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RESEARCH ARTICLE

Albertus Magnus on Alchemy: Between *Ars* and *Scientia*

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Argument
The aim of this paper is to accurately assess the epistemological status of Albertus Magnus' (ca 1200-80) alchemy. In modern bibliography there is a "black or white" approach to the question of whether Albertus regarded alchemy as an art or *scientia,* and thus the adoption of an absolute thesis on the matter tends to create a series of interpretational problems. In contrast, I argue that Albertus' approach to alchemy does not exclude either art or *scientia* and, depending on the context, the Dominican master sometimes considers alchemy as an art—when it is connected with manual labor—and sometimes as a *scientia*—when it is connected to natural-philosophical and metaphysical aspects. At the end of my paper, I offer a way of properly assessing the Albertian alchemy, and determining how and when to accurately connect it with the notions of art and *scientia*.

Keywords: Alchemy; Albertus Magnus; Craft; Science; Natural philosophy; Metaphysics

Introduction

The massive translation of scientific texts from Arabic to Latin, which happened in the second half of the twelfth century, was a decisive factor in alchemy's diffusion throughout the Latin Medieval world (Lindberg 1978, 52–90; Burnett 2013, 341–364; Moureau 2020, 87–141). One of the most important contributions of these translations was the dissemination of the Aristotelian works on natural philosophy (Burnett 2005, 370–404; Burnett 2010, 814–821). In fact, the natural works of Aristotle provided a theoretical basis which allowed alchemy to entrench its theoretical part (*theorica*) within a valid and legitimate natural philosophy. For instance, the alchemists drew on Aristotle's *Meteorologica* (III, 378a15–26) and his theory of the two exhalations (Eichholz 1949, 141–146) in order to justify their sulfur-mercury theory, and relied on Aristotle's *Physics* to show that art can imitate nature (199a15–17), or even complete it (199c15). By highlighting connections with Aristotelian natural philosophy, the alchemists attempted to claim a higher epistemological status for alchemy than that of mere art.[1] However, such claims often collided with alchemy's *practica*, that is, its practical part, which was characterized by laboratory processes and manual labor. As a result, medieval thinkers faced difficulties in assessing alchemy's character and positioning it accurately within the medieval framework of knowledge.

[1]The medieval Latin term of art is *ars*. The notion of *ars* in the Middle Ages has a different meaning from the contemporary one we use today, which is closely connected to fine arts. The medieval *ars*, in contrast, was associated with craftmanship and skilled labor, while the term of "mechanical arts" (*artes mechanicae*) included such "arts" as commerce, weaving, agriculture and armament. For more on medieval *ars*, see: Schatzberg 2018, 29–41; Speer 2012, 670–671 and Allard-Lusignan 1982.

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The aforementioned difficulty is also connected with another factor, which is in turn concerned with the educational reformation that occurred in the twelfth and thirteenth centuries. Already from the twelfth century, medieval education started becoming more institutionalized, and the Cathedral schools emerged as one of the standard places for one to receive education. Subsequently, in the thirteenth century the institution of the university was founded, leading to the emergence of new centers of knowledge such as the universities of Bologna, Paris and of Oxford (Kibre and Siraisi 1978, 120–144; Shank 2013, 207–239). Both the universities and the Arabic translations provided a tremendous impetus to the reassessment of the sciences and the arts. As a consequence, the classical *trivium* and *quadrivium* were progressively marginalized or even completely supplanted by the Aristotelian natural works (Weisheipl 1965, 54–90; Weisheipl 1978, 461–482; Nader 1994, 739–754).

Alchemy, despite its alleged ties with Aristotelian natural philosophy, never succeeded in gaining enough authority and recognition to be taught in the university curricula. Nevertheless, alchemical imprints can be found in several books that were connected with the academic program. For instance, Lafleur has brought to light four introductions to philosophy that were taught in Paris around 1250, and in one of these, the *Philosophica disciplina*, alchemy is regarded as a science which is a part of natural philosophy (Lafleur 1988, 262; Lafleur 1994, 48–50). Likewise, Barbara Obrist has shown that the *De secretorum alchimiae* of Constantinus Pisanus was probably the notes of a university student, which proves that alchemy was discussed within the realms of the university (Obrist 1990).

These two examples indicate the ambiguity of alchemy's status, which was largely the result of the implied contradiction between its theoretical and practical parts, that is, the *theorica* and *practica*. On the one hand, the theoretical part of alchemy was the part which was closest to Aristotle's natural philosophy and therefore was considered the "scientific" part. The practical part, on the other hand, was seen as connected to manual labor and reduced to the level of art. In relation to the universities, alchemy occupied a unique position: it was sufficiently similar to an "art" to evade formal inclusion in the curriculum, yet scientific enough to merit discussion among scholars and students.

This ambiguity is reflected in the writings of numerous medieval thinkers of the twelfth and thirteenth centuries. For example, figures such as Gundissalinus, Daniel of Morley, early Grosseteste and Roger Bacon viewed alchemy favorably, treating it as a *scientia*.[2] Conversely, Vincent of Beauvais, Thomas Aquinas, Bonaventure, and others regarded alchemy as an art. Importantly, however, this latter list of medieval scholars does not contain one of the most eminent figures of the High Middle Ages—Albertus Magnus.

The case of Albertus is particularly interesting for two reasons. Firstly, he was one of the most prolific writers of the Middle Ages and his *corpus* includes many commentaries on Biblical works and on books of Aristotle. Additionally, an important characteristic of Albertus' work was that he tried to incorporate and integrate the entire body of available knowledge of his epoch in his *corpus*, which meant that he was open to entertaining some fields of knowledge, like alchemy and magic, that were on the fringes during his time. Secondly, though the name of Albertus Magnus has often been associated with a group of alchemical texts of the fourteenth and fifteenth centuries that were *not* written by him (Calvet 2012, 115–60), the name of the Dominican master has nevertheless been connected with a rich alchemical tradition that portrays Albertus as one of the most famous representatives of alchemy. Given the above, it is worth asking what position Albertus Magnus took with regards alchemy's classification in his system of thought.

[2]It should be stated that the medieval notion of *scientia* is different from the modern notion of science since the former usually has the ensuing meanings: i) a habit of the mind or an intellectual virtue and ii) knowledge attained through demonstration. Natural philosophy was often part of *scientia* and it has been alternatively suggested that it is the term of medieval natural philosophy that should be regarded as the forerunner of modern science. For more, see: Livesey (2005, 455-458) and Harrison (2015, 11-19).

