

**Nature Rejoicing in Nature:  
On the Origin of the Philosophical Stone**

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A note from the author:

The following text is submitted in the spirit of a ‘request for comment’. The opinions articulated should be considered preliminary and in early draft status. This paper is a living document: The author will likely add to, retract, or otherwise modify the contents of this work as future research progresses.

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# 1: Zosimos of Panopolis, the *Muṣḥaf aṣ-ṣuwar*, and the Philosophical Stone

The aim of this paper is to present a hypothesis as to the origin, purpose, and chemical composition of what has been referred to in more recent times as the “Philosopher’s Stone”. The basis of this investigation begins with the alchemist Zosimos of Panopolis (3<sup>rd</sup> century CE). Within the authenticated works of Zosimos there is found reference to an operation that describes the making of the “stone that is not a stone”. The present author regards this stone as the prototype and foundation of what has been referred to as the philosophical stone or “stone of the sages”. However, while the stone is an identifiable chemical substance, the authenticated writings of Zosimos do not indicate precisely in what manner this stone is to be utilized. In order to articulate this hypothesis, the details of the operation described by Zosimos to manufacture the stone will be compared with content from an Arabic text named the *Muṣḥaf aṣ-ṣuwar* (Tome of Images, 10<sup>th</sup> century CE).<sup>1</sup> The *Muṣḥaf aṣ-ṣuwar* is a lengthy compilation of material purportedly from Zosimos that has been wrapped in a dramatization of questions and answers between master (Zosimos) and student (Theosebeia). It may be the oldest alchemical text that demonstrates the stages of the alchemical work pictorially.

The *Muṣḥaf aṣ-ṣuwar* is regarded by the present author to be one of the most important alchemical texts to have survived unto the modern era. This text is unique in its detailed explanation of the alchemical operation and its symbolic associations. The exploration of these associations not only clarify the authenticated writings of Zosimos, but may possibly shed light on other ancient alchemical authorities such as Maria, Agathodaimon, Hermes, Isis, Ostanos, and Democritus.<sup>2</sup> Most importantly, in many cases the *Muṣḥaf aṣ-ṣuwar* indicates what alchemical symbols do not mean. Many scholars, taking the substances and allusions of alchemy literally, have assumed that the transmutation or artificial coloration of metals was a primary goal of the alchemical work. The *Muṣḥaf aṣ-ṣuwar* demonstrates beyond a doubt that this was indeed not the principal aim of the work as it was understood by the author.

Based on an analysis of the authenticated Zosimean material, it may be suggested that the commentary of Zosimos of Panopolis regarding the “stone that is not a stone” is an actual experiment that may be grasped using modern chemical terminology. In addition, the present author proposes that the majority of the content of the *Muṣḥaf aṣ-ṣuwar* is likely a detailed exposition of this single experiment which serves to clarify the authenticated writings of Zosimos. In order to articulate this hypothesis, it will be necessary to navigate the complex maze of symbolic references found within the *Muṣḥaf aṣ-ṣuwar*. This symbolic complexity is not only a means of protecting a chemical craft secret, but also a trial of the consciousness of the individual attempting to understand the work. Whether the overall hypothesis is correct or not, it is hoped that this exploration of symbolism will help to expand the understanding of the reader regarding the Greco-Egyptian alchemical tradition and to elucidate what the present author refers to as the alchemical consciousness.

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<sup>1</sup> Zosimos of Panopolis, *The Book of Pictures: Muṣḥaf aṣ-ṣuwar*, trans. by Salwa Fuad and Theodor Abt (Zurich: Living Human Heritage, 2011).

<sup>2</sup> With the possible exception of Maria, these names are largely assumed to be pseudonyms. Reference to a name such as “Democritus” should be understood as pseudo-Democritus.

Zosimos was a native of Egypt and lived some time near the year 300 CE. He is most anciently referred to as the ‘Panopolitan’ or the ‘Theban’ (i.e. from the Thebaid region). Shannon Grimes sums up his biography thusly:

**“Unfortunately, very little is known about his life. From his writings, it appears that Zosimus was a teacher of alchemy, that he was probably employed as an artisan in an Egyptian temple complex at one time, and that he was well versed in Hermetic and ‘gnostic’ literature. His religious ideas are largely based in these traditions.”<sup>3</sup>**

Much ink has been spilled over the religious and spiritual influences suggested by the works of Zosimos. However, what has been written regarding the alchemical operations that are the main focus of his writings would suggest that the alchemical work is largely metallurgical. The prevailing opinion among scholars is that the principal aim of the alchemists of Greco-Roman Egypt was to create metallic alloys, or to attempt to color metals in order to give them the appearance of a different, more valuable metal. A literalist approach to the Greco-Egyptian alchemical tradition often results in the assertion that the ancient alchemists thought they were trying to turn ‘copper into silver’ or ‘silver into gold’, at least superficially. Modern scholars are not to be entirely blamed for taking this approach. There are very few clues within the texts themselves to suggest that the ingredients given within an alchemical recipe are anything other than what is stated. In other words, there is no ancient ‘instruction manual’ from the time of Zosimos that clearly explains how symbols were formulated and employed. This lack of clarity has resulted in a great deal of speculation with regard to the chemical practices and psychological motivations of the ancient alchemists.

The underpinning of the argument presented is that the (relatively recently published) alchemical text named the *Muṣḥaf aṣ-ṣuwar* may be just such an instruction manual. The book’s Arabic title, translated by Salwa Fuad and Theodor Abt as “Book of Pictures”, and by Benjamin Hallum as “Tome of Images”<sup>4</sup>, reflects the fact that the book contains a series of symbolic drawings that illustrate different stages of the alchemical work. These images serve to clarify or expand upon the written passages within the book. However, the pictures themselves are only a small fraction of the book’s content which spans over 400 pages in English translation, making it one of the largest complete alchemical texts in existence.

There is some scholarly debate between Abt and Hallum as to whether the *Muṣḥaf aṣ-ṣuwar* is a translation of an authentic book written by Zosimos or if it is merely a compilation of material wrapped in dialogue by a later Islamicate author. While the present author favors the argument of Hallum that the book in its entirety is not an authentic writing of Zosimos, Hallum, together with Abt, have demonstrated that the book contains much authentic material. Hallum provides an overview of these correspondences:

**“The Tome of Images includes a number of excerpts from other Arabic works attributed to Zosimos, at least three of which survive, allowing the texts to be compared. The first of these is the Third Epistle of Zosimos, one of a collection of seven epistles known only in Arabic, but certainly translated from the Greek and attributable to Zosimos. Almost the entire text of the Third Epistle**

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<sup>3</sup> Shannon Grimes, “Zosimos of Panopolis: Alchemy, Nature, and Religion in Late Antiquity” (PhD diss., Syracuse University, 2006), 26.

<sup>4</sup> B. C. Hallum. “The Tome of Images: an Arabic Compilation of Texts by Zosimos of Panopolis and a Source of the Turba Philosophorum”. *Ambix* 56 No. 1 (2009): 76-88.

is reproduced in the Tome of Images (end of Book 1 and majority of book 2) and nearly verbatim, but with a number of details (e.g. names of people and places) often missing or badly disfigured.”<sup>5</sup>

Hallum continues:

“Abt noticed, in the Tome of Images, extracts of another extant Arabic Zosimos text almost certainly translated from the Greek, The Book of Keys (*Kitāb al-mafātīḥ*).”

And the third correspondence:

“...the inclusion in the Tome of Images of a section from The Sulphurs, an authentic work of Zosimos extant almost in its entirety in Arabic. Two Greek fragments of The Sulphurs survive...”

