the predominant way PEREIRA 1992 utilizes the *Codicillus* in his monograph on pseudo-Lullian alchemical doctrine.

10 Ps.-LLULL 1563; Ps.-LLULL 1572; Ps.-LLULL 1651; MANGET 1702, *Codicillus seu Vade mecum*, 880–911. The latter is regarded as the standard reference edition. The PEREIRA 1989 catalog and the LullDB database both list Ps.-LLULL 1630, *Vade mecum*, 258–273 and Ps.-LLULL 1663, vol. II, *Vade mecum*, 257–271 as containing the *Codicillus* (MP I.10); however, they actually contain a different work with a similar title, the *Liber artis compendiosae qui Vade mecum nuncupatur* (MP I.30).

11 I use the term ‘diagrammatic’ according to the usage given in KRAEMER 2010, a well-known article on diagramatology. For a recent overview of diagrammatic reasoning which, however, does not take alchemy into account, see HIGUEIRA RUBIO 2023.

12 See the classic study on the art of memory by YATES 2013.

## The Three Types of Alchemical Principles

The author begins the treatise by establishing three types of alchemical principles: material principles (*principia materialia*), demonstrative principles (*principia demonstrativa*), and practical principles (*principia practicalia*).<sup>13</sup> He considers these principles as general instruments of the medical-alchemical art, thus applicable not only to the creation of the elixir but to the production of any medicine.<sup>14</sup> Although the author promises a tripartite division of the treatise based on the three types of principles – potentially modeled on the tripartite division of medieval medicine into *res naturales*, *non naturales*, and *contra naturam* –, he ultimately devotes a single chapter to each principle (5, 6 and 7, respectively). It is worth noting, however, that he frequently references these principles throughout the text. What follows is a brief overview of each type of principle.

The material principles are divided into two categories: ‘natural’ (*naturales*) and ‘against nature’ (*contra naturam*).<sup>15</sup> Mercury (*argentum vivum*) and sulphur (*sulfur*) are regarded as natural principles, while vetriol (*vitriolum*) and salt (*sal*) are considered as principles against nature. These four substances are respectively the principles of generation and corruption of metals. The author of the *Codicillus* seems to follow the mercury-sulfur theory of Arabic origin, according to which metals are composed of varying degrees of purity and proportions of mercury and sulfur.<sup>16</sup> However, he introduces an Aristotelian twist, stating that

13 *Codicillus*, f. 100r: “In quo quidam compendio... determinavimus perfecta declaratione effectum totius practicae huius artis et operandi modum per certa et efficacia instrumenta, quae sunt trium generum principalia principia in hac arte.”

14 *Ibid.*: “Facimus autem formam nostri compendii tripertitam de tribus generibus principiorum cum omnibus regulis huius artis, quibus velut effectivis instrumentis et propriis non solum iam dictae, quin immo etiam cuiuscumque traditae compositionis medicinarum, artis veritatis illuscescat, et quam promptius directo tramite habeatur.”

15 *Ibid.*, f. 100v: “Naturales vero sunt sulfur et argentum vivum: ex hiis gignitur amor metallicus, per quem fit generatio rei petitaе quando eorum propria individua naturali foedere invicem colligantur... Contra naturam vero sunt natura vitrioli et sal naturae communis, ex quibus oritur... corruptio rei petendae, in quantum, videlicet, deterior natura eorum iuvatur super meliorem sulfuris et argenti vivi.”

16 *Ibid.*, f. 102r: “Exemplum de materialibus: sulfur vero et argentum vivum sunt extrema omnium metallorum, ergo metalla erunt media inter sulfur et argentum vivum. Sed metalla differunt ab argento vivo in eorum compositione illo modo, quo ipsum differt per puritatem vel impuritatem a sulfure immundo, terreo, extraneo sibi. Propter quod, magis depurata aliis duo reperiuntur, ut aurum et argentum, sine quibus ars ista integrari non potest, cum in illis sit purissima sulfuris substantia ingenio naturae perfectae depurata.”  
On the mercury-sulphur theory in the Arab-Latin tradition, also in relation to the history

mercury represents the matter, while sulfur represents the form, emphasizing the strong connection between the two as a 'love bond' (*amor metallicus*).<sup>17</sup> Regarding the material principles 'against nature', it is possible that the terms 'vitriol' and 'sal' refer to types of mineral acids, whose dissolving effects on metals would be considered the cause of their corruption. The demonstrative principles (*principia demonstrativa*) are represented by the four colors: black (*nigredo*), white (*albedo*), yellow (*citrinatio*) and red (*rubedo*).<sup>18</sup> Faced with the vast range of colors produced during the *opus*, primarily through the actions of fire, the author narrows the focus to these four, employing Aristotelian logical terminology to distinguish between two categories: accidental (*per accidens, accidentales*) and substantial (*substantiales*).<sup>19</sup>

The four substantial colors are, thus, the visible signs (*signa*) most consistently manifested in material substances during the various operations of the *opus*. As such, they serve as guiding markers for the alchemist on the path to creating the elixir. Furthermore, the correct sequence of colors – progressing from black to red, through white and yellow – provides the alchemist with a framework to regulate their work, allowing them to calibrate their interventions (*se regulare*) on the material substances accordingly.

Finally, the practical principles are represented by the four alchemical operations: solution (*solutio*), purification (*ablutio*), reduction (*reductio*) and fixation

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of chemistry, see NEWMAN 2014.

17 *Codicillus.*, f. 100v: "Hoc autem, carissime, est argentum vivum nostrum in se formam recipiens sulfuris vel metalli, secundum quod virtus illorum unius vincit virtutem alterius vel ad temperamentum adinvicem, ut regis natura metallorum ostendit, cum sit in nobiliori formarum."