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In considering Albertus Magnus, modern scholarship appears to mirror the ambivalence and ambiguity observed in the aforementioned medieval scholars regarding this matter. In fact, on the one hand, there are scholars like Crisciani (1996, 11–12; 2008, 113), de Libera (2003, 166 and 172) and Calvet (2018, 86) who all bestow the category of *scientia* on Albertus' alchemy, mostly because alchemy is addressed in his commentaries on Aristotle's natural works. On the other hand, Partington (1937, 11), Kibre (1980, 187), Newman (2004, 44–50) and Thorndike (1943, 567–568) emphasize the aspect of *ars* in Albertus' work, noting in particular his claim in his *De mineralibus* that alchemy is the art that best imitates nature. However, as will become apparent throughout this paper, Albertus' position towards alchemy cannot be described through a "black or white" perspective. Doing so risks creating misconceptions towards Albertus' approach to alchemy, since one stance (for example: Albertus' alchemy is an art) will often be contradicted by other Albertian sources. As a result, "absolutism" does not really serve as an explanatory tool for assessing Albertus' overall approach to alchemy.

Given the divergence, the aim of this paper is to shed light on Albertus' epistemological approach towards alchemy and determine alchemy's actual epistemological identity in the work of the Dominican master. In order to accomplish this goal, I first examine Albertus' sources which are relevant to alchemy and its connection to art, showing that Albertus does not reduce alchemy to the mere level of art. I will then show how Albertus' alchemy relates to natural philosophy and *scientia naturalis*. This connection will be established through the Aristotelian doctrine of *symbola,* which plays an integral role in Albertus' conception of alchemical transmutation. Finally, I will further expand on Albertus' association of alchemy with *scientia* by revealing its meta-physical aspects. By the end of this study, I will have argued that the Dominican master created clear associations of alchemy with both *ars* and *scientia* and thus I will propose a way of accurately assessing Albertus' "scientific" approach to alchemy.

Alchemy and art in the work of Albertus Magnus

In order to answer the question of whether Albertus regards alchemy as an art or a "science" it is crucial to recognize that his views on alchemy were evolving throughout his career. It is true that Albertus' early approach to alchemy shows clear signs that he considers it to be an art. This is evident in his commentary on Lombard's *Sententiae*. Particularly, in distinction seven of the second book, Albertus treats the question of whether demons can induce a substantial form in transmuted bodies. There, he speaks of four kinds of transmutation, of which the third is concerned with alchemical transmutation:

> The third [type of transmutation] occurs through the stripping off of properties, and the imposition of others through liquefaction, sublimation, and distillation, which the alchemists effect: and in this fashion by means of a quite well-known operation, bread, ink, and the like come into existence. I think that [alchemists] do not give substantial forms, as Avicenna says in his *Alchemy*, the sign of which is that one does not find the properties comprising the species in the things produced thus. For this reason, alchemical gold does not benefit the heart, and an alchemical sapphire does not cool off sexual ardor, or cure an affection of the windpipe [*arteriaca*]; nor does an alchemical carbuncle dispel a vaporous poison. And the test [*experimentum*] of all these things lies in the fact that alchemical gold is consumed more in the fire than the other, and also precious stones produced by alchemy; and likewise they do not last as long as the natural ones of that species. This is because they do not have the specific form [*species*], and so nature has denied them the virtues that are given with the specific form for the conservation of the same. (Newman 2004, 48)[3]

[3]The English translation of this text is taken from William Newman's book *Promethean Ambitions: Alchemy and the Quest to Perfect Nature* (2004). The original can be found in the Borgnet edition (1893-4): Albertus Magnus, *Super IV Libros*

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This is Albertus' first account on alchemical transmutation and he makes an effort to connect it with art even though he never mentions it explicitly. Albertus manages to create this connection by defining alchemical transmutation as the stripping off of properties by means of technical operations such as sublimation and distillation. In addition, Albertus emphasizes that alchemy cannot confer a substantial form to a metal and, due to this deficiency, the transmuted metals do not have the same medicinal properties as the original ones. What Albertus implies by the latter statement is the Aristotelian doctrine that art is incapable of inducing a substantial form, a tenet which is repeated in many different parts of Albertus' work.[4] Another thing worth noting is that Albertus makes no attempt in this excerpt to associate alchemy with any natural procedure, and thus leaves no space for departing from the interpretation of alchemy in terms of art.

The source presented above, along with Albertus' statement in his *De mineralibus* that alchemy is the art that imitates nature *maxime,*[5] might tempt one to readily deduce that Albertus classified alchemy as an art. Yet, a closer look at the sources may provide a different picture. Firstly, it should be clarified that Albertus is quite Aristotelian in his definition of art. Aristotle in his *Nicomachean Ethics* defines art as "a reasoned state of capacity to make" or "the ability to judge rightly in making things" (1140a1).[6] Similarly, Albertus follows Aristotle's lead and defines art as "a productive principle accompanied with reason" (*factivum principium cum ratione*), a definition that is repeated throughout his work.[7] However, whenever the Dominican master discusses the topic of art as such, he never mentions alchemy as an example, nor does he do so when referring to mechanical arts (*artes mechanicae*).

As some scholars have already noted, the use of the term "mechanical arts" reveals that Albertus was influenced by Hugh of St. Victor and his *Didascalicon*, despite the fact that the Dominican master's list of such arts deviates from Hugh's (Sternagel 1966, 106; Whitney 1990, 137–138; Mariétan 1901, 156-160). Albertus refers to the mechanical arts in his commentary on *Metaphysics,* where he mentions the art of bread-making and the military art as part of his list, neither of which were initially included by Hugh.[8] In contrast, there are excerpts in Albertus' work which clearly denote that he viewed alchemy as rising above mere art, indicating a tendency to regard it as "something more." These sources present art as an assistant in the operations of nature, suggesting that during alchemical transmutations it is nature that performs the transmutation and not art.[9] This Albertian idea of art as a helper of nature has its origins in Neoplatonism and specifically in Plotinus, who in the fifth book of his *Enneads* refers to

Sententiarum, lib. II, dist. 7, art. 8, p. 158a. For a critical edition of the text, see: Jeck (1994, 226): "Tertia est per exspoliationem proprietatum et dationem aliarum et per liquefactionem et cibationem et sublimationem et distillationem, quibus operantur alchimici. Et hoc modo operatione satis nota fit panis et incaustum et huiusmodi. Et puto, quod non dant formas substantiales, sicut etiam dicit Avicen. in *Alchimia* sua. Cuius signum est, quod in talibus operatis non inveniuntur proprietates continentes speciem. Unde aurum alchimicum non laetificat cor, et saphirus alchimicus non refrigerat ardorem neque curat arteriacam, et carbunculus alchimicus non fugat venenum vaporabile in aere. Et omnium talium experimentum est in hoc, quod aurum alchimicum consumitur plus in igne quam aliud, et similiter lapides alchimici. Et iterum non durant ita diu sicut naturalia illius speciei. Et hoc ideo est, quia non habent species. Et ideo negavit eis natura virtutes quae dantur cum speciebus ad conservationem specierum."

[4]Albertus Magnus, *Super ethica*, VI, lectio 9: "et iterum artificialia non sunt in tali esse nisi per formam accidentalem, quia ars non potest inducere formam substantialem, ut dicit Philosophus."