It also appears that a text published by Hallum within his Ph.D. thesis named the 25<sup>th</sup> Epistle<sup>6</sup>, itself a translation of an original Greek text, is cited within the *Muṣḥaf aṣ-ṣuwar*.

It is clear that the author of the *Muṣḥaf aṣ-ṣuwar* had access to a significant cross-section of the authentic writings of Zosimos. Almost certainly, as future studies of the text proceed, more correspondences will be identified. There may also be authentic material within the *Muṣḥaf aṣ-ṣuwar* that has not been preserved in any other format, though such may never be proven. The author of the text is, for the present author, convincingly authoritative regarding the alchemical work, its composition, and its qualitative and quantitative operations. But the question remains: If the *Muṣḥaf aṣ-ṣuwar* is a contrived dialogue from an Islamicate source using Zosimean material, how much of what is described actually applies to the true Greco-Egyptian tradition? The symbolic perceptions of the text's author could reflect contemporary trends within Islamicate alchemy, and may not apply to earlier time periods.

In order to explore the question, an analysis of the two traditions is required. What do the authenticated writings of Zosimos cited by the *Muṣḥaf aṣ-ṣuwar* say, and how do they contrast and compare with what is stated in the *Muṣḥaf aṣ-ṣuwar* as a whole? Hallum has previously published an Arabic transcription of the 3<sup>rd</sup> Epistle, however it remains untranslated into a European language.<sup>7</sup> However, Hallum states that the reproduction of the 3<sup>rd</sup> Epistle in the *Muṣḥaf aṣ-ṣuwar* is “nearly verbatim” so the corresponding section of the *Muṣḥaf aṣ-ṣuwar* may be regarded as largely reflecting the genuine Greco-Egyptian tradition.

Abt provides a discussion of the relationship of the *Muṣḥaf aṣ-ṣuwar* to the Book of Keys:

“Some similar passages show how the Book of Pictures makes use of *Kitāb al-mafātīḥ* material. For example, Zosimos' dream of the young man fighting the dragon is in both books...”<sup>8</sup>

The small portion of the *Muṣḥaf aṣ-ṣuwar* which contains this dream may also be regarded as largely reflecting the genuine Greco-Egyptian tradition.<sup>9</sup>

Elements of the 25<sup>th</sup> Epistle are only briefly cited, however, the passages quoted contain very interesting information about the alchemical process.

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<sup>5</sup> Hallum, “Tome of Images”, 82.

<sup>6</sup> Benjamin Hallum, “Zosimos Arabus: The Reception of Zosimos of Panopolis in the Arabic/Islamic World” (PhD diss., Warburg Institute, 2008), 120-122 and 280-283.

<sup>7</sup> Hallum, “Zosimos Arabus”, 311-322.

<sup>8</sup> Zosimos (Abt/Fuad), 47.

<sup>9</sup> Abt implies that this dream is not the only correspondence to the Book of Keys.

**“For, water is the enemy of fire and likewise the Sage said ‘Nature seizes its like as an enemy does his enemy when he defeats him’. She said: But if it is an enemy, how is it its like? And if it is its like, how is it an enemy to its partner? He said: I shall explain that to you that it burns the body like the burning of a sulphur and in burning it becomes an enemy and becomes stable with it in the fire with the stability of something together with its like. So, we call it the water of sulphur since it burns bodies and endures the onslaught of fire. We have taught that water is the enemy of fire and that this water burns like a sulphur without smoking like one because it is a water. However, it grasps a sulphur by means of its wetness and stabilizes it upon the fire so that it becomes capable of tincturing. Its name is ‘water’ for it is a liquid that runs like water but as far as its actions and its potential are concerned it is a sulphur. This is why the Sage said ‘Nature takes its like as an enemy’ and I have explained that what is stable upon the fire are bodies and what are volatile are sulphurs, for they do not endure upon the fire. Then he said ‘I have explained to you that when they are mixed with bodies they endure upon the fire due to their wetness and this is what is in those sulphurs that I have named to you’.”<sup>10</sup>**

From this text we learn of the battle between two natures. This is stated to be an interaction between a ‘water’ and a ‘body’. A similar passage cited within the *Muṣḥaf aṣ-ṣuwar* appears to be a paraphrasing of the original.

**“She said: «And how, O Zosimos, does the nature take its close one as the enemy?» He said: «Concerning its close one, it also turned into water as in the first work. So we named it water of sulphur. Concerning his word “as enemy”, it is because the water is the enemy of the fire, but it took its companion and it clung to it, and it did not leave it to become smoke. If there were not water concealed in its (the fire) inside as its moisture, it would escape (emendation). Even when you see it just like water, then know that it has a tremendous power and effect. I have already told you that what remains in the fire and fights against it are the natures which are the bodies. And concerning those which are not natures, they are the sulphurs which do not remain in the fire.»”<sup>11</sup>**

It is with the authenticated writing of Zosimos known as *On Quicklime*, a subset of the greater work known as *The Sulphurs*, that we see the makings of a real, graspable chemical composition. As Hallum has noted, significant portions of *On Quicklime* are found within the *Muṣḥaf aṣ-ṣuwar*, though with clear modifications. *On Quicklime* appears to be an alchemical recipe in more or less plain language, however this clarity is entirely removed from the corresponding section of the *Muṣḥaf aṣ-ṣuwar* (possibly to hide the straightforward instructions of the original). With a thorough understanding of this operation, it then becomes worthwhile to investigate whether or not this experiment is reflected in other areas of the *Muṣḥaf aṣ-ṣuwar*. Of particular interest is that the text of *On Quicklime* describes the manufacture of the “stone not a stone”, a subject found throughout the *Muṣḥaf aṣ-ṣuwar*. Indeed, this stone seems to be the primary focus and sought for goal of the text.

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<sup>10</sup> Hallum, “Zosimus Arabus”, 332-335.

<sup>11</sup> Zosimos (Abt/Fuad), 193. From *The 1<sup>st</sup> Book about the Learning*.

## 2: The Operation of Quicklime

On Quicklime is a subset (the first two ‘books’ or chapters) of a larger work of Zosimos known as The Sulphurs. Within this short treatise there is described a chemical reaction between two primary ingredients; the result of which is called the “stone and not a stone”. The experiment in question, if taken at face value, contains elements of what some modern alchemists refer to as the ‘acetate path’.<sup>12</sup> Generally speaking, the aim of the ‘acetate path’ is the production of various acetate salts with a view toward a distillation of those salts to produce important chemical compounds.

Discussed below is an English translation of On Quicklime, made by Benjamin Hallum from an Arabic copy of the text.<sup>13</sup> This text is quoted along with a French translation by Michèle Mertens, taken from a Greek copy of the text.<sup>14</sup> The two translations follow each other fairly closely.

**“I am making clear to you the matter of quicklime, for it is from the feminine power. I would like you to know, O sages, that the stone that is called alābastrūn, they have called a brain, because it restrains every dye which does <not> remain. You take alābastrūn and roast it for a day and night until it becomes quicklime.”**

**« Je vais vous parler clair. En effet, il est bien connu que la pierre d’albâtre est appelée encéphale parce qu’elle retient toute teinture fugace. Prenant donc la pierre d’albâtre, grillez un jour et une nuit : vous obtenez de la chaux. »**

This paragraph describes the initial manufacture of quicklime, one of two principal ingredients used in the operation. Mertens suggests that the literal sense of the word alābastrūn refers to the mineral ‘alabaster’ (i.e. limestone), however, she qualifies that statement by saying that the word may more likely be a codename that indicates eggs or “the egg”.<sup>15</sup> It is unclear if this relationship is purely symbolic or rather if this choice of substitution may relate to the fact that both limestone and the shells of eggs are of the same substance – a composition consisting primarily of calcium carbonate,  $\text{CaCO}_3(\text{s})$ . Eggshells represent a relatively pure form of calcium carbonate (95%), with a remainder of calcium phosphate, magnesium carbonate, and some proteins. If ‘alabaster’ actually refers to the shells of eggs, the purity of the calcium carbonate in eggshells may explain its choice for use in this particular experiment. The result would be a relatively pure form of quicklime as compared to quicklime made from stone.