18 *Ibid.*, f. 101r: "Demonstrativa vero principia generalia, quibus artifex signis praecognitis insignitus... artificialiter informatur, sunt illa signa quae magis habitu fixa a materialibus principiis successive in decoctionibus emittuntur, et sunt hic quattuor principales colores, scilicet: nigredo, albedo, incineratio, et rubedo. Et ex hiis emanantur tot colorum mixturae per accidens, quot in tota natura possunt excogitari, sed non remanent in effectu, nisi tantummodo quattuor supradictae, velut rectrices totius magisterii. Quorum primus, scilicet nigredo, terminatur in album, deinde album illud in cinerium, et postea cinerium terminatur in rubeum, quod est ultimum principium demonstrativum, finis perfectionis totius magisterii."

19 *Ibid.*, f. 117r: "Artifex debet se regulare per signa demonstrativa, quae sunt colores in opere apparentes, tam substantiales quam accidentales, licet alumnus artis de accidentalibus non debeat curare, nisi solum de principalibus substantialibus, quae sunt quattuor, scilicet, niger, albus, citrinus et rubeus, in qualibet decoctione apparentes, secundum magis et minus donec sit completum."

(*fixatio*).<sup>20</sup> The *solutio* consists in the dissolution of the raw materials into the four Aristotelian elements (*terra, aqua, aer, ignis*); the *ablutio* consists in the purification of each element separately; the *reductio* consists in the recomposition of the four purified elements into a superior version of mercury and sulphur; and, finally, the *fixatio* consists in the production of the elixir from the union of the superior mercury and sulphur. This simplified presentation of the four operations, of course, masks the complex (and often confusing) laboratory activities of the alchemist at each stage. In fact, as the author notes, each operation is further subdivided into several other operations, totaling more than twenty in all.<sup>21</sup>

At this point, it is important to clarify a potential source of confusion: the meaning of the term *materia prima* in the alchemical field. The four substances that constitute the material principles – particularly mercury and sulphur – do not directly correspond to the raw materials subjected to the *solutio*. In practice, the alchemist initiates the transformation process by dissolving (‘corrupting’) a portion of gold or silver to extract a purer and finer version of mercury and sulfur than that found in less noble metals, such as lead or iron. This refinement facilitates the purification of mercury and sulfur, as, according to the medieval classification of metals, gold and silver are considered closer to perfection – and, by inheritance, so are their constituent elements. Thus, sulfur and mercury are considered the *materia prima* in the sense that they constitute the essential components of metals, but not necessarily in the sense of being the raw materials with which the *opus* begins – a role more accurately attributed to gold and silver.

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20 *Ibid.*, f. 101r: “Tertii sunt generis principia operativa in hac arte sunt principales quattuor convertentes, videlicet: solvere, abluere, reducere, et figere. Et... ex quolibet istorum dependent plura alia particularia principia practicalia actus ignium respicientia et eorum informationes, ut puta naturalis, innaturalis, contra naturam, et artificialem...”

21 *Ibid.*, ff. 104v–105r: “Prima enim pars ostendit modum graciliandi grossum per liquefactionem, elementationem, dissolutionem et lapidis separationem per quattuor elementa. Secunda pars ostendit modum alleviandi ponderatum per distillationes, calcinationes, rarefactiones, condempnationes, inhumationes, congelationes, solutiones et et animationes quae sunt elementorum praeparationes. Tertia pars ostendit modum lenificandi asperum ac lapidis nutrimentum per imbibitiones, decoctiones, assationes, inhumationes et lapidis sublimationes. Quarta pars ostendit modum dulcescendi amarum et maturandi crudum per reductiones, impinguationes, inhumationes, fomentationes, animationes, fixationes et incerationes.”

From what has been said about the three alchemical principles, it is clear that the *Codicillus* seeks to organize a predominantly empirical body of knowledge into a structure that is easily recognizable. While acknowledging the continuous and gradual properties of phenomena, the alchemist's rational intent imposes discrete categories and patterns to maximize the memorability of the operative framework. Furthermore, note the author's effort to maintain a certain numerological consistency, typical of medieval thought: the ternion in the three types of principles; the quaternion in the four species of each principle; the binion in the two sub-genres of material principles; and unity, lastly, in the one final product (which, elsewhere, he calls the *suprema omnium medicina medicinarum*).

A simple diagram (Figure 1), created by a sixteenth-century hand in a manuscript from the preceding century,<sup>22</sup> essentially summarizes the three types of principles just described, demonstrating that the schematic nature of the work was quickly appreciated:

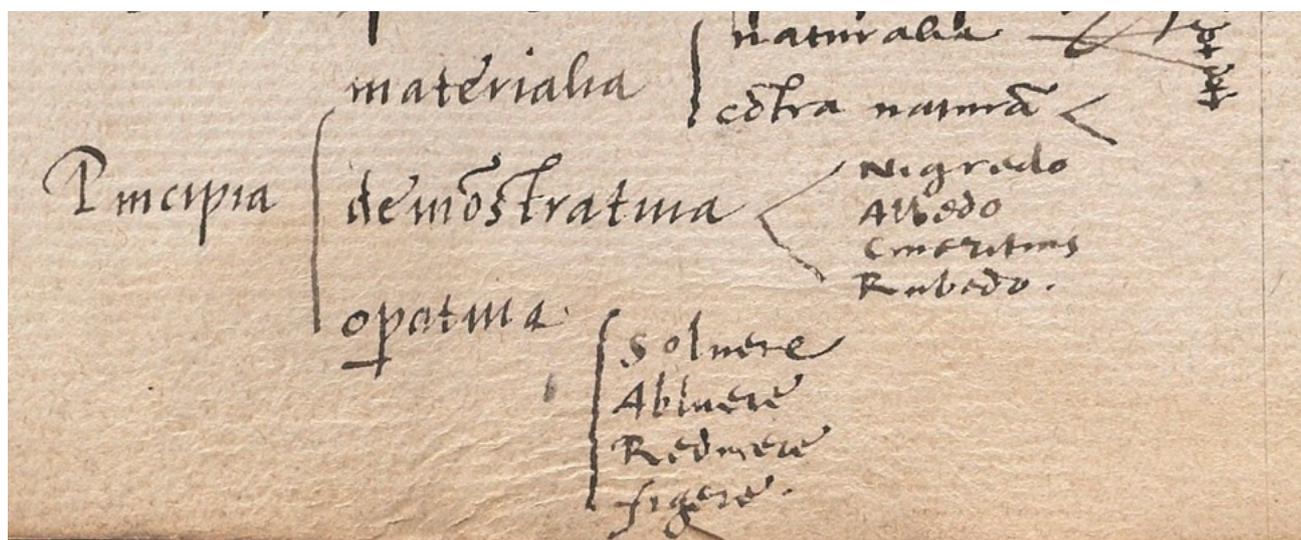


Figure 1: New Haven, Yale University Library, Mellon Collection, MS. 12, f. 171v. Diagram of a 16<sup>th</sup>-century hand visualizing the three alchemical principles of *Codicillus*.

<sup>22</sup> New Haven, Yale University Library, Mellon Collection, MS. 12, f. 171v.

The three types of alchemical principles in the *Codicillus* are neither static nor strictly linear; rather, they are dynamic, interconnected, and relate to each other within a single process that is both cognitive and functional.<sup>23</sup> The alchemist must use the alchemical operations (i.e., the practical principles) to transform the initial substances (i.e., the material principles) step by step, until obtaining the elixir. Throughout this process, the alchemist must pay attention to the colors emitted at each stage (i.e., the demonstrative principles), which guide him in the correct execution of the *opus*. This, in the most essential and systematic way, constitutes the entire alchemical magisterium according to the doctrine of the *Codicillus*.

### The Division of the Magisterium into Four *Regimina*

In addition to the structural division of the alchemical framework into three types of principles, the author of the *Codicillus* also introduces a methodological breakdown of the practical aspect of alchemical practice (*magisterium*) into four stages, called *regimina* ('government, rule, direction'), each corresponding to one of the four alchemical operations.<sup>24</sup> Each operative principle is paired with one of the four demonstrative principles, so that a specific alchemical color characterizes and accompanies each *regimen* throughout its entire duration.<sup>25</sup> Thus, the *solutio* initiates the *nigredo*, the *ablutio* starts the *albedo*, the *reductio* begins the *citrinatio*, and the *fixatio* leads to the *rubedo*. It is crucial for the alchemist to observe the precise sequence of colors that marks the beginning of each of the four operations; any deviation from this order signals an error, typically caused

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23 *Codicillus*, f. 100v: "Sed primo intelligendum, quomodo ex iam dictis principiis formantur plura alia principia, quae ad unguem per litteram revelabimus, secundum quod iam dicta materialia principia ab eorum natura labuntur, et successive gradualiter alterantur notis et certis operibus per practicalia principia directa et gubernata mediante doctrina intellectuali, quae per demonstrativa principia regulantur."

24 *Ibid.*, f. 104v-105r: "Magisterium hoc in quattuor dividitur partes, secundum quod sunt quattuor principia practicalia... Verum si grossum facis subtile per dissolutionem, et ponderatum leve per levigationem seu rarefactionem, asperum quoque leve per reductionem, et amarum dulce per maturationem et volatilium fixationem, habebis completum magisterium."

25 *Ibid.*, f. 105r: "Et primo de primo principio practicali sive regimine, quod est dissolutionem cum suis quattuor primis principiis materialibus et eius principio demonstrativo, quod est nigredo, sine quo gubernari non potest." Here, I limit myself to citing the example of the couplet *solutio-nigredo*, as it is the most concise and evident in the treatise.

by improper handling of fire.<sup>26</sup> This division of the *magisterium* into four *regimina* is already present in the famous *Rosarius philosophorum* attributed to Arnau de Vilanova,<sup>27</sup> and a simple textual comparison shows that this work is the direct source of *Codicillus*.<sup>28</sup> However, the extension from three to four colors, as well as the one-to-one correspondence with the operations, is an innovation of the pseudo-Lullian work.<sup>29</sup> Moreover, in the pseudo-Arnaldian text, colors are simply sensible qualities, like any others (smell, texture, etc.) – signs that are certainly useful in experimental practice, but which, unlike in the *Codicillus*, do not attain the rank of true demonstrative principles. These are the four colors that became central in the later alchemical tradition, and the organization of the *opus* into four phases would remain influential until Carl Jung’s psychoanalytic developments.<sup>30</sup> On the other hand, there is still much to explore regarding this successful concept from a historical and philological perspective. Preliminary research suggests that one of its primary vehicles of transmission was the *Codicillus*.

It is important to emphasize that – far from referring to any kind of inner or spiritual transformation – the four colors and phases in the *Codicillus* reflect the author’s explicit intention to provide a straightforward method (*directo tramite*)

26 *Ibid.*, f. 117r: “Studeat igitur artifex et prudenter attendat cum in omni opere fuerit omnia signa demonstrativa quae in qualibet decoctione apparent illaque in sua mente recondat et eorum causas sapienter investiget. (...) Quacumque igitur vice post vice paulatim et paulatim vigora ignem in calcinatione donec terra egrediatur alba ex ignis fortitudinis, quia sicut calor agens in humido generat primo nigredinem, ita agens in sicco generat albedinem, et successive in illo albo generat citrinitatem, sed cum addictione rei tingentis illud, quae rota est naturae, perficitur.”

27 For the *Rosarius philosophorum* and the alchemical works attributed to Arnau de Villanova, see CALVET 2011.

28 CALVET 2011, *Rosarius*, 300: “Modi vero regiminis ad invicem convertendi sunt quatuor principales, scilicet solvere, abluere, reducere et figere.”; *Codicillus*, f. 101r: “Tertii sunt generis principia operativa in hac arte sunt principales quattuor convertentes, videlicet: solvere, abluere, reducere, et figere.”