[5]Albertus Magnus, *De Mineralibus*, lib. III, tr. 1, cap. 2: "Signum autem hujus est, quod videmus in arte alchimiae fieri, quae inter omnes artes maxime naturam imitatur."

[6]For an analysis on Aristotle's notion of art, see: M. J. Charlesworth (1957) and Serafina Cuomo (2007, 9–14); for a general account on art in ancient Greece, see: T. K. Johansen (2021).

[7]Albertus Magnus, *Super ethica*, II, lectio 6; Albertus Magnus, *Metaphysica,* I, tr. 1, cap. 7; IX, tr. 1, cap. 4; Albertus Magnus, *Super Porphyrium de universalibus,* cap. 6; Albertus Magnus, *De causis et processu universitatis a prima causa,* II, tr. 2, cap. 42.

[8]Albertus Magnus, *Metaphysica,* I. tr. 1, cap. 10: "sicut mechanicae vocatae, quae sunt panifica, medicina, lanificium, militaris, architectura et huiusmodi."

[9]Albertus Magnus, *Super ethica*, VI, lectio 6: "Ad sextum dicendum, quod etiam ita est in alchimia, quod ars non est nisi adiuvans operationem naturae; unde paulatim natura operante huiusmodi conversiones fiunt."; Albertus Magnus, *De bono*, tr. 2, q. 2, a. 8: "natura autem certius agit quam ars, ut probatur in operibus alchimicis, quae producit natura et non ars."; Similar

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agriculture and medicine as arts that help nature to maintain its right state (Tatarkiewicz 1963, 236–237; Emilsson 2021, 245 and 254). Likewise, Albertus' statements reveal that alchemy, on the one hand, is associated with nature while, on the other, alchemical transmutation is presented as a process in which nature is the decisive factor for its accomplishment.

Albertus' shift towards a more naturalistic reading of alchemy is also revealed in his *De mineralibus,* when the Dominican master applies a critique to Gilgil (Ibn Juljul, 10th c.) and his alchemical approach. In the fourth chapter of the third book, Albertus examines the opinions of the ancients about the material of metals, rejecting Gilgil's opinion that the material of metals was fused ash on the grounds that he was only a *mechanicus* and not a *physicus* and therefore he made wrong statements on subjects pertaining to natural philosophy.[10] This excerpt is very important since it clearly shows that Albertus distinguishes between a practical and a theoretical, that is, natural-philosophical aspect of alchemy. Gilgil's opinion is rejected due to his undue emphasis on the "mechanical" aspect of alchemy, which resulted in the neglect of its natural-philosophical one.

Through this statement Albertus seems to acknowledge the traditional division of alchemy and its texts into *theorica et practica* (Newman 2013, 386). As Obrist points out, this dichotomy endowed medieval alchemy with a Janus-faced identity: its theoretical aspect leaned towards *scientia*, while its practical facet aligned with *ars* (Obrist 1996, 220). Albertus, in his comments on Gilgil, appears cognizant of this split, hinting at an "epistemological" elevation of alchemy beyond the level of art.

This shift in Albertus' approach can be justified. In his commentary on the *Ethics* which was written shortly before the *De mineralibus,* Albertus expresses an opinion that tends to bridge theoretical and practical knowledge. In particular, the Dominican master states that philosophy (i.e *scientia realis*) can be completed or perfected by mixing and including both speculative and practical knowledge.[11] However, apart from the above, there is a further consideration. The very nature of alchemy and alchemical transmutation may well have posed significant theoretical difficulties to Albertus that could not be tackled or overcome by referring alchemy to art alone.

To further explain, the relation between Albertus' alchemy and art is rather peculiar. This peculiarity emerges if one examines the aforementioned relation in light of the following analysis: firstly, according to Aristotle (*Physics* II, 1, 192b22–23) natural objects are characterized by an internal source of movement which leads them to such activities as generation, corruption and change in its general meaning. Artifacts, on the other hand, tend to be construed as being devoid of any internal source of change and as being products of mimesis of nature, which initially exist in the artisan's mind as ideas and then become practical manifestations through manual labor (Carroll and Weisheipl 1985, 9–11). For example, the concept of a wooden bed first exists as an idea in the carpenter's mind, which then begins to take physical form through the actions of the artisan, which serve as an external source of its change.

Albertus seems to have adopted these Aristotelian theories, since he also accepts that artificial objects can be produced by an external principle, the artisan.[12] Likewise, the Dominican master asserts that the underlying matter of each artifact does not have the inherent capacity to change

points are also made in Albertus' commentary in Metaphysics. See: Albertus Magnus, *Metaphysica,* XI, tr. 3, cap. 2 and V, tr. 1 cap. 4.

[10]Albertus Magnus, *De Mineralibus*, Lib. III, tr. 1, cap.4: "Haec autem inconvenienter et stulte dicta sunt : quoniam ipse Gilgil mechanicus et non Philosophus fuit, sed de mechanica alchimia praesumens praesumpsit mentiri de physicis."

[11]Albertus Magnus, *Super ethica*, VI, lectio 1: "Et inde est, quod philosophia dividitur in practicam et theoreticam, ut dicit Ptolemaeus: Non est perfecta scientia, quae non habet practicam cum speculativa admixtam. Est enim practicum, ut dicit Avicenna, dupliciter, scilicet quod est operativum simpliciter et quod est sciens rationem, per quam operatur. Sed specialiter haec scientia in utroque perficit, quia includit in se finem utriusque, scilicet felicitatem civilem, quae est finis practicae, et felicitatem contemplativam, quae est finis contemplationis. Unde perficit ad utrumque opus, et ad speculandum per virtutes intellectuales et ad opera, quae sunt civilis vitae."

[12]Albertus Magnus, *Super ethica*, VI, lectio 7: "Sed materia artificialium est mota a quodam principio extrinseco, et ideo operationem artis non vocat actionem, sed factionem, quia est ad aliquid faciendum ut operatum quoddam."

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itself and create an artifact like a bed.[13] Yet, if one tries to apply the aforementioned exegetical scheme to Albertus' alchemy and treat the latter as a mere art, then some problems arise.

The first problem is concerned with the actual "artifact" that is produced by alchemical transmutation. Surprisingly enough, it seems that in Albertus' alchemy two different "artifacts" may be produced depending on the success (or not) of alchemical transmutation. If the alchemical transmutation is unsuccessful, then an artificial "artifact" has been produced, since a kind of *forma artificialis* has been bestowed on the metal which is accidental and has not come about via a genuine transmutation. By contrast, if the alchemical transmutation is successful, then this entails that a new substantial form has been conferred upon the metal, which by default cannot be done by means of art.[14] In this regard, it seems that Albertus needs nature and natural philosophy (*physica*) in order to explain the transmutation and production of a genuine metal.

The second problem is concerned with the source of change. As we have already seen, artificial artifacts are supposed to be deprived of any intrinsic source of change, something that does not apply to the case of metals. All metals are bearers of the formative power (*vis formativa*) which dwells within a metal and it is responsible for educing the form from matter with the aid of celestial power.[15] That said, if Albertus' alchemy is to be construed as an art alone, then we have an "artifact", that is, a metal, which has an intrinsic source of change and its form does not seem to depend on the artisan.