The roasting operation described appears to accurately portray the production of quicklime and there is no hint that Zosimos is being deceptive in any way. When enough heat is applied to calcium carbonate, a carbon dioxide molecule is freed to form calcium oxide,  $\text{CaO}(\text{s})$ , or ‘quicklime’:

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<sup>12</sup> See, especially: Robert Allen Bartlett, *The Way of the Crucible* (Lake Worth, FL: Ibis Press, 2008), 143-181.

<sup>13</sup> Hallum, “Zosimus Arabus”, 280-283.

<sup>14</sup> Les Alchimistes Grecs, Tome IV, 1re partie: Zosime de Panopolis, *Mémoires authentiques*, ed. and trans. by Michèle Mertens (Paris: Belles Lettres, 1995), 48-49.

<sup>15</sup> Mertens, 48. « L’expression  $\acute{\alpha}\lambda\beta\alpha\sigma\tau\rho\acute{\iota}\tau\eta\varsigma$  peut s’interpréter de deux manières : ou bien il s’agit de l’albâtre véritable, qui est une variété de carbonate de calcium et qui pouvait donc être utilisé dans la fabrication de la chaux, ou bien – et ceci est plus vraisemblable – nous avons affaire ici à une désignation métaphorique de l’œuf. »



Zosimos continues his instruction by adding the 2<sup>nd</sup> ingredient of the operation:

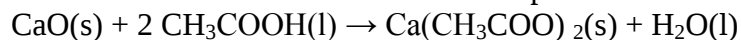
**“Then take strong vinegar, put it in a vessel, do not cover it and pour in the quicklime. Then take from it the vapour that moves upon the surface of the vinegar, hour after hour, and as much as its vinegar decreases you add [that amount of] vinegar to it and put it into it from the first day you throw it into it to the completion of seven days. Then take its vapours after that and leave it like that for 21 days. Continue to take its vapours until there remain to it no more vapours.”**

**« Prenez alors du vinaigre très fort et éteignez(-la). C’est bien une réalisation extraordinaire que vous admirerez alors : cela blanchit parfaitement la surface. Laissez reposer et ajoutez-y du vinaigre très fort, non dans un récipient clos, mais à découvert, afin de laisser monter la vapeur qui s’en dégage à chaque fois. Prenant encore du vinaigre fort, laissez monter la vapeur pendant sept jours. »**

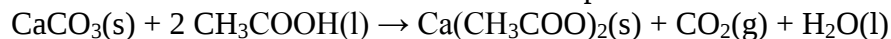
The quicklime is poured into an uncovered pot of vinegar, and the vinegar is allowed to slowly reduce. Zosimos seems to imply that heat is applied to the vessel to speed up the reduction as a vapor moving on the surface tends to imply a gentle heating. Such a vapor would not be perceived during ordinary evaporation (though small bubbles of carbon dioxide might be).

“Strong vinegar” is an important qualifier as it indicates a vinegar with a high acetic acid content. The whitening mentioned within the Greek version helps to confirm the result of the mixture. There is an essential chemical reaction which begins to occur here between the quicklime (calcium oxide, and perhaps some calcium carbonate) and the acetic acid,  $\text{CH}_3\text{COOH}(\text{l})$ , of the vinegar. In both cases the end product of the reaction is similar.

Calcium oxide reacts with acetic acid to produce calcium acetate and water:



Calcium carbonate reacts with acetic acid to produce calcium acetate, carbon dioxide, and water:



At this point it is worth noting that an oft-repeated admonition of the *Muṣḥaf aṣ-ṣuwar* is to be gentle with the fire in the first operation. The instruction represents the genuine Greco-Egyptian tradition as the same warning is found at the beginning of the 25<sup>th</sup> Epistle, one of the authenticated works of Zosimos that the author of the *Muṣḥaf aṣ-ṣuwar* adapted:

**“Know that there will be no error unless it is from the fire in the first mixing of the things. For if you employ the fire gently until the things are mixed together, each of them being fixed one to another, and there has been no error in it, then there shall appear to you the blackness, then the whiteness and then the redness. Observe how the Sage spoke when he commanded us to make the poison thick like earth, anoint half of it, and then put it on a gentle fire until each of them takes hold of another. And when each of them has taken hold of another the rusting occurs.”<sup>16</sup>**

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<sup>16</sup> Hallum, Zosimus Arabus, 333.

Zosimos refers to two substances which are mixed together and ‘take hold of one another’, very much like the operation described by On Quicklime. The *Muṣḥaf aṣ-ṣuwar* makes many similar statements. For example, Zosimos warns Theosebeia about a mixture which is dissolved, and the dangers of the fire:

**“If you mix it with wrong measures, you fall into error and by that the slowness comes. If slowness comes, bad thoughts come in. The sage distinguished different kinds of fire. He ordered us that at the beginning, at the time of the dissolving, the fire should be gentle.”<sup>17</sup>**

Perhaps the most useful temperature to facilitate a reaction between the quicklime and the acetic acid of the vinegar would be a moderate heat which speeds up evaporation but also limits the volatilization of the acetic acid. This immediately brings to mind the many inventions for gentle heating attributed to Maria, one of the alchemical authorities frequently quoted by Zosimos. The bain-marie, or double boiler, bares her name to this day.

The operation is portrayed to be quite time consuming. During the first 7 days, vinegar is repeatedly added to the pot as it evaporates, while in the following 21 days the vinegar is apparently allowed to reduce down without being refilled. This 28 day total is strikingly close to the lunar cycle, and may suggest a symbolic number of days.<sup>18</sup> On Quicklime continues:

**“And when you see that it has no more vapours, set it for 40 days in the sun, then pound it and take it up as a secret and give it to no one. For none of the savants explained this as I, myself, have explained it and they never used to express it amongst themselves except by gestures. And this is the stone of which they said ‘it is a stone and not a stone’ and they said ‘it is that which everyone knows and which no one knows’, and ‘it is that which has no value and is of enormously high value’, and ‘it is that which no one gives and many give’ and it is the medicine in which is the power of the mysteries which are called Mithraic/Mithraism.”**

**« Procédez ainsi jusqu’à ce que la vapeur ne monte plus, laissez quarante jours au soleil et à la rosée qui se manifeste pendant ce délai, adoucissez à l’eau de pluie et, après avoir fait sécher au soleil, vous détenez le mystère incommunicable, auquel personne parmi les prophètes n’a osé initier par la parole : ils le faisaient seulement par leurs procédés gestuels. Car cet élément capital, ils l’appelèrent dans leurs écrits obliques la pierre qui n’est pas une pierre, celle qui est inconnaissable et connue de tous, celle qui est indigne d’honneur et très honorée, celle qui n’est pas un cadeau tout en étant un cadeau divin. Et moi aussi je la vanterai comme celle qui n’est pas un cadeau tout en étant un cadeau divin, la seule qui dans nos travaux soit plus forte que la substance matérielle. Car c’est cela la drogue, le principe actif, le mystère mithriaque. »**

Zosimos indicates that no one before him has expressed this secret in the same manner (i.e. without symbolic gestures, an admission which might indicate Zosimos is being relatively open with the ingredients and procedure). This phase of the mixture suggests leaving the vinegar/quicklime combination in the open air to completely evaporate any moist element. However, setting the product in the ‘sun’ might also refer to continued heating. Like the number 28, the number 40 may have symbolic significance rather than suggesting a literal number of

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<sup>17</sup> Zosimos (Abt/Fuad), 354. From The 5<sup>th</sup> Book about the Magnesia.