29 Cf. the above note with CALVET 2011, *Rosarius*, 322: “Studeas ergo, cum in opere fueris, omnia signa que in qualibet decoctione aparent, in mente tua recondere et eorum causas investigare. Tres quippe sunt colores: niger, albus et citrinus. Cum autem terra egreditur, nigra imperfecta est et non completa. Quamque igitur vice post vicem reitera: paulatim et paulatim vigora ignem in calcinatione, quousque terra egrediatur alba ex ignis fortitudine. Nam sicut calor agens in humidum prestat nigredinem, ita agens in sicco generat albedinem.”

30 Jung makes dozens of references to the four alchemical colors in his works, and cites the *Codicillus* on several occasions, cfr. JUNG 2014.

for learning the alchemical art. And he achieves this by structuring a body of empirical knowledge, grounded in experimental demonstration, into a symbolic scheme where each operative phase corresponds to changes in matter, perceptible through direct sensory observation (*demonstratio ad oculum*).<sup>31</sup>

### **The *Scientia Mediorum et Extremorum***

One of the fundamental ideas in the alchemical theory expounded in the *Codicillus* is that the transmutation of one substance into another can only occur gradually (*gradatim*), by the alchemist imitating the natural course of things (*verus cursus naturae*).<sup>32</sup> The transformation of matter, or the change of one species into another, is, in reality, the 'transit' (*transitus*) from one 'extreme' (*extremum*) to the other within that course.<sup>33</sup> This transition is possible only through a series of linear, gradual changes – so-called 'means' (*media*) – enabled by a concatenation of common properties between the successive substances. The reciprocal convertibility of the mean into the extreme and the extreme into the mean is, as the author seems to suggest, nothing more than an instance of the Aristotelian principle of potentiality and actuality.<sup>34</sup>

This theoretical framework – central to the *Codicillus* but also frequently found in the *Rosarius philosophorum* – originates in Albertus Magnus' paraphrase of Aristotle's *Metaphysics* (X, 7) in his *Mineralia*. In this passage, Aristotle states that between opposites there is always something in between (he even

31 *Codicillus*, f. 100v: "Scribentur omnia certa principia, non solum considerationis, sed ad oculum demonstrationis huius per modum textus theoreumatum principiorum demonstrabilium..."

32 *Ibid.*, f. 103r: "Nam cum iste sit verus cursus naturae, et ars satagat ymitari naturam quantum potest, taliter est persequendum, quoniam natura, quae complere potest aptitudinem materiae suae, nusquam ab extremo ad extremum transit donec prius successivis operationibus compleat omne medium."

33 *Ibid.*, fol. 102r: "Tamen, non fit transitus de extremo ad extremum nisi per medium. Et hoc esse scimus naturaliter proprium imperfectorum omnium metallorum, scilicet quae in specie videntur incompleta, propter quod omnia illa in quolibet naturaliter sunt convertibilia. Quia, cum omne medium in se habeat naturam informem, tamen formata et distincta per sua propria retinentur extrema (...). Quamobrem patere potest ipsa extrema de mediis posse educi, et hoc videlicet secundum quod naturae virtus unius extremi in illis mediis iuvatur super virtutem alterius."

34 *Ibid.*, fol. 102r: "Nam quippe media in extremis convertuntur et extrema in mediis gradatim resolvuntur, quod tamen procul dubio fieri non posset, si extrema per ingenium et naturam non extraherentur a mediis de potentia ad actum."

uses the transition between colors as an example).<sup>35</sup> Albertus readily recognizes the applicability of this Aristotelian notion in the alchemical context, emphasizing its significance in the transmutation of metals.<sup>36</sup> Indeed, nature's need to exhaust all possibilities also extends to the mineral kingdom, so that between one metal and another, there must exist a chain of *media* that the alchemist must understand in order to successfully perform transmutation.

Intertextual analysis reveals that the *Codicillus* not only appropriates the Aristotelian principle but embraces the entire Albertian teaching on what the author refers to as the 'science of the means and the extremes' (*scientiam mediorum et extremorum*):<sup>37</sup>

...non est motus de extremo ad extremum nisi per medium. Est autem omnium metallorum proprium, quod videntur incompleta esse in specie, et ideo in quodlibet convertibilia: medium enim proprie dictum habet informem naturam quam formatam distinctam extrema retinent... In medio aliquo modo secundum formas confusas sunt extrema. Propter quod extrema per ingenium et naturam de mediis reducuntur, quando unitur virtus unius extremi super alterum.<sup>38</sup>

Tamen, non fit transitus de extremo ad extremum nisi per medium. Et hoc esse scimus naturaliter proprium imperfectorum omnium metallorum, scilicet quae in se vocantur incompleta, propter quod omnia illa in quolibet naturaliter sunt convertibilia. Quia, cum omne medium in se habeat naturam informem, tamen formata et distincta per sua propria retinentur extrema, secundum quod latius declaravimus in *Scientia de sensibilibus*, ubi ostenditur qualiter in mediis secundum formas confusas possunt extrema, et hic satis est determinatum.<sup>39</sup>

35 ARISTOTELES 1995, *Metaphysica*, X, 7: "Quoniam autem contrariorum contingit aliquid medium esse et quorundam est, necesse ex contrariis esse media. Omnia namque media in eodem sunt genere et quorum sunt media. Media enim haec dicimus in quaecumque permutari prius est necesse quod permutatur, ut... in coloribus si veniet ex albo in nigrum, prius veniet ad puniceum et plumbeum quam ad nigrum... Necesse est ergo media et quorum sunt media in eodem genere esse."

36 ALBERTUS MAGNUS 1890, *Mineralia*, 98a-b: "Sapiens enim et diligens natura quae omnis materiae complet aptitudinem, ab extremo ad extremum non transit, ut dicit Aristoteles, nisi compleat omne medium... Mediorum autem natura summe notanda ad transmutatione metallorum: quia in eis consistit plurima scientia eorum qui unum in aliud convertere nituntur."