It is highly possible that these problems were also detected by Albertus, who, in his *De mineralibus,* attempts a second description of the alchemical transmutation that differs from the one we saw in his commentary on Lombard's *Sententiae*. This time Albertus adopts a more naturalistic account, which reveals close ties with nature and natural philosophy (*physica*). In the ninth chapter of the third book of the *De mineralibus*, Albertus expresses a favorable stance towards alchemy and alchemical transmutation and his account runs as follows:

> And we shall say that skillful alchemists proceed in entirely the same way in transmuting metals. For first, they cleanse thoroughly the material of quicksilver and sulphur, which, as we shall see, are present in metals. And when it is clean, they strengthen the elemental and celestial powers in the material, according to the proportions of the mixture in the metal that they intend to produce. And then nature itself performs the work, and not art, except as the instrument, aiding and hastening the process, as we have said. And so they appear to produce and make real gold and real silver. . . . For the celestial power is widespread, and its effects are determined by the powers of whatever it acts upon in mixtures. For this is the way we see the celestial powers acting in the whole of creation, especially in things produced from putrefaction. For in these we see the powers of the stars influencing the powers in the material so as to produce something for which it is suitable. And alchemy also proceeds in this way, that is, destroying one substance by removing its specific form, and with the help of what is in the material producing the specific form of another [substance]. And this is because, of all the operations of alchemy, the best is that which begins in the same way as

[13]Albertus Magnus, *Metaphysica,* I, tr. 3, cap. 9: "quod subiecta materia non facit transmutare seipsam. Et huius exemplum in artificiatis; in his neque lignum neque aes, quae sunt materiae subiectae diversis artibus, est causa transmutandi seipsum in formam artis. Lignum enim non seipsum movendo facit se lectum, neque aes seipsum movendo facit se statuam idoli."

[14]Albertus Magnus, *Super ethica*, VI, lectio 9: "et iterum artificialia non sunt in tali esse nisi per formam accidentalem, quia ars non potest inducere formam substantialem, ut dicit Philosophus."; Albertus Magnus, *Super Dionysium de divinis nominibus,* cap. 11: "quia artifex inducit formam, quam praeconcepit, sine transmutatione materiae. Et ideo quia forma naturalis est substantialis, proportionata materiae, requirit praeparationem in materia; formae autem artificiales sunt accidentia et non substantiales formae et sunt in diversis secundum rationem unam."

[15]Albertus Magnus, *Meteora,* IV, tr. 1, cap. 4: "In eo vero, quod est naturalis, habet in se virtutem formativam uniuscuiusque naturae, cuius calor naturalis esse dicitur. Sic enim est in eo vis caeli et motorum caelestium et vis complexionis sive formae illius naturae, quam format, sicut in calore seminis plantae vel animalis est vis, quae vocatur formativa animalis vel plantae. Et eodem modo est in mineralibus et calore eorum."

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> nature, for instance with the cleansing of sulphur by boiling and sublimation, and the cleansing of quicksilver, and the thorough mixing of these with the material of metal; for in these, by their powers, the specific form of every metal is induced. (Albertus Magnus 1967, 178–9)[16]

This source confirms a genuine shift in Albertus' conception of alchemy and alchemical transmutation. In his description, it becomes evident that he has accepted the importance of *physica* regarding the success of explaining an alchemical transmutation. The Dominican master admits that the role of the alchemist is to prepare the matter appropriately in order for nature to take over and bring about the transmutation of the metal. Furthermore, Albertus acknowledges that the celestial spheres and their power have an important role to play too in the process, while he also acknowledges that the new form will be bestowed on the metal "with the help of what is in the material" and thus he alludes to formative power, that is, the intrinsic source of change that we have discussed before. All these suggest that Albertus' alchemy has a great part that connects to natural philosophy, and therefore that Albertus tends towards an "alchemy according to natural philosophy," though he never uses this expression.

Natural philosophy, *scientia* and alchemy in the work of Albertus Magnus

Thus far it has been shown that Albertus' alchemical thought has strong natural-philosophical allusions, and it is worth examining if these allusions can be further entrenched on a more solid natural-philosophical basis. Doing so will draw a strong connection with *scientia,* because the Dominican master's general scheme of sciences indicates that his *philosophia realis* or *scientia realis* is divided into natural philosophy, mathematics and metaphysics.[17] Likewise, Albertus often refers to *physica*, that is natural philosophy, as *scientia naturalis,* which further attests to his intention to associate natural philosophy with the notion of *scientia*. With this in mind, this section explores how and in what terms Albertus Magnus connected alchemy with natural philosophy and the notion of *scientia*.

Before we delve into our analysis, it should be mentioned that there are some instances in Albertus' *De mineralibus* where he refers to alchemy as *scientia*. For example, in the first chapter of the first book of the *De mineralibus* Albertus briefly discusses and refers to alchemy as follows:

> These are what the alchemists investigate, calling "stone" everything that does not evaporate in the fire; and this they call "body" and "substance." But what does evaporate in the fire—like sulphur and quicksilver, which impart various colors to the so-called "stones"—they call "spirit" and "soul" and "accidentals." But it is the task of another science to investigate these

[16]Albertus Magnus, *De Mineralibus*, Lib. III, tr. 1, cap. 9: "Per omnem autem eumdem modum dicemus operari alchimicorum peritos in transmutatione metallorum. Primo enim quidem purgant multum materiam argenti vivi et sulphuris, quam inesse videmus metallis, qua purgata, confortant virtutes materiae quae insunt ei elementales et coelestes ad proportionem mixtionis metalli quod intendunt inducere : et tunc ipsa natura operatur, et non ars, nisi organice, juvando et expediendo, ut diximus : et sic verum aurum et verum argentum educere et facere videntur [. . .] Coelestis enim virtus valde communis est, et accipit determinationem per virtutes eorum quae sunt subjectum ejus in rebus commixtis: hoc enim modo virtutes coelestes operari videmus in tota natura generatorum, maxime in his quae ex putrefactione generantur. In his enim videmus virtutes stellarum influere virtutes in id ad quod convenientiam habet materia. Alchimia autem per hunc modum procedit, scilicet corrumpens unum a specie sua removendo: et cum juvamine eorum quae in materia sunt, alterius speciem inducendo: propter quod omnium operationum alchimicarum, melior est illa quae procedit ex eisdem ex quibus procedit natura, sicut ex purgatione sulphuris per decoctionem et sublimationem, et ex purgatione argenti vivi, et bona permixtione horum cum materia metalli : in his enim ex virtutibus horum omnis metalli species inducitur."