<sup>18</sup> The black and white stages of the alchemical work could be juxtaposed with the blackness of the new moon and whiteness of the full moon. One could speculate that a transition from whitish quicklime, to blackened quicklime in dissolution with vinegar, to white calcium acetate would explain a white (full moon) → black (new moon) → white (full moon) 28 (actually 29.5) day cycle.

days.<sup>19</sup> The remaining product is the “stone not a stone”. Certainly this is one of the earliest prototypes for the concept of the ‘philosophical stone’. However, in this case we have a clear chemical identity for this stone: The reaction when completed and dried will produce (among other trace constituents) whitish crystals of calcium acetate:



It is a stone and not a stone, a brittle crystal. A similar reaction between vinegar and eggshells is often performed today within the context of the crystal growing experiments of children.<sup>20</sup> The impression given by the 68 day operation (taken literally) would imply a significant starting volume of vinegar. However, Zosimos provides some hints within the *Muṣḥaf aṣ-ṣuwar* which suggest that one should not take the mention of a specific number of operative days too seriously:

**“She said: «Then what about the statement of the sage: “Roast it for three days with their nights on a gentle, continuous fire till it is roasted.”» He said: «When you read in their books: “Cook such and such until it is roasted”, then the number of those days and their nights becomes worthless when the sage makes an exception and says: “Three days and their nights.” So do not act according to that, leave aside these days, and ignore his statement in order that the operation be completed. And as a confirmation of what I order you to do, Democritus said: “Roast it for two or three days till the poison becomes fully and extremely red.” The sages were in agreement about the solidification of the water of sulphur with its body on a small fire of dung till it gets solidified. Then it must be cooked till it becomes red. Know that among them are those who ordered us to solidify it on a small fire, while others ordered us (to use) hot ashes (instead). I suggest that your fire should be gentle at the beginning of the work in order that the water gets mixed with the cloud, because Democritus said: “Mix the cloud with the water of sulphur and cook it on a small gentle fire of dung until it gets solidified.”»”<sup>21</sup>**

The above discusses the mixture of a body with the “water of sulfur” and its subsequent solidification using a gentle heat. This is followed by a second cooking to make red after the initial solidification. There is now some specification with regard to the source of the heat: A small fire of hot ashes or dung are possibilities. Zosimos seems to imply that the operation

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<sup>19</sup> The number 40 is significant in many Judaic, Christian, and Islamic contexts. There are too many possibilities to even begin to suggest an interpretation. [See, for example: [http://en.wikipedia.org/wiki/40\\_\(number\)](http://en.wikipedia.org/wiki/40_(number))]

<sup>20</sup> For example, <http://www.rocksforkids.com/RFK/Grow%20Calcium%20Acetate%20Crystals.htm>. The site suggests 3 weeks to produce calcium acetate crystals from evaporation given a 250ml quantity of vinegar, though heating can significantly speed up the process. The crystals produced in this experiment are described as ‘botryoidal’, a word derived from the Greek meaning ‘like a bunch of grapes’.

<sup>21</sup> Abt, 188-189. From The 1<sup>st</sup> Book of the Learning.

should be taken to its completion based on personal circumstances, and not a preset number of days. Indeed, the amount of time required to reduce or evaporate a liquid would depend greatly on the initial volume of the liquid in question, of which Zosimos says nothing.

Returning to the operation of On Quicklime, the components of the reaction (vinegar, eggshells or limestone) are common and have little value. When combined with the correct art, however, it is suggested that a great value is imparted. The despised are made to be the honored. On Quicklime continues by describing the power of the stone:

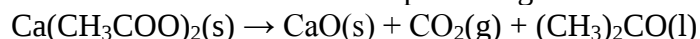
**“I teach you that the spirit of fire merges with this stone and becomes a unique spirit.”**

**« En effet, l'esprit du feu s'unit à la pierre et devient un esprit unique en son genre. »**

It is not immediately clear from the text what Zosimos means by the “spirit of fire” merging with the stone. The modern understanding of the ‘acetate path’ of alchemy is that acetate salts were formed with the intention of sublimating the mineral and collecting a distillate. It is possible that this statement illustrates an unspoken operation. The stone by itself has no power but it contains a spirit with the power of fire. In order for this power to be utilized, the spirit must be separated from the composition. Zosimos is silent on the matter in this particular text, and so the reader is left to speculation. However, as we have seen from the *Muṣḥaf aṣ-ṣuwar* above, Zosimos states elsewhere that the solidified body is cooked a second time until it becomes red.

Assuming an unspoken operation, the result of the sublimation of calcium acetate is the production of acetone, and a number of ‘acetate essential oils’, which consist of a complex arrangement of chemical substances, especially strong acids. The reaction shown below is a highly simplified rendering of the one in question.

Distillation of calcium acetate producing calcium oxide, carbon dioxide, and acetone:



It is interesting to note the Ouroboros-like nature of the reaction which gives back the starting product (calcium oxide). The remainder of the sublimation could perhaps be reused in a repetition of the operation. Acetone is not supposed to have been known during the lifetime of Zosimos.<sup>22</sup> However, the final statements of Zosimos in On Quicklime explain the uses of the end product.

**“And I will explain to you the works of this stone; for if it mixes with komari, it dyes pearls and it whitens copper for him who would incline its colour towards the colour of gold. And may God grant him success in it. For it is a principal that no one before me has explained nor revealed its secrets.”**

**« Mais je vous ferai connaître les propriétés de la pierre : mélangée à de la comaris, elle parachève les perles ; c'est pour cela en effet qu'on l'a appelée chrysolithe ; l'esprit emporte tout par la vertu de la poudre sèche. Et moi, je vais vous faire connaître la comaris, chose à laquelle aucun (des prophètes) n'a osé initier : eux-mêmes l'ont au contraire transmise par les procédés gestuels. Elle tient à distance la potentialité femelle (?) de trop haut niveau. Car à lui seul ce blanchiment est**

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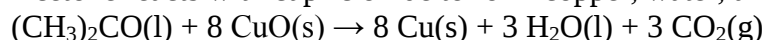
<sup>22</sup> Modern assumptions pertaining to the history of acetone production suggest that it was a European invention. Acceptance of the production of acetone in Greco-Roman Egypt would require a significant shift in the understanding of scientific history.