37 *Codicillus*, fol. 103v: "Dicimus igitur quod tot modis potest virtus lapidis confortari, quibus potest debilitari, quia tot modis dicitur unum oppositum (sive oppositorium) quot et reliquum, sicut notabiliter cognoscitur per scientiam mediorum et extremorum."

38 ALBERTUS MAGNUS 1890, *Mineralia*, 98a-b.

39 *Codicillus*, f. 102r.

The *extrema* are those substances that, during the process of transformation, are observed in a more stable state of matter. The *extremum* marks a static period of actualization, 'extracted' (*extraherentur*) from the *medium* as matter moves from potency to act (*de potentia ad actum*). In relation to the demonstrative signs – particularly the colors these substances emit – the *extrema* represent the points of greatest epistemic accessibility for the alchemist throughout the alchemical process. These moments of 'rest' between phases require the manual intervention of the alchemist, who, through the operative principles of the art, triggers the next stage of transformation. The *media*, in contrast, are those states of matter that are more unstable and indeterminate during the alchemical process. They constitute the dynamic state that matter assumes during the transition from one extreme to another. The *medium*, in this sense, holds the *extrema* in potency, or – using the Albertian expression – has the 'confused forms' (*formas confusas*) of its extremes.

The properties of the *media* are knowable to the alchemist only *per coniecturam*, as the *medium* represents an average of the two observable extremes.<sup>40</sup> The transit through the *media* does not appear to require the intervention of the alchemist, who merely observes and regulates the conditions of the experiment (heat, humidity, etc.) while Nature takes its course. The *scientia mediorum et extremorum* seems to partly assimilate the traditional medical distinction between the 'extrinsic' and 'intrinsic' properties of bodies. The extrinsic properties are observable and manipulable, thus falling under the competence of the *artifex*. In contrast, the intrinsic properties are hidden and beyond the alchemist's immediate reach; they represent the inner workings of Nature. The *Codicillus* thus establishes a symbiotic division of labor between the alchemist and Nature: the former actively applies various operational acts to the *extrema*, manipulating them through techniques such as heat, distillation, or other alchemical processes, while relying on the action of the latter on the *media* to complete the transit

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40 *Ibid.*, f. 102v: "Sic patet qualiter natura extremorum est cognoscibilis per naturam suorum mediorum, et e converso."; f. 115r: "Fili, in ista arte maxime accipimus medium... coniunctionis inter duas qualitates quae in se disconveniunt in specie, non autem in genere, nisi solum secundum maiorem vel minorem distantiam unius ab altero, quam in decoctionibus suscipiunt, tam per naturam quam per artem. Et ideo, huius species medii habet similitudinem cum temperamento, et cum puncto quod aequae distet a duobus extremis, et cum virtute quae sit in medio vitiorum."

of matter through the cycle of transmutation. In this sense, the *Codicillus* affirms that the alchemist is nothing more than a simple administrator (*simplex administrator*).<sup>41</sup>

It is not the alchemist, the author asserts, who transmutes matter – but rather, it is wise Nature. The alchemist’s role is limited to preparing the artifice (*artificium*): arranging the external conditions of the experiment and skillfully regulating the action of fire. It is Nature, operating on the intrinsic properties of matter, that ultimately brings it to perfection. By means of this ‘*scientia mediorum et extremorum*’ the alchemist is capable of gradually reducing the initial substances to their pure and essential components (‘*spermata*’), that is, the philosophical sulfur and mercury, from which it is possible to carry out the transmutation of the inferior metals into silver and gold.<sup>42</sup>

### **The *rota alphabetalis***

The *Codicillus* further develops the *scientia mediorum et extremorum* in an operational sense through a device likely inspired by Lullian combinatorial art: the alphabet.<sup>43</sup>

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41 *Ibid.*, f. 118r: “Propter quod dicimus quia alkimista non est nisi simplex administrator; non autem ipse transmutat metalla nisi natura, cui per artificium magis praeparat. Et sic ipsa natura, quae sagax et sapiens est, peragit. Unde sufficiat tibi sapienter disponere et informare materiam extrinsecam secundum vires naturae, cum ipsa sufficienter operetur intrinsecus ad sui perfectionem.”

42 *Ibid.*, f. 103r: “Et ideo, karissime, talem mediorum naturam habes procul dubio praenotare, antequam in magisterio aliquid praesumas attemperare, nihil omittendo de suis mediis, sive sint materialia, sive practicalia, sive demonstrativa, quousque ipsa natura sua metalla gradatim reduxerit ad suum primum esse, scilicet sul et argentum vivum, quae sunt propria spermata metallorum, et magis propinqua cum quibus facies illas peculiosas transmutationes, per quae omnia imperfecta perficiuntur.”

43 *Ibid.*, f. 102v: “Ulterius est exquisite ac provide cognoscendum genus mediorum et extremorum... quemadmodum potest percipi evidentissime litteris alphabetibus, quibus operationes succincte ac gradualiter decurrunt et labuntur ad principales gradus sublimationum, et sunt: C, D, E, et F, quae descendunt de B, ut ipsum possint po[r]tare in naturam G. Secunda autem extrema vel media descendunt de G sunt: H, I, K, L quae portant ipsum G in naturam M. Tertia vero principia sive media sunt illa, quae successive et immediate descendunt de M, ut ipsum deducant in R, videlicet: N, O, P, Q. Quarta vero sunt: S, T, V, X, et ista immediate per successionem legitimam descendunt de R, ut ipsum beneficiis suis possint sublimare et deportare in Y, et ad ultimam perfectionem deducere. Et cum hoc rota alphabetalis circulariter est completa.”