[17]Albertus Magnus, *Physica*, lib. I, c. 1, tr. 1: "Cum autem tres sint partes essentiales philosophiae realis, quae, inquam, philosophia non causatur in nobis ab opere nostro, sicut causatur scientia moralis, sed potius ipsa causatur ab opere naturae in nobis, quae partes sunt naturalis sive physica et metaphysica et mathematica, nostra intentio est omnes dictas partes facere Latinis intelligibiles."

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> things which depend so much on occult theories and practices. (Albertus Magnus 1967, 10–11)[18]

In this source Albertus makes a first, brief attempt to discuss the general theory of alchemy according to which all metals are compounds of sulfur and mercury, a theory which has its origins in the alchemy of Jabir ibn Hayyan. Additionally, all metals consist of a "body," which cannot be evaporated in the fire, and a "sprit" or "soul," which is the volatile part of a metal and it is responsible for the metal's color. The important thing, though, is that Albertus acknowledges that the study of these things falls under the field of "another science," that is, alchemy. Similarly, when Albertus examines Callisthenes' opinion on alchemy, he asserts that Callisthenes considers alchemy as the science which confers the form of noble metals upon base ones, without, however, commenting in any negative way on Callisthenes' consideration of alchemy as *scientia*.[19] Nevertheless, such excerpts are evidence only of Albertus' loose use of a strict terminology regarding the "scientific" level of alchemy. They fall short of delivering a solid argument about his detailed views concerning the intricacies of alchemy and its connection with natural philosophy.

Nevertheless, Albertus has connected alchemy with natural philosophy in a profound way, and as we will see, natural philosophy plays an integral role in the explanation of alchemical transmutation of metals. Even though Albertus does not provide a thorough account on the matter, a careful analysis of selected sources allows for the reconstruction of his perspective. The Dominican master provides a very vague idea of the intricacies of alchemical transmutation in the ninth chapter of the third book of his *De mineralibus* where he states: "And for this reason he (Avicenna) himself adds that 'specific forms are not transmuted, unless perhaps they are first reduced to prime matter (*materia prima*)'—the [indeterminate] matter of [all] metals—and then, with the help of art, developed into the specific form of the metal they want" (Albertus Magnus 1967, 178).[20] This excerpt sketches out Albertus' general theory of transmutation, according to which metals can be transmuted into each other, provided that they are first reduced to prime matter.

Through this statement, Albertus echoes the Avicennan *Sciant artifices*, an abbreviated form of Avicenna's pivotal phrase concerning his rejection of alchemical transmutation, which is originally found in the *De congelatione et conglutinatione lapidum* of Avicenna. The *De congelatione* was translated around 1200 by Alfred of Shareshel and it added to the Latin translation of Aristotle's *Meteorologica.* Thus the text was initially transmitted to the Latin West under Aristotle's authority (Newman 1989, 423–445; Mandosio and di Martino 2006, 406–424). This Avicennan text rejected alchemical transmutation on the grounds that art is inferior to nature and that the alchemists cannot know the true characteristics of metals because they are hidden from their senses and therefore they cannot change what they cannot see and understand. Avicenna's rejection of alchemical transmutation was abundantly circulated in the Middle Ages through the phrase "Sciant autem artifices alkimie species vere permutari non posse . . . " (Let the artisans of alchemy know that the species [forms] of metals cannot really be transmuted) and ignited a medieval debate on alchemy's validity and efficacy in which many medieval scholars participated.

[18]Albertus Magnus, *De Mineralibus*, I, cap. 1, tr. 1: "Propter quod non curamus inquirere differentiam lapidis et spiritus sive animae, et corporis sive substantiae, et accidentis, de quibus inquirunt Alchimici, lapidum vocantes omne illud quod non evaporat in igne, et idem vocant corpus et substantiam. Id autem quod evaporat in igne, sicut sulphur, et argentum vivum, et ex quibus diversorum colorum fiunt ea quae vocantur lapides, vocant spiritus et animam et accidens : alterius enim scientiae est inquirere de his quae occultis valde fulciuntur rationibus et instrumentis."

[19]Albertus Magnus, *De Mineralibus*, III, cap. 7, tr. 1.

[20]Albertus Magnus, *De Mineralibus*, III, cap. 9, tr. 1: "propter quod et ipse subjungit, quod non permutantur species, nisi forte in primam materiam et in materiam metallorum reducantur, et sic juvamine artis deducantur in speciem metalli quod voluerint."

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At the early stages of his career, Albertus used the *Sciant artifices* as a means to reject alchemy. But as we see from the excerpt of the *De mineralibus,* the Dominican master later adopted a more favorable attitude towards alchemy (Rinotas 2022, 57–82). In fact, as shown above, Albertus is open to the possibility of alchemical transmutation as long as metals are reduced to prime matter, something which at first glance contains a paradox since, according to Aristotelian philosophy, prime matter cannot exist on its own without a form. However, the analysis of Albertus' meaning of *prima materia* in this context contains the key to understanding how he conceives of alchemical transmutation and, to a further extent, of the relation between alchemy and natural philosophy.

Anna Rodolfi's study on Albertus' conception and use of the term "prime matter" provides us with some important tools with which to understand the source at hand. According to Rodolfi, Albertus often equates the term *prima materia* to the four elements. Therefore, the term *elementum* may be used in order to denote prime matter (Rodolfi 2004, 18–20). Rodolfi's study has recently been enhanced by that of Loconsole, who has cogently shown that the term *prima materia* in Albertus' *De mineralibus* often denotes a lifting of prime matter to the level of elements (Loconsole 2020, 185–224). These two studies serve as sufficient proof to argue that Albertus Magnus does indeed associate alchemical transmutation with natural philosophy and, in this regard, the alchemist does not act as a mere artisan but also as a natural philosopher (*physicus*), who is supposed to have a profound knowledge of natural philosophy, of the theories of prime matter and of the elements in particular.

But how can alchemical transmutation occur by means of elements? Albertus provides us with this answer in his *De mineralibus,* where he notes that metals can be transmuted into each other by means of *symbola*. It is in the sixth chapter of the third book of the *De mineralibus* that Albertus Magnus discusses the cyclical production of metals and there he makes an explicit reference to the Aristotelian *symbola*:

> An additional statement should now be made: one thing that is common to all metals is that their materials are closely related. We know, from what has been determined in the science of *Generation and Corruption*, that among [things] having a common property in their material, powers, and potentialities, the transmutation of anyone into another is easy. And this is the reason for the assertion of many philosophers—whose father is Hermes Trismegistus, called the prophet of philosophers—that the production of the metals is cyclical, from each other, just as the production of the elements is cyclical. And this seems to me very true. (Albertus Magnus 1967, 200)[21]

In this source the Dominican master admits that the matter of metals is closely related and their transmutation to each other is easy due to the existence of "common properties," that is, *symbola*.[22]

The Aristotelian theory of *symbola* is found in Albertus' commentary on the *De generatione et corruptione,* where he deals with it in more detail. According to this theory, the elements are bearers of qualities, and a quality that is commonly shared by two elements can act as a *symbolum,* which can facilitate and accelerate the transmutation of one element to another. In the second chapter of the second book of the *De generatione*, Albertus gives the example of fire being transmuted to air, which he originally takes from Aristotle. In this regard, fire is hot and dry, while

[21]Albertus Magnus, *De Mineralibus*, III, cap. 6, tr. 2: "His autem adjiciendum est, commune omnibus metallis esse, quod propinqua est valde materia eorum. Scimus autem ex his quae in scientia Peri geneseos determinata sunt, quod inter habentia symbolum in materia et virtutibus et potentiis naturalibus, facilis est transmutatio ad invicem. Propter quod et multorum Philosophorum, quorum tamen pater est Hermes Trismegistus, qui Propheta Philosophorum vocatur, assertio est, circularem esse metallorum generationem, et ex se invicem, sicut et circularis est generatio elementorum : quod etiam mihi videtur verissimum."