**devenu digne de vénération de la part de tout prophète. Je vous ferai connaître aussi la vertu de la perle ; elle acquiert sa propriété à être cuite dans l'huile, ce qui est une potentialité de type féminin. Ayant pris une perle d'Asie, cuisez dans de l'huile, non pas sous couvercle, mais à découvert, pendant trois heures, à feux moyens ; prenez un chiffon de laine, pressez-le sur la perle afin d'ôter l'huile. À réserver pour les besoins des teintures en profondeur car l'accomplissement de la substance matérielle se fait au moyen de la perle. »**

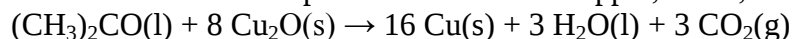
If the above statement is taken literally, Zosimos indicates that the end product is used as a dye, or perhaps as a base for a dye in conjunction with the 'komari/comaris'. Acetone-based products are used today in dyeing (for example, to stain concrete): Acetone-based dyes sometimes penetrate their target better than similar water-based dyes. Some research suggests that komari may indicate a substance derived from the fruit, leaves, or bark of the strawberry tree: *Arbutus Unedo*.<sup>23</sup> The components of this tree have been shown to dye white fibers a reddish or purple color depending on the source of the dye. Alchemically produced acetone might very well serve as a base for pigment from a red fruit or vegetal substance. This acetone/pigment combination could be applied to pearls for, presumably, a red or purple coloration.

The Arabic copy of the text suggests a substance which modifies the color of copper. It is possible that the reference to copper in the Arabic version may be entirely symbolic, describing the stages of the experiment (copper/silver/gold). However, taken at face value, it would appear that the verb 'to whiten' does not actually mean 'to make the color white'. If copper were whitened it would be inclined toward the color of silver rather than the color of gold. Rather it seems to mean to 'brighten' or 'lighten' the color in this context. The implication is that we are starting with oxidized copper (darker than natural copper) and the color is whitened (i.e. lightened) toward the color of gold (natural copper without oxidation or patination). Acetone, indeed, acts as a restorative to oxidized copper and thus would help to incline its color toward the color of gold.

Acetone reacts with cupric oxide to form copper, water, and carbon dioxide:



Acetone reacts with cuprous oxide to form copper, water, and carbon dioxide:



We can see that acetone is a substance which could potentially fit the description suggested by Zosimos, and might be regarded as a water with extremely special properties; a water with the spirit of fire.

The sublimation of calcium acetate produces more than just acetone. There are some important color changes that occur during the distillation of an acetate salt. In this regard, the work of C.A. Becker, a 19<sup>th</sup> century physician and enthusiast of alchemical experimentation, should be recalled. Becker made an investigation of the medicinal properties of various acetate distillates in his book *Das Acetone*. Becker describes the liquid produced by the distillation of calcium acetate:

**“The corals are dissolved in distilled vinegar; the solution is vaporized and the dry salt is placed in a luted retort. The phlegm is removed first with a low temperature; then with a different recipient**

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<sup>23</sup> Julia Martínez García and Marta E. Martínez Armero (<http://www.morana-rtd.com/e-preservationscience/2013/Martinez-28-12-2012.pdf>).

**the spirit is distilled over along with a small amount of red oil, both very pleasant smelling and bright red.”<sup>24</sup>**

The phlegm described is likely the water content from the hydrated calcium acetate crystals. The removal of this water content will reduce the crystalline substance to a powder of calcium acetate. Acetone is a naturally clear liquid. The bright red oil represents some of the non-acetone components of the distillation. As was stated previously, this is a highly complex array of chemicals that are here referred to loosely as ‘acetate essential oils’.<sup>25</sup> Speaking of the red oil, Becker states:

**“It discolored litmus paper cinnabar-red, while pure acetone showed only a weak acid reaction after several minutes.”**

The red oil produced has a very strong acid component, and it was particularly this oil that was sought for by the alchemists of the ‘acetate path’.

This reading of On Quicklime suggests to the present author that the ‘stone of the sages’ may be identified as calcium acetate with a fair degree of certainty. One could always argue that subjects like quicklime and vinegar are merely a further layer of substitutions, but as was stated previously, the roasting operation of the quicklime appears genuine and Zosimos claims an openness in describing the procedure compared to his predecessors. The text by itself only describes the formative operation of the acetate salt. Unfortunately, this does not provide conclusive evidence for the use of this salt. A portion of the *Muṣḥaf aṣ-ṣuwar* which is derived from On Quicklime has the following to say:

**“She said: «Then tell me what you say about the alabaster.» He said: «It is the lime. When it became a stone, we named it alabaster. <He said> We named it alabaster because of its intense whiteness. As for the lime (we named it like this) because it conceals fire in it, in the same way as the fire is concealed in the lime of ordinary people. As for the head, this is because the dye is concealed in its interior and it hides it (the dye) in its subtle (part) just as the head collects the thoughts, yet people only see the head but cannot see the thoughts in it. In the same way, the white colour is seen on the stone and the dye is concealed in it and cannot be seen.» She said: «O Zosimos, you described this well. Then tell me more about it.» He said: «Take that stone and destroy it by cooking, then you will like its colour. Then soak it with the vinegar until it absorbs the moisture, and do this seven times daily for 40 days. Sweeten it with the sun and the dew until the secret becomes complete for you, (the secret) that the sages could only explain with symbols and examples.» She said: «Then tell me more.» He said: «There is more to say about it than can be said in words. » She said: «In spite of that, tell me!» He said: «The sage said: “It is a stone – not a stone, known – not known, precious – cheap, and it is the only thing that is good for dyeing. This is because when the heat of the fire hits this stone, it is destroyed, and it becomes a spirit that is single-unique (fard) in its working and there is no other stone which does its work.”»”<sup>26</sup>**

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<sup>24</sup> C.A.Becker, *Das Acetone*, trans. Frater Parush (2002), 33.

<sup>25</sup> To the knowledge of the present author, the work of Robert Bartlett represents the only serious investigation into the chemical composition and properties of the ‘red oil’ of acetate distillations. His book, previously referenced, indicates some of the results of GC/MS (gas chromatography – mass spectrometry) testing performed against acetate distillates.

<sup>26</sup> Abt, 575-576. From The 13<sup>th</sup> Book: Questions about the other Composition.

It is clear that this version of On Quicklime is quite different from the original copies previously discussed. Did the author of the *Muṣḥaf aṣ-ṣuwar* possess a corrupt copy of the text? This is a possibility, however, it seems to the present author that it is also plausible that the text has been purposefully modified, perhaps to hide the clear recipe stated within the original. The statement “fire is concealed in the lime of ordinary people” possesses obvious chemical truth. When quicklime is mixed with water, a reaction occurs which produces calcium hydroxide and heat energy (an exothermic reaction). This reaction would be readily apparent to anyone working with quicklime in the ancient world. However, this version of the text seems to imply that lime is something other than the quicklime of the people. This contradicts the roasting operation described by Zosimos in the original version of On Quicklime. However, if this is a pure form of quicklime produced from eggshells (or some other form of calcium carbonate), then it is not the ordinary quicklime of the people produced from stone.