The author designates the letters B, G, M, R and Y as *extrema*, and then considers the letters between each of them as *media*. For example, between one *extremum* (B) and the other *extremum* (G) there will be four *media* or intermediate steps: C, D, E and F. Thus, the entire alchemical process is structured into 21 steps, running through the alphabet from B to Y: five *extrema*, each with four intermediate steps, for a total of 16 *media*. The letter A is omitted, likely because, in both Ramon Llull's works and the *Testamentum*, it is used to designate God. Each letter represents a degree in the transformation of matter.<sup>44</sup> The *extrema* correspond to types of material principles, while the *media* represent specific substances. The first material principles are associated with the letter B, which includes salt (C), vitriol (D), silver (E), and gold (F). The second set of material principles is linked to the letter G, encompassing the four elements: *terra* (H), *aqua* (I), *aer* (K), and *ignis* (L). The third set, represented by the letter M, includes the so-called 'seeds of metals' (*spermata metallorum*), which are closer to the metallic genus (*generi metallico proxima*): sulfur (N), mercury (O), and two *fermenta* (P, Q). The letter R designates the elixir or philosopher's stone. The significance of the *media* S, T, V, and X remains unclear, though they might represent varying degrees of purity of the elixir.

Finally, the letter Y denotes the multiplication of the perfection achieved through the application of the elixir. The idea of arranging *media* and *extrema* as letters of the alphabet allows the *Codicillus* to visualize the *scientia mediorum et extremorum* in an original mnemonic device: the *rota alphabetalis* ('alphabetical wheel'), also known as the *rota de conversione elementorum* ('wheel of the conversion of the elements'). The *rota* is a circular diagram divided into 22 sections, sufficient to place the Latin alphabet from A to Y around it. Each *extremum* – B,

<sup>44</sup> *Ibid.*, f. 102v: "Per B debes intelligere prima principia materialia, scilicet aurum et argentum, naturam vitrioli et salis cum mercurio. Et per G debes intelligere secunda principia materialia, scilicet elementa (terram, aquam, aerem, et ignem) quae fluxa sunt seu elicitata successivis ac graduatis operationibus ex primis iam dictis principiis materialibus tempore suo. Et per M intelligere debes tertia principia materialia, quae sunt sulfur purum et argentum purum vivum et fermenta philosophorum creata et elicitata successive per magisterium ex secundis iam dictis immediatis principiis. Et per R intelligas medicinam vel elixir completum, aut argentum vivum fluens, penetrans, tingens et permanens, subli[m]atum ad secundum R, scilicet secundum gradum, et compositum ex immediate praeiacenti materia, videlicet de tertiis principiis superius nominatis. Et per Y intelligere debes multiplicationes, quae tertii gradus sublimationis et successivis operationibus fiunt ex dicta medicina."

G, M, and R – occupies the cardinal points, forming a cross (+) and further subdividing the wheel into quadrants, corresponding to the four phases of the *opus*. Thus, each quadrant represents one of the four alchemical operations – *solutio*, *ablutio*, *reductio*, and *fixatio* – and is characterized by an alchemical color: *nigredo*, *albedo*, *citrinatio*, and *rubedo*.

The figure below presents a possible reconstruction of the *rota alphabetalis* that I have created. In fact, no manuscript from the tradition – at least among those I have been able to analyze – includes a concrete illustration of the *rota alphabetalis*.<sup>45</sup> Paradoxically, it is a diagram without a figure. Nor does the *rota* correspond to any of the numerous figures transmitted by the *Testamentum*, many of which are complex illustrations of wheels. Due to its apparent simplicity, the *rota alphabetalis* of the *Codicillus* is rather reminiscent of the authentic figures of Ramon Llull. Moreover, it appears to be more faithful to the operative – not merely mnemotechnical, as in the *Testamentum* – intention of the Lullian diagrams, though it lacks the same combinatorial functionality.

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45 Bologna, Biblioteca Universitaria, MS. 930 (which contains other unrelated diagrams, ff. 155v, 160v, 161r, 175v); Cambridge, Corpus Christi College, MS. 112 (Misc. Z); Città del Vaticano, Biblioteca Apostolica Vaticana, Vat. Lat. 5846; Firenze, Biblioteca Nazionale Centrale, MS. B.R.52; Gotha, Forschungs- und Landesbibliothek, Chart. A 1017; New Haven, Yale University Library, Mellon Collection, MS. 12 (which has another unrelated diagram, f. 180r); Paris, Bibliothèque Nationale de France, MS. NAL 643 (which, however, contains an interesting summary table, f. 155r); Prague, National Library of the Czech Republic, MS. XXIII.D.132.