[22]On the use of the Aristotelian doctrine of *symbola* in the work of Albertus Magnus, see: Rinotas (2024).

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air is hot and moist; and if moist dominates over dry, then fire will be transmuted to air.[23] For the accomplishment of this transmutation the hot quality acts as a *symbolum*, a common property, which allows a quick and easy transition from the element of fire to that of air. Due to this kind of mechanism, Albertus concluded that the transmutation of metals is cyclical (*ad invicem*) just like that of the elements.

The fact that the metals consist of different ratios of sulfur and mercury should not be regarded as posing any difficulty or creating any conflict with the theory of *symbola,* since both sulfur and mercury are compounds of elements and they can therefore be bearers of *symbola*. Albertus is well aware of this since he discusses quicksilver (mercury) within the context of *symbola*. Specifically, Albertus states that two pieces of lead may stick together if they are rubbed either with soap or with another unctuous material, and that the reason for this is because the quicksilver (mercury) in the lead has unctuous moisture and thus needs a *symbolum* in order to adhere to the surface of lead.[24]

Metaphysics, *scientia* and alchemy in the work of Albertus Magnus

In the previous section I showed that Albertus makes a direct connection between the phenomenon of alchemical transmutation and natural philosophy through the Aristotelian *symbola*. Thus, the Dominican master offers an easy way to link alchemy to *scientia naturalis*. This would suffice to infer that Albertus does indeed associate alchemy with the notion of *scientia*, but Albertus provides even more evidence towards this direction through his description of the metaphysical implications of alchemy. In this section, we will see how Albertus discussed or at least attempted to discuss alchemy within the context of the *scientia* of metaphysics.

The metaphysical implications of Albertus' alchemy derive from the fact that transmutation by means of *symbola* implies an incomplete or partial transmutation, characterized primarily by a change of color and the transmission of some metallic properties, without yet bringing about a substantial change in the metal and therefore a new substantial form. Such an inference is further attested in Albertus' *De nutrimento et nutrito*, where he states that stones cannot serve as nourishment to animated beings due to the stones' cold and earthly composition:

> One of these (causes) is the proximity to the elements; and for that reason (these nutriments) are not mixed in terms of substance, but rather the qualities of earth and water have dominion in them like in simple (unmixed) bodies. And therefore all (nutriments) of this kind are cold and devoid of moist heat which is incorporeal in those which are nourished. And evidence that these (nutriments) are proximate to elements is that their transmutation in turns is easy like the one of elements. And this is also evident in the alchemical performances in which one metal easily receives the colour and property of another.[25]

[23]Albertus Magnus, *De generatione et corruptione*, II, tr. 2, cap. 2: "Verbi gratia ex igne quidem erit aër, altera qualitate transmutata; ignis enim est corpus calidum et siccum, aër autem est corpus calidum et umidum. Quapropter si vincatur siccum ab umido, ignis erit aër, si autem e converso umidum vincatur a sicco, ex aëre erit ignis."

[24]Albertus Magnus, *De Mineralibus*, III, cap. 1, tr. 2: "Propter quod etiam plumbum plumbo non consolidatur, cum extremitas utriusque liquescit ferro candente, nisi prius dura superficies radatur et tollatur siccum terreum quod impedit conglutinationem : eo quod conglutinatio unius cum altero est per virtutem humidi quod influit in aliud, et non per virtutem sicci quod stat in seipso. Sed neque conglutinatio fit, nisi postquam rasum est, ungatur sepo vel aliquo quodam pingui unctuoso : quod ideo fit, quia argentum vivum quod in plumbo est, habet humidum unctuosum, sicut saepius dictum est, et ideo non adhaeret superficiei, nisi per aliquod habens symbolum in natura."

[25]Albert the Great, *De nutrimento et nutrito*, tract. 1, cap. 1, p. 324b: "quarum una est talium ad elementa vicinitas : et ideo non sunt substantialiter commixta, sed potius dominantur in eis qualitates terrae et aquae sicut in simplicibus. Et ideo frigida sunt omnia talia in genere, non habentia humidum calidum quod incorporabile sit in eis quae nutriuntur. Signum autem, quod haec vicina sunt elementis, est quod facilis est eorum transmutatio ad invicem sicut et elementorum: quod patet in operibus alchimicis, in quibus de facili unum metallum alterius recipit colorem et proprietatem."

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The important thing in this source is that Albertus refers to alchemy and accepts that transmutation of metals is easy due to the "vicinity of elements"—an implied reference to the theory of *symbola*. Apart from this, the Latin expression of *transmutatio ad invicem* that is used in the *De nutrimento* is also used in the previous source we examined in the *De mineralibus*.[26] Yet, this kind of transmutation is easy and succeeds only in bestowing a change of color on the metal and the transmission of some metallic properties, without impacting the substantial form of the metal. The problem of substantial form is something that the Dominican master often repeats in his *De mineralibus,* as he makes it explicitly clear that a change in color does not mean a true transmutation. On the contrary, Albertus relates such a transmutation to a fraudulent kind of alchemy:

> But those who color [metals] white with white, or yellow with yellow [coloring], leaving the specific form of the original metal unchanged in material—without doubt they are deceivers, and do not make real gold and real silver. And yet they nearly all follow this method, completely or partly. For this reason, I have had tests made on some alchemical gold, and likewise silver, that came into my possession; and it endured six or seven firings, but then, all at once, on further firing, it was consumed and lost and reduced to a sort of dross. (Albertus Magnus 1967, 179)[27]

Through this excerpt it becomes evident again that Albertus believes that in alchemical performances it is "easy" to color a metal but difficult, on the other hand, to affect its substantial form. And unfortunately, the majority of the alchemists act as deceivers, since they do not really know how to bring about a true metallic transmutation. Albertus provides proof for his allegations and admits that after six or seven firings the supposedly transformed metal could not maintain its form, and was consumed. At this point, the Dominican master seems to have had a kind of experimental procedure in his mind that needed to be tested. In particular, his hypothesis appears to be that a metal, according to Aristotle, is a *homeomerous* body, and as such it should be the same in all its parts, inside and outside.[28] Therefore, through consecutive firings, Albertus would be in place to determine whether a newly transmuted metal has become, both inside and outside, a *homeomerous* body indeed. Yet, as Albertus acknowledges, his testing failed to confirm his hypothesis, since the form of the metal was consumed and not preserved.