The symbolic associations suggest that alabaster without qualifier is quicklime in its transitory states: as starting material as well as the product that is created from the quicklime, a stone with a white color. Presumably, this white stone is a reference to calcium acetate, a stone with a concealed dye or moisture (acetone/red oil). It is the quicklime which coagulates the vinegar into a salt and prevents its escape: The quicklime/vinegar composition (the acetate ‘stone’) restrains and conceals a moist component (acetone/red oil) like the head collects and conceals thoughts. There is a passage from the *Muṣḥaf aṣ-ṣuwar* which clarifies the use of the word alabaster as a symbol:

**“She said: «Then tell me about when the sage said: “Take copper, put in it the first part and put it in a vessel, then cook it for 41 days so you will find it as a stone whose moisture has dried up. Then cook it until nothing remains except the sediment. When it reaches that point, wash it with pure water seven times. When the water is used up, then leave it to rot in its vessel until the redness which you want appears.”» He said: «Yes, as Sīmās said in brief. The whole work is completed because he ordered us to soak it in sour vinegar seven times and to leave it to rot. But concerning Hermes, he said a great deal about this but was hiding as he said: “Operate on the black alabaster with vinegar and natron.” So he named the blackness black alabaster when it became black. Then, after that he said white alabaster, and he ordered it to be operated on with the eternal water. Then, when it became red, he named it red alabaster and ordered it to be operated on with colocynth (qalqant) and ṣaḥīra (vitriol?) until it becomes red. But by all of that he meant the seven soakings, and at that time the colours appear. But concerning the work, not many things enter into it, but it is as I told you, that it becomes black, white, and red.»”<sup>27</sup>**

Not only the mention of the alabaster, but also the soaking with vinegar (7 times = 7 days?) seems to surely recall the operation of On Quicklime. The chemical operation stated in On Quicklime can be generally applied to the response of Zosimos, and appears to follow the fundamental color changes of the canonical alchemical operation (i.e. the first transition from black to white). Including an implied distillation of the acetate, there is also a transition from white to red. Applying this supposition, black alabaster could be the name of the quicklime/vinegar composition in which the quicklime becomes “blackened” as it is dissolved in vinegar (a color that would assume a very dark red-wine vinegar as a starting product, unless black is to be taken purely figuratively as referring to death and rotting). White alabaster would then be the calcium acetate produced from the cooking and evaporation. Finally, red alabaster

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<sup>27</sup> Abt, 560-561. From The 12<sup>th</sup> Book about the Last Operation Only and Its Weight.

would describe the ultimate redness ('red oil') resulting from a distillation of the acetate. Zosimos asserts that few things enter into the operation, and as *On Quicklime* has only two ingredients, this assertion seems to match.

The pictures shown within the *Muṣḥaf aṣ-ṣuwar* are almost entirely symbolic, with little hint as to an actual alchemical practice. Only one of the pictures shows a scientific operation, and this is perhaps the most important picture of the entire series. The illustration shows an alchemical distillation of a substance from a very powerful furnace:



The end product of this distillation is red. It is possible this image represents the distillation of an acetate salt producing acetone and 'red oil'.

This examination of *On Quicklime* along side derivative material within the *Muṣḥaf aṣ-ṣuwar* allows for the formation of an initial hypothesis: Perhaps the lengthy and symbolically complex subject matter of the *Muṣḥaf aṣ-ṣuwar* is actually describing the operation stated more or less clearly in *On Quicklime*. Zosimos asserts that the quicklime operation produces the "stone and not a stone" and that it is a great mystery that has never before been openly revealed. The essence of the mystery may lie in an understanding of the archetypal reaction of acid (vinegar) and base (quicklime) producing salt (acetate). A clarification of this acetate hypothesis must begin by examining the stated aims and goals of the alchemical work as described by the author of the *Muṣḥaf aṣ-ṣuwar*. From there, the vast array of symbols employed must be cross-referenced for clues as to meaning and intent. If the symbols of the work can be mapped out to tangible substances or principles, it may be possible to establish a framework for understanding the *Muṣḥaf aṣ-ṣuwar* and perhaps other authenticated writings of Zosimos. If the author of the *Muṣḥaf aṣ-ṣuwar* has preserved the Greco-Egyptian tradition faithfully, then it is also possible that some light may be shed on the writings of more ancient alchemical authorities such as Maria and Democritus.

### 3: Nature Conquers Nature

The aim of the alchemical work as it is described throughout the *Muṣḥaf aṣ-ṣuwar* is the mixing of substances that are abstractly referred to as ‘natures’. It is problematic to provide a strict definition of just what a ‘nature’ is as meaning is highly dependent upon context, though in all cases a common theme of polar opposition is maintained. Zosimos often repeats the words of Democritus regarding the interaction of two principal natures:

**“She said: «What is everything?» He said: «It is the winner, which wins over what was not possible to be conquered.» She said: «Maybe you mean the male and the female?» He said: «I told you that all you need at the beginning of the matter is the one natural male, and one nature which wins over that natural one. With regard to this, Democritus said: “Nature rejoices in nature, nature holds nature, and nature wins over nature.”»<sup>28</sup>**

Only two principal substances are required for the alchemical operation; one masculine and the other feminine. This sexual symbolism is probably the most common meaning suggested by the word ‘nature’. From this description the female aspect is said to ‘win over’ the male, the one conquers the other. But the concept of ‘nature’ is more nuanced than a simple masculine/feminine polarity.

**She said: «Then tell me about the male and the female. Are they from one nature?» He said: «Yes. But know that although the two are from one thing neither their natural disposition, nor their essence, nor their force are one. » She said: «How do they become different although the two are from one thing ?”» He said: «Understand that the male (principle) is strong, powerful, dry and hot while the female (principle) is moist, weak and cold. So when the two natures which I described to you, namely the hot, the cold, the dry and the moist are united, God brought out from the two what your eyes saw.»<sup>29</sup>**

The male and the female are composed natures, or natures containing natures. The male nature possesses the qualities of strength, heat, and dryness while the female is weak, cold and moist. This bringing together of male and female oppositions is the classic *mysterium coniunctionis* or *coincidentia oppositorum* described in alchemical texts from all time periods. This understanding of natures and their balance is articulated by Zosimos with analogies from many different craft trades. While there is no evidence from the *Muṣḥaf aṣ-ṣuwar* that the alchemical work is intended to create a medicine<sup>30</sup>, the creation of medicines is used to illustrate the mixing of natures:

**“She said: «Then tell me about the statement of Democritus: “Physicians do not dare to mix remedies unless they know the natures and what is their power, and which of them is the cold, the hot, the dry and the moist and what are the diseases to which they are exposed. When they know them, they compose the remedies and mix them, and they cure the sick one and help them to recover by the will of the exalted God.”» He said: «Democritus wrote this: “The one who does not**

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<sup>28</sup> Abt, 296. From The 4<sup>th</sup> Book of the Composition.

<sup>29</sup> Abt, 174. From The 1<sup>st</sup> Book about the Learning.

<sup>30</sup> It might be argued that the Greek word *pharmakon* should be understood as ‘poison’ rather than ‘medicine’ within ancient alchemical contexts. The female nature is a poison to her male companion.

know the cold, the hot, the dry, and the moist so that he can compose them – the close one with the close one, and the suitable one with the suitable one – , and has no experience or knowledge, will not find a remedy that cures the soul from every illness.” Therefore anyone who enters into this work (in this way) becomes disbelieving towards it, because of the harm that this work causes him due to his ignorance of the harmonious, non-conflicting natures which are suitable for this work. So whoever enters into this work has to know the natures in it. When he knows the natures, he mixes them with what destroys them, because what gets mixed with them conquers all of them with its colour. In the same way as it conquered their appearance outside, it will also conquer their interior.»<sup>31</sup>

The natures that are close and suitable to one another are their oppositions: The hot nature is close to the cold nature, and the dry nature is close to the moist nature. These are merely polarized aspects of the same axial function; two sides of the same coin. Ultimately this polarity is highly influenced by the function of temperature (movement), because by a things temperature it takes on quality. Heat energy defines a things hotness or coldness, but also its state as solid, liquid, or gas. These four natures can be composed with one another in a manner which gives way to a further complexity.