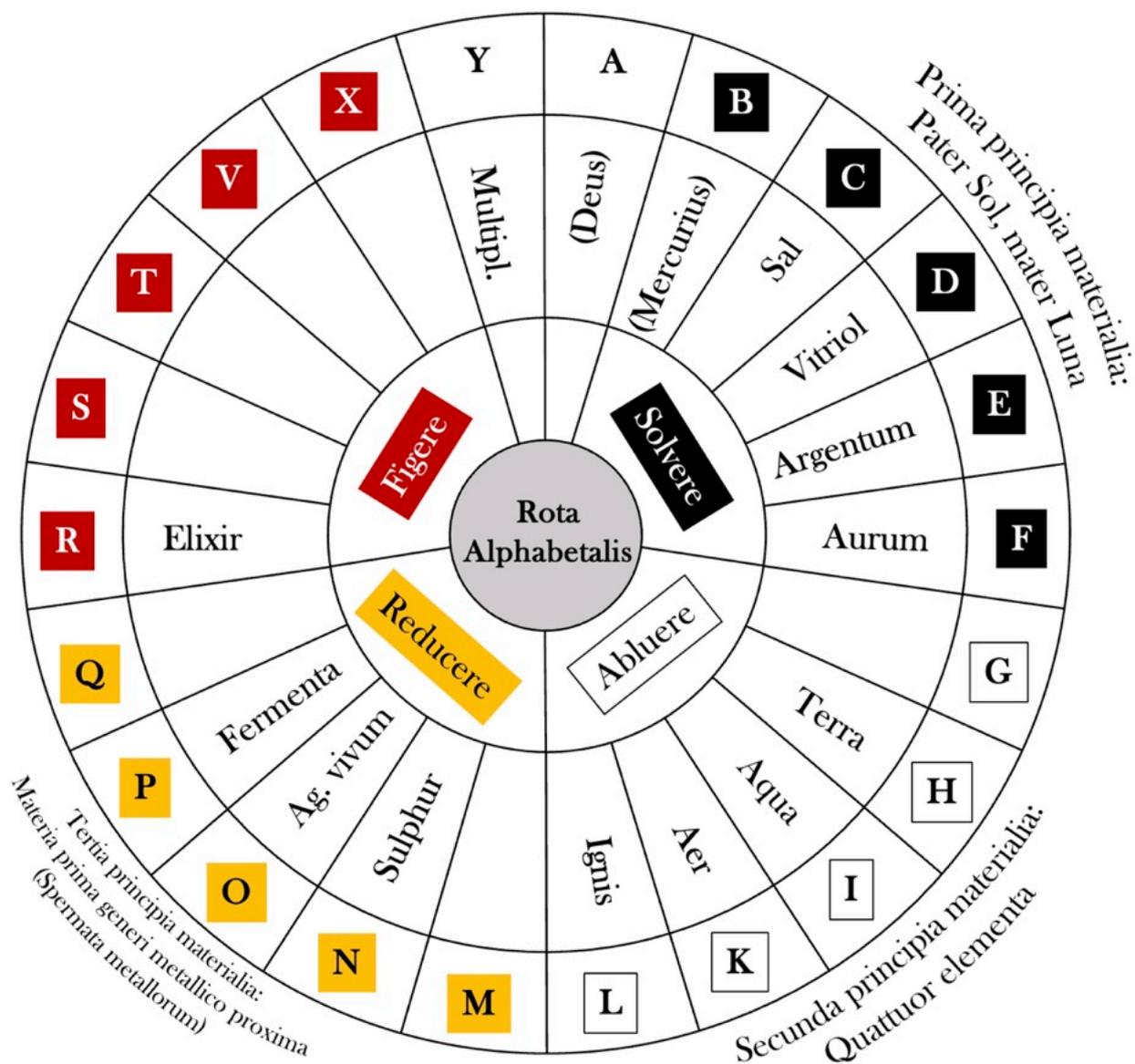


Figure 2: Reconstruction of the *rota alphabetorum* described in the *Codicillus*.

The letters of the alphabet (in the outer circle) represent the substances (in the central circle) undergoing transformation. The four quadrants correspond to the four operative principles (in the inner circle): *solvere*, *abluere*, *reducere*, and *figere*. Each quadrant is coded with the color (demonstrative principle) that characterizes the respective phase: *nigredo*, *albedo*, *citrinatio*, and *rubedo*. The letters B, G, M, and R designate the *extrema*, which the author divides into *principia materialia prima, secunda, and tertia*. I deduce the designation of the letters A and S by comparison with the alphabet of the *Testamentum*. The meaning of the letters Q and S-X remains to be deciphered, but they could refer to different degrees of purification of the elixir.

Thus, the entire alchemical *opus*, from beginning to end, is illustrated in the figure of the alphabet wheel, with the three alchemical principles integrated into a unified mental structure. The *olutio* of the initial substances (*sal, vitriol, argentum, aurum*), represented by B, initiates the *nigredo* alchemical phase; the *ablutio* of the four Aristotelian elements (*terra, aqua, aer, ignis*), represented by G, corresponds to the *albedo*; the *reductio* to the essential components (*sulphur, argentum vivum, fermenta*), represented by M, gives rise to the *citrinatio*; and finally, the *fixatio* of the elixir, represented by R, leads to the *rubedo*. The elixir may perhaps be further purified through additional successive distillations (S, T, V). The process culminates with the multiplication of the material perfection, denoted by Y.

### Future Research, The Art of Memory and Concluding Thoughts

The precise relationship between the *rota alphabetalis* of the *Codicillus* and the *Testamentum* has yet to be fully investigated. The *Codicillus* mentions, on one occasion, that the *rota de conversione elementorum* is one of the four figures transmitted in the *Testamentum* that completes the figure of the ‘Great Distillation’ (*figura magnae circulationis*).<sup>46</sup> However, it is not clear to me which diagram of the *Testamentum* this refers to, as none of the figures in the work bears that

46 *Codicillus*, f. 107v: “Talibus autem cautelis observatis perficitur rota de conversione elementorum ad invicem, quae una ex quattuor figuris existit, quibus completur figura magnae circulationis quam tradidimus in nostro *Testamento*.”; *ibid.*, f. 107r: “Et hoc per figuram rotae primae elementorum conversionis ad invicem, sicut hic et in nostro declaramus *Testamento*.”

title. On the other hand, the *Testamentum* refers on several occasions to a series of wheels, which may relate to the same conceptual or potentially illustrated figure: the *rota sola*,<sup>47</sup> the *rota elementorum*,<sup>48</sup> and the *rota circularis tocus seculi*, also called the *cathena aurea*.<sup>49</sup> This preliminary survey suggests great potential for establishing a strong doctrinal connection between the *Codicillus* and the *Testamentum* in relation to the *rota*, though I leave this for future research.

At first glance, the *rota alphabetalis* of the *Codicillus* might appear as a simplistic or even naïve device – a mere pretext for employing the traditional circular figure. The author may have sought to capitalize on Ramon Llull’s fame by parasitizing Lullian art, sacrificing in the process its ingenious combinatorial mechanisms. Alternatively, it could be seen as a complex alchemical ruse designed to confuse the layman and conceal secret knowledge from the uninitiated. Finally, it might be interpreted as a spiritual and mystical symbol, perhaps of distant Kabbalistic ancestry. These are, in fact, the very accusations and prejudices that pseudo-Lullian alchemical diagrams – and even Lullian art itself – have faced since the Renaissance.<sup>50</sup>

However, the *rota alphabetalis* is, in all evidence, a logical instrument of operative rationality. In fact, it meets all the criteria of diagrammatic thinking.<sup>51</sup> With the *rota*, the *Codicillus* effectively codifies the three types of alchemical principles – material, operative, and demonstrative – in a single symbolic image, il-

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47 Ps.-LLULL 1999, 74: “Et ideo pauci sunt, qui nostrum opus sciunt ponere in actu, cum non habeatur nisi una rota sola, que vadit per unam semitam ad respectum nature, per quam se habent mutari elementa sub conservacione et mutacione speciei talis in illis infuse de potencia in actum.”