Given the above, it has become evident that for the Dominican master the solution to the problem of substantial form is the key for a successful and true metallic transmutation. As we saw in the previous chapter, the action of formative power is pivotal for a metal to gain a new substantial form (Takahashi 2008, 451–481; Cerrito 2023). Albertus explicitly explains its role in the *De mineralibus,* where he states:

> So undoubtedly there is a formative power in nature, poured by the stars of heaven, and this [power] guides towards a specific form the heat that digests the material of metals. For as we have said elsewhere, this heat has its right direction and formative power from the Moving Intelligence. . . . And it is heat that has the power of doing this; but it would not have the power of imposing a boundary at all, except for the power of the boundary itself—that is, of the form, which is the boundary. And therefore the formative power must guide and control the heat that imposes the boundary. But this form is not the form produced in the material:

[26]See note 21.

[27]Albert the Great, *De mineralibus*, lib. III, tract. 1, cap. 9, p. 71b: "Qui autem per alba albificant, et per citrina citrinant, manente specie metalli prioris in materia, procul dubio deceptores sunt, et verum aurum et verum argentum non faciunt : et hoc modo fere omnes vel in toto vel in parte procedunt : propter quod ego experiri feci, quod aurum alchimicum quod ad me devenit, et similiter argentum postquam sex vel septem ignes sustinuit, statim amplius ignitum consumitur et perditur, et ad faecem quasi revertitur."

[28]Aristotle discusses homeomerous bodies in his *De generatione et corruptione* 1, 10, 328a:6ff and *Meteorologica* IV, 10, 388a13.

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> therefore it must be the form of the First Cause that gives forms to all things in nature. And this cause is the Mover of the sphere, bringing forth natural forms through the motion of heaven and the qualities of the elements. (Albertus Magnus 1967, 166–7)[29]

So, according to this text, the formative power is closely connected to the emergence of a metal's form, while, additionally, this formative power derives from the celestial realm, which establishes in turn a *de facto* association with metaphysics. Thus, the question that emerges is whether an alchemist can *know* how to bring about a new substantial form in a metal. By initiating such questions what we seek to find is whether Albertus is alluding towards a *scientia* of alchemy, which presupposes a knowledge of metaphysics as a decisive factor for alchemy's success.

A first answer to this question can be found in Albertus' commentary on the *De anima,* where he makes some serious associations of alchemy with the "contemplative science of separate things" (*scientia contemplativa separatorum*). Particularly, in the third book of his commentary Albertus discusses the question of whether the *separata*, that is, the divine things, can be known. From chapters six to eight Albertus comments on various opinions of ancient authorities like Trithemius and Theophrastus, as well as the opinions of Al Farabi and Avembache, which he finds erroneous. At the end of chapter eight Albertus examines the proposition of whether, due to a capacity of our intellect, we can know *separata*, that is, divine things through divine things themselves, just as we know composed things through themselves. Albertus denies this possibility by admitting that if we know something of divine things this is through composed things with matter.[30] Then the Dominican master proceeds to examine another possibility, according to which we can have knowledge of *separata* because our intellect is connected by nature (*connaturalis*) to know these things. Albertus comments on this statement by saying:

> . . . then it is necessary that we all are defective in the speculative science of separate (divine) things either for that cause, because the principles of this science are not invented, just like we are defective in alchemy, or due to this, that we are not trained in a sufficient way; whichsoever of the two is not probable since such defect is not general among all humans.[31]

This excerpt is particularly significant and insightful, as it places alchemy squarely within a "scientific" context from Albertus's perspective. Specifically, Albertus states that if our intellect is connatural in knowing the divine things then we have to admit that we all fail in the speculative science of divine things because the principles of that science have not been discovered yet, just like we fail in alchemy. In this regard, Albertus seriously alludes, at least, to alchemy as a science whose principles are yet to be discovered, while he obviously creates connections between alchemy and the notion of the divine.

At first sight, these allusions seem a bit strange and hard to explain, but they become clearer once we combine them with the content of some excerpts from *De intellectu et intelligibili*. In this book, as Palazzo has cogently shown, Albertus discusses the abilities of "extraordinary men" like the astrologers, the magicians and the philosophers (Palazzo 2009, 160–168; Palazzo 2011, 80–82).

[29]Albert the Great, *De mineralibus*, lib. III, tract. 1, cap. 5, p. 65b: "ita procul dubio virtus formativa est in natura et stellis et coelo influxa, quae ad speciem dirigit calidum digerens materiam metalli: sicut enim et in aliis dictum est, calidum hoc habet rectitudinem et virtutem formalem ex intellectu movente . . . et hoc facit calidum terminans, quod nullo modo potest habere virtutem terminandi nisi per virtutem ejus quod est terminus : est autem forma terminus : oportet igitur quod virtus formalis dirigat et informet ipsum calidum terminans : forma autem haec non est forma quae inducitur in materiam : oportet igitur quod sit forma primi efficientis quod dat formas in tota specie naturali. Hic autem est motor orbis formas naturales explicans per motum coeli et qualitates elementorum."

[30]Albertus Magnus, *De anima,* lib. III, tr. 3, cap. 8.

[31]Ibid.: "tunc oportet, quod omnes deficiamus in scientia speculativa separatorum aut propterea, quia principia illius scientiae non sunt inventa, sicut deficimus in alchimia, aut propter hoc quod non sumus exercitati sufficienter; et utrumque horum est improbabile, quia talis defectus non esset generalis apud omnes homines." Cf. Averroes (1953, 494).

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When it comes to philosophers, the Dominican master mentions that their intellect becomes very powerful when it unites with the superior intelligences, and through them, with the Divine Intellect. In this state the philosophers are capable of gaining prophetic knowledge and of transforming matter.[32] The latter statement contains strong allusions to alchemy, since the philosopher's upgraded intellect through its union with Divine Intellect is the key for transforming matter. That said, it now makes total sense why Albertus used alchemy alongside the science of *separata* in the previous source. Namely, like the science of *separata*, alchemy seems to be a science whose principles have not been discovered yet. Therefore the alchemist, who as we saw must act as a *physicus* (natural philosopher), should unite his intellect with the Divine intellect in order to be instilled with the knowledge of transmuting matter. This interpretation aligns with and sheds light on another source from Albertus, where he again puts alchemical transmutation within a divine-theological context.