“She said: «Then tell me about when you say: “This work is of two types: one of them is a hidden thing that the sages kept secret for the intelligent people in order that they might extract by their contemplation and precise understanding. As for the second type, it is delusions and vanities, made from many operations and many things which are all false.”» He said: «Yes, it is as you said. But whoever understands must analogise what he doubts about this work with the matter of the world, and he must ponder over these four natures, the earth, the water, the air, and the fire, for everything that the exalted God created is from these four. Its birth and its nourishment come from them, its life is by them, and to them it returns, by the will of God. So whoever wants to enter into this work should not doubt it. He must analogise it with the matters of the world, contemplate on these four natures, and know that the uncountable number of human beings is created from those two, Adam and Eve. So whoever enters into this work, should not look for the many things, but only for the one origin. Then he should work hard for its marriage, its fecundation and its operation, for by it, people and animals multiply. And you, my lady, if you know the natures, you must make use of their master, because it is what you are looking for.»<sup>32</sup>

Earth, Air, Fire, and Water as qualitative elements are also spoken of as natures. So far this provides the beginning of a rather long list of ‘natures’: male, female, strong, weak, hot, cold, dry, moist, earth, air, fire, and water. It should be clear that a general theme of opposition is developed by all of these natures.<sup>33</sup> It seems likely that the alchemists of the Greco-Egyptian tradition were influenced to a certain degree by traditional Greek philosophy. Aristotle’s *On Generation and Corruption* provides a template by which this list of natures may be partially digested:

“The elementary qualities are four, and any four terms can be combined in six couples. Contraries, however, refuse to be coupled: for it is impossible for the same thing to be hot and cold, or moist and dry. Hence it is evident that the ‘couplings’ of the elementary qualities will be four: hot with dry and moist with hot, and again cold with dry and cold with moist. And these four couples have

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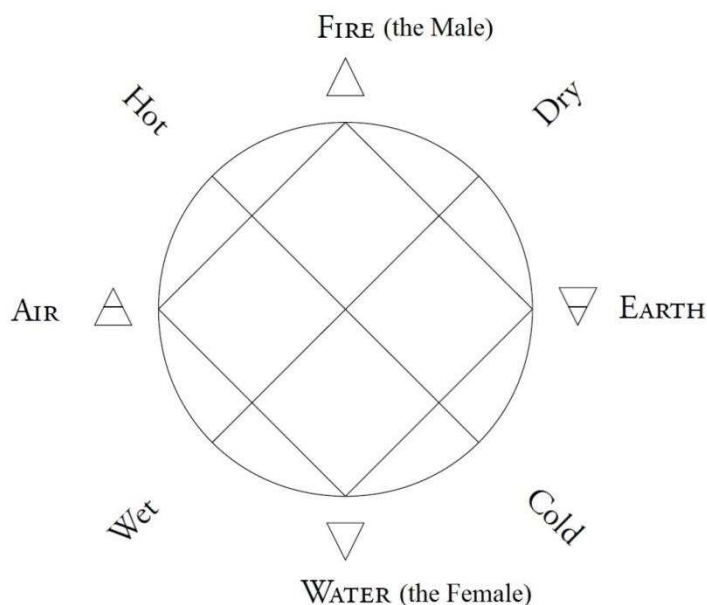
<sup>31</sup> Zosimos (Abt/Fuad), 169. From The 1<sup>st</sup> Book of the Learning.

<sup>32</sup> Zosimos (Abt/Fuad), 358-359. From The 5<sup>th</sup> Book about the Magnesia.

<sup>33</sup> In this regard, the discussion of Pythagorean opposites within Aristotle’s *Metaphysics* may be of interest.

attached themselves to the apparently ‘simple’ bodies (Fire, Air, Water, and Earth) in a manner consonant with theory. For Fire is hot and dry, whereas Air is hot and moist (Air being a sort of aqueous vapour); and Water is cold and moist, while Earth is cold and dry.”<sup>34</sup>

If the relationships defined by Aristotle are applied to what has been said by Zosimos, a visual representation of the natures may be attempted:



The above depiction may reveal the identity of what Zosimos refers to as the male and the female natures: These are the natures of Fire (the male is hot and dry) and Water (the female is cold and moist). The aim of the alchemical operation as described by Zosimos is the achievement of what could be regarded as a logical absurdity; the marriage of Fire and Water. Aristotle would not accept such an absurdity, any more than he would accept that something could be simultaneously hot and cold, or moist and dry. This fact could allow one to classify alchemy as a distinctly non-Aristotelian science. However for the alchemists, such an operation is not only possible, it is perhaps the principal secret of the alchemical opus. The *Muṣḥaf aṣ-ṣuwar* confirms such an intent by an obscure reference to a saying of Jesus Christ:

**“She said: «Then tell me about when Alāsārdus says: “O you students, I warn you of strong fire in the operation, for it is the enemy of water, until the two are reconciled.”» He said: «In the same way as Christ, peace be upon Him, said to those who came to test His knowledge by their science, addressing them before they started speaking: “How amazing of you, O community of sages, that you reconciled fire and water so they live together in the operation.” They were astonished when He knew them by their science. <He said:> In the same way I warn you about the fire, and I tell you that if you reconcile fire and water, your work will be good, God willing.»”<sup>35</sup>**

<sup>34</sup> Aristotle, *On Generation and Corruption*, ([http://classics.mit.edu/Aristotle/gener\\_corr.2.ii.html](http://classics.mit.edu/Aristotle/gener_corr.2.ii.html)).

<sup>35</sup> Zosimos (Abt/Fuad), 523. From The 9<sup>th</sup> Book about the Measures of the Fire. This saying of Christ is one of the few statements given by the *Muṣḥaf aṣ-ṣuwar* which provides a concise goal of the alchemical operation.

Zosimos, within the context of the *Muṣḥaf aṣ-ṣuwar*, suggests that Christ possessed an implicit knowledge of the alchemical work.<sup>36</sup> The historical reality of a such a statement notwithstanding, it becomes clear that the goal of the alchemists is to produce a proof that such a reconciliation of opposites is indeed possible. This is a proof which is said to have practical applications such as in dyeing, however the value of such a proof might also reinforce certain spiritual frameworks. The juxtaposition of Fire and Water immediately brings to mind ancient Egyptian cosmogony – the birth of the solar principle within the waters of chaos.

This discussion of the natures may be directly applied to the acetate hypothesis. The first substance mentioned by the quicklime operation is the formation of quicklime itself. Quicklime is a solid, dry body that is produced by heating in a furnace. It is a substance with the power of elemental Fire, as is evidenced by its exothermic reaction with water. The second substance mentioned is the vinegar. Vinegar is an acidic liquid with the cold and moist properties of elemental Water. With this understanding, the acetate hypothesis may be clarified by suggesting that the following correspondences apply to the *Muṣḥaf aṣ-ṣuwar*:

Quicklime = Male = Fire = Hot and Dry

Vinegar = Female = Water = Cold and Moist

These relationships will form a foundation for understanding the symbolism of the *Muṣḥaf aṣ-ṣuwar*. Before it was mentioned that the female principle conquers the male principle. As quicklime is dissolved in vinegar during the operation of Zosimos, so does the female nature conquer the male nature and become a single composed substance (a dissolution of calcium which ultimately becomes an acetate salt).

The male and the female principles must be joined, and this is expressed symbolically in a myriad of ways. The first illustration of the *Muṣḥaf aṣ-ṣuwar* is described in the text, however, it appears to be missing from the copy utilized by Abt and Fuad for their translation. The description employs the symbol of two vipers to express the male and female natures.