48 *Ibid.*, 90: “Quapropter rota elementorum per naturam tota in girum rotatur, usque venerit ad suum punctum terminatum; et sic per experienciam evidentem monstrat tibi natura quod virtus, que est potencia in semine bladi, numquam ponitur in actu productivo aut vegetativo..., quoniam est causa sue ablevacionis, subtiliacionis, eciam rarifaccionis, quousque veniat ad terminum puncti generacionis, quam vocamus multiplicacionem ab uno grano ad centum, et de centum ad decem mille.”

49 *Ibid.*, 264: “Ista, fili, est cathena deaurata et rota circularis tocus seculi, per quam natura sapiens gubernatur per omnia sua instrumenta in rotando et circulando et transeundo in girum, quam summus creator voluit conservare in suis mirabilitatibus divinis et infinitis potenciis.”

50 Cf. RUBIO 2014, YATES 2007.

51 KRAEMER 2010 identifies six essential characteristics of diagrams and diagrammatic reasoning in his theory of diagrammatics: simultaneity, spatiality, hybridity, referentiality, operativity, and dependence.

illustrating their reciprocal structural relationship. He also succeeds in projecting the four temporal phases of the *opus* in two dimensions, iconically expressing the traditional division by colors. Using the alphabet, it unambiguously refers to the components of the alchemical 'machine', while also expressing the sequentiality of the transmutatory course. Thanks to this ingenious device, the whole operative framework (*canone directivo seu regula*) and the entire alchemical process are placed – in the author's words – before the mind's eye (*oculis tuae mentis*).<sup>52</sup>

The *rota alphabetalis* is also a mnemonic device, as the author himself states in his intentions.<sup>53</sup> The association of mnemonics and alchemy is typically considered a phenomenon of the Renaissance and modern periods, when the *characteristica universalis* began to develop.<sup>54</sup> However, the *Codicillus rota* already represents an early example of the application of the Art of Memory to medieval alchemy. To recognize this, it suffices to consider the wheel as the 'palace' of memory and the 21 squares as the *loci* ('places'). The apprentice can then mentally traverse the alchemical process, associating each letter with a material principle – or, more precisely, with an evolutionary stage of the material principles – and each quadrant with a specific operation and the distinctive color of the four phases.

Moreover, the image of the wheel is the diagram that best illustrates, from a figurative point of view, the central operation of alchemy: distillation. In Latin, *distillatio* (or more correctly, *destillatio*) is also called *circulatio* ('circuit'), due to the semicircular path that the distilled substance follows in the alembic: from the *cucurbita* to the *ambix*, through the cooling tube, and finally into the *phiala*. The *rota*, therefore, is not only an operational diagram but also a pictogram symbolizing the circular movement of material substances during the process of sublimation and condensation. It may also serve as a metaphor for the course of

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52 *Ibid.*, 102r: "Dicimus igitur, fili carissime, quod oportet te ad sensum praestituere oculis tuae mentis pro canone directivo seu regula omnia intelligibilia principia supradicta, et hoc secundum ordinem sequentium et doctrinae intellectualis in memoria incolenti, intellectu intelligenti, et voluntate diligenti, si completum finem huius operis volueris adipisci, qualiter habendo promptitudinaliter considerationis respectum ad signa et naturas mediorum et etiam extremorum."

53 Cf. the previous note.

54 In addition to the works of Frances Yates already cited, cf. Rossi 1960.

nature that the alchemist strives to replicate faithfully, on a smaller scale, in his laboratory through the distillations of his alembic. In fact, the entire teachings of the *Codicillus* revolves around this metaphor, to the point that the author can state that the alchemist's task is ultimately 'to turn the wheel' (*rotam rotare*).<sup>55</sup>

Finally, the *rota alphabetalis* is an exemplary case of philosophy applied to alchemy – or, if you prefer, of alchemical philosophy. At the core of the *rota* is the transmutatory principle that the author calls the *scientia mediorum et extremorum*. As I have demonstrated through intertextual analysis, this science is nothing other than a development of Albert the Great's intuition of applying the Aristotelian principle of opposites and means within the alchemical context. Furthermore, the *Codicillus* makes a constant effort to frame transmutation in the Aristotelian terms of potentiality and actuality. Thus, Albert's brilliant idea, which in the *Mineralia* had remained merely a suggestion, was not left unheeded; in the *Codicillus*, it is developed into an original tool of experimental research.

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55 *Ibid.*, 106v–107r: “Et hoc habebis rotam primam [107r] finitam de conversione elementorum ad invicem. Ista enim quidem operationes sunt contritiones, assationes, imbibitiones, decoctiones, inhumationes, vivificationes, solutiones, congelatione, sublimationes, praeparationes, fixationes, reductiones, generationes, et corruptiones, quas philosophi non sub completa sermone serie, nec sub tegmento, ne quis forte imputaret malitiae vel nequitiae, sed sub electi providentia in duas naturales et extremas operationes, velut omnium limites includentes totius naturae fabricam, quae sunt rarefactio et condensatio, notabiliter diviserunt. Quanto ergo, fili karissime, hanc rotam rotare facies integram, tanto nobilioris activitatis seu virtutis erit materia.” This idea already has some precedent in the preceding tradition. Cf. CALVET 2011, *Rosarius*, 298: “Sic etiam lapis noster resolvitur in argentum vivum per magisterium nostrum, ergo prius fuit argentum vivum. Modus autem ipsum in argentum vivum est conversio naturarum in suam primam radicem, naturas autem convertere est elementa singulariter rotare.”

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