Particularly, in the thirteenth question of his *De XV problematibus*, Albertus asks "whether God can give immortality and incorruptibility to a thing which is mortal and corruptible." As de Libera has noted, Albertus begins his answer by admitting that this question does not really pertain to Peripatetic philosophy, and attempts to resolve the question by initiating his "theorem of proximity," according to which a thing that is closer to God can become incorruptible and immortal while the things that are at a distance cannot (de Libera 2003, 169). The surprising fact, however, is that the Dominican master uses alchemy as an example to further explicate the aforesaid theorem. In particular, he states: "some of the wise alchemists say that the elemental substance can be transformed in the sky because the corruptible matter can be reduced to the quality and order of incorruptible things."[33]

In commenting on this source, de Libera argues that the appearance of alchemy was another way for Albertus to indicate that this topic may be pertinent to philosophy too. In doing so, de Libera underlines Albertus' broad sense of philosophy, as encompassing all the natural knowledge of his era (de Libera 2003, 172–174). This interpretation gains additional support if we take our previous analysis into account, according to which Albertus' alchemy has ties with natural philosophy through the Aristotelian doctrine of *symbola*. However, de Libera's approach does not treat the actual content of the source. In fact, the previous sources that we encountered provide us with some important insight which is useful for unlocking some important aspects of Albertus' alchemical thought with respect to the last source.

First of all, it should be noted that Albertus refers to the "wise alchemists" and this choice of phrasing is not arbitrary. In Albertus' thought, the notion of wisdom (*sapientia*) is influenced by both St. Augustine of Hippo and Aristotle. Albertus, on the one hand, accepts St. Augustine's definition of wisdom, according to which actual wisdom is what refers to the knowledge of divine things. On the other hand, he also endorses Aristotle's doctrine, according to which wisdom is connected with the knowledge of the first principles (Speer 2018, 8–19). In this regard, Albertus accommodates both definitions of wisdom since, as Andreas Speer has persuasively put it, "the philosophical and Biblical wisdom seem to have found the same language" (Speer 2018, 17). This brief analysis of Albertus' notion of wisdom is helpful in understanding the meaning of "wise alchemists," since the latter phrase denotes that alchemists have a certain capacity to know divine things and the first principles. Thus, Albertus' wise alchemist seems to be able to know the *separata* we encountered in his commentary on the *De anima*, while he is also reminiscent of the philosopher of the *De intellectu,* since such knowledge would require a union with the Divine Intellect. Additionally, this intellectual state would also render the alchemist capable of transforming the matter, and thus this proximity with the sky is used by Albertus as a means to stress the alchemist's certain ability to perform a genuine transformation.

[32]Albertus Magnus, *De intellectu et intelligibili*, II, 11.

[33]Albertus Magnus, *De XV problematibus*, probl. XIII: "quidam alchimicorum sapientes elementalem substantiam in caelum dicunt posse converti per hoc quod materia corruptibilis potest reduci ad incorruptibilium dispositionem et ordinem."

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Conclusion

It is true that Albertus Magnus has not provided us with any particular classification of sciences that includes alchemy—not, at least, in the same way as Gundissalinus and Pseudo-Al Farabi have done. Undoubtedly, such a record would have been extremely useful in our effort to assess Albertus' approach to alchemy. However, as demonstrated in this study, the substantial excerpts and references to alchemy left by Albertus enable us to deduce that he indeed contributed, albeit indirectly, to the debate on alchemy's "scientific" status. Regarding the ultimate question, of whether Albertus regarded alchemy as an *ars* or a *scientia*, I think that this cannot be settled by taking an absolute position on one side or the other. Such a position would be a distortion of Albertus' actual attitude towards alchemy, which does not completely exclude either the notion of art or that of science.

So, does this mean that all the scholars mentioned in the introduction are right? It would be more accurate to say that they have only explored one side of the coin without really paying any proper attention to the other. If we really want to properly assess Albertus' alchemy, we must keep in mind alchemy's distinction between *practica* and *theorica*. Albertus acknowledges a purely practical and artisanal part of alchemy, concerned with alchemical procedures that entail such workings as distillation, calcination, coagulation etc. He thus sees a strong and maybe inevitable connection of alchemy with art. This "artistic" connection, however, is always in line with nature, since the aim of art is to help nature to perform the alchemical transmutation, and Albertus explicitly stresses that it is nature that performs the work and not art.

Consequently, in the *theorica*, as we saw, Albertus makes clear connections with natural philosophy and metaphysics, thus associating alchemy with *scientia naturalis,* the first principles and the knowledge of divine things. The Dominican master creates these links through the Aristotelian doctrine of *symbola* and the intellectual capacity of the alchemist, who acts as a philosopher whose intellect, at the stage of *intellectus divinus*, can transmute matter. In this regard, when Albertus criticizes and rejects Gilgil for not being a *physicus*, that is, a philosopher, he is probably hinting at Gilgil's lacking knowledge of *symbola* and at his inability to access metaphysical truths through divine intellect—two elements that are important for a successful alchemical transmutation.

Given the above, I would say that Albertus' approach to alchemy should be divided into three levels. In the first level, Albertus treats alchemy as an art indeed, and discusses the practical aspects of it as described above. In the second level, Albertus conceives of alchemy as a part of natural philosophy, since a necessary theoretical knowledge of the intricacies of elements and matter is needed on the alchemist's part in order to "manipulate" *symbola* and perform a transmutation (albeit probably an incomplete one due to the lack of a new substantial form). Finally, in the third level, the Dominican master relates alchemy to metaphysics, where a "wise" alchemist can perform a true and genuine transmutation of matter after having reached the proper state of intellect. The last two levels seem to provide us with enough evidence to link Albertus' alchemy to *scientia*. Therefore, the solution to our initial dilemma would be to determine first to which level our analysis refers and then opine on the "scientific" aspects of Albertus' approach to alchemy. In this way, we not only maintain the *practica* and *theorica* perspectives of Albertus' alchemy intact, but also come up with an assessment that does justice to the actual alchemical thought of the Dominican master.

As a final note, a few words on the historiographical and sociological aspects of this study are worth mentioning. During the Middle Ages, artisanal and "scientific" endeavors were clearly divided, and each was performed at a different place: at laboratories and universities respectively. However, Albertus' account on alchemists provides a novel approach, since the two seemingly separate realms of medieval craft and science are bridged through the theoretical and practical parts of alchemy. In this regard, Albertus's alchemist aligns with the historiographical trend of Pamela Long and Pamela Smith, according to which the artisan was a crucial factor for the

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emergence of what we call "new sciences" (Long 2011; Smith 2004). Additionally, Albertus' alchemist reminds us of Zilsel's "superior craftsman," meaning that the Albertian alchemist is a type of artisan who equally combines theoretical and practical knowledge (Zilsel 1942, 544–562). Yet, one should always have in mind that Albertus holds a special place for alchemy in his system of thought and thus we must beware of generalizing and claiming that Albertus applies the same attitude towards alchemy in all other instances of *ars* in his work. Such a conclusion would demand a more detailed and a holistic analysis on Albertus' approach to *ars*. Nevertheless, the case of alchemy has clearly shown that *ars* and *scientia* are two realms of knowledge that can share some common ground and thus further research on Albertus' notion of *ars* would likely be a promising scholarly endeavor.

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