**“The first picture which Zosimos made for Theosebeia at the beginning of this 1<sup>st</sup> book is a picture of Zosimos having on his head the sun in golden water, and on his body, plates of golden water, and his shirt has green and yellow on it, and his robe is red. Close to his legs he is holding two winding vipers bound together by two knots. One of them is a yellow viper with green on its belly and its back is gilded with golden water. The other one has the colour of the sky and its back is [covered] with silvery water. The picture of Theosebeia has on her head a crescent moon, coloured with silvery water.”<sup>37</sup>**

The image of Zosimos possesses a clear solar association via the sun depicted on his head, and likewise so does Theosebeia have a lunar association by her crescent moon. One serpent is described as having plates of golden water (like Zosimos) while the other is colored with silvery water (like Theosebeia). The similarity of these winding serpents to the caduceus should be fairly clear.<sup>38</sup> It is clear that these two serpents (as well as Zosimos and Theosebeia) are analogous to the masculine and feminine natures described throughout the *Muṣḥaf aṣ-ṣuwar*.

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<sup>36</sup> See the discussion by Abt, pp. 120-124.

<sup>37</sup> Zosimos (Abt/Fuad), 141. From The 1<sup>st</sup> Book of the Learning.

<sup>38</sup> It is also probably not a coincidence that one of the alchemical operations of Nicholas Flamel begins with two winding serpents. The *Muṣḥaf aṣ-ṣuwar* may be the indirect source for the symbols of Flamel.

Zosimos treats these serpents as a great secret. When Theosebeia inquires about the nature of the two vipers, Zosimos does his best to avoid answering directly.

**“She said: «I asked you about the two vipers and the castor-oil, and I did not ask you what Hermes ordered his students to do.» He said: «I wanted to lead you to other things than what you asked me about, to test your mind; so you are one of the sages!» She said: «If I were one of the sages I would be content with what I read in the books.» He said: «Do not say that. I swear by God that I have read sixty treatises and books, and often I doubted some of what I found in the books, till I remembered it in some of the other books which I had read before. So I understand it by comparing.» She said: «How do you acquire that (knowledge)?» He said: «Each one of them invented difficult and dark things and matters for what he wrote about the work, and some far-fetched analogies with which to compare them.» She said: «Then why do you blame me for asking someone like you?» He said: «I blame you for not doing the intensive reading of books as I ordered you.» She said: «Then tell me about the two vipers. For it seems to me that you are refusing to tell me what they are.» He said: «It is my right to do that.» She said: «Then do not do that and keep jealousy away from you, and complete the crown of your favour to me for I am your student and your slave.» He said: «I (will) never name them with their (proper) names.» She said: «Then say something about them.» He said: «One of the two is the dragon, and the other one is an egg, and the third one is water. And the dragon is the yolk, and the shell is the egg, and the water is the moisture and all of that is destroyed, except the yolk. And the yolk is no good except with the moisture. And the moisture is no good except with the shell.» She said: «You started with the most difficult (aspect) of what I asked you about.» He said: «It is the magnesia. Thus leave away what remains as I spoke without jealousy.»”<sup>39</sup>**

Difficulty in understanding the alchemical work is openly acknowledged by Zosimos, as almost nothing presented may be taken at face value. Some of the analogies used by the more ancient practitioners are even called “far-fetched”. One might imagine that if this difficulty persisted for Zosimos how much more difficult it might be for the modern scholar to correctly correlate these symbols. Zosimos implies that one could never discover the true nature of the work by reading a single text: It is necessary to contrast and compare a large collection of texts (and this may be exactly what the author of the *Muṣḥaf aṣ-ṣuwar* has done).

Rather than providing a clear explanation of the two vipers, Zosimos makes matters even more complex by turning the two into three. The work is compared to the shell, yolk, and albumen of the egg. The message appears to be that the shell and the albumen (as natures) are destroyed in the work, leaving to the yolk to survive, just as the animal inside an actual egg survives while the albumen is digested and the shell is broken open during the hatching process. For the present author, this certainly brings to mind Mertens’ suggested association of alabaster with the egg. By extension, the male and female principles might then be considered to be the shell (quicklime/dry/male) and albumen (vinegar/moist/female). Both of these substances are destroyed during the operation described in *On Quicklime* to become the acetate salt (i.e. yolk) that is the result of the destruction of the two natures (two become one). This destruction of two and creation of one is analogized to the act of giving birth.

**“She said: «Then tell me about this viper which is named the Harmful One (aṣ-Šaḍīna) and about its strong poison.» He said: «That is a viper which has great power and its poison is deadly, and I do not know anything on earth more deadly than it.» She said: «And how does its poison kill?» He said: «Its poison only kills her husband.» She said: «How does it kill her husband?» He said:**

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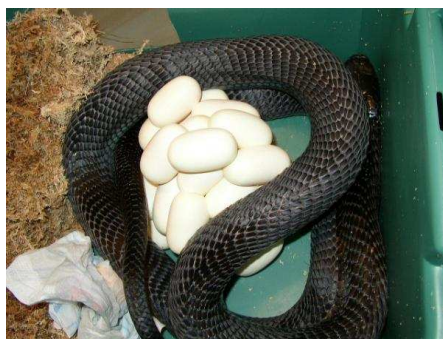
<sup>39</sup> Zosimos (Abt/Fuad), 158-159. From The 1<sup>st</sup> Book of the Learning.

**«When the male has sexual intercourse with her and placed his sperm in her, his soul came out immediately with his sperm, thus the male died.» She said: «I see that his sperm was his soul.» He said: «She accepted the sperm, longing for it. So she became pregnant. Then, when her pregnancy was completed and her delivery came close, her son did not come out in the same way as ordinary creatures.» She said: «So how did he come out?» He said: «He pierced her womb, so the child came out alive and the mother died immediately. The child came out as male and female, replacing his parents in order that nothing else is mixed with the nature of the two. So this foetus has always been renewed. The parents die and the child lives.»<sup>40</sup>**

This statement may provide some clarification for the well-known Democritean maxim. This female nature rejoices in receiving the sperm/soul of the male which she longs for. Thus the female nature conquers the male nature by the male's death during the reproductive act, which could be understood as the acidic (i.e. poisonous) vinegar which acts upon and dissolves the quicklime. The product of their union, while being called a “son” is actually specified to be both male and female: the androgyne. Both natures (acid and base) become restrained within the one nature (salt).

**“She said: «Then what about when he said: “Make a gum from the male and the female dragon (*tinnīn*).”» He said: «He spoke well, because in both of them are the red and the white, so this is the magnesia that lights up when we mention it. And Hermes said: “I order you to give it its right food and nourishment in the first dissolving, and to cook it until it becomes a white cluster. By this operation the earth becomes polished.” You must know that the gum is gums, but we named them gum because it holds and is held. It is what improves the flower, but that comes in the operation of the greatest nature. »<sup>41</sup>**

The mixing of the two serpents or dragons involves a dissolving and a cooking. The “white cluster” described fits perfectly the product of the operation suggested by On Quicklime as calcium acetate. It was mentioned previously that this white acetate salt often forms in a cluster of globules that can be called botryoidal (grape-like). It is possible to speculate on a connection between this fact and the choice of symbolism employed as being a mating of serpents/vipers/dragons: The white cluster of calcium acetate produced by the quicklime operation bares a certain similarity to a clutch of eggs produced by the mating of male and female serpents.



<sup>40</sup> Zosimos (Abt/Fuad), 181-182. From The 1<sup>st</sup> Book of the Learning.

<sup>41</sup> Zosimos (Abt/Fuad), 366. From The 5<sup>th</sup> Book about the Magnesia.

#### 4: Alchemical Consciousness

Alchemical texts are commonly known to employ a language of symbols. However, the word ‘symbol’ must be separated from its origin: The Greek ‘symbolon’ is an object broken into two pieces, which, when reunited, serve as a means of recognition or identification. The common usage is an extension of the idea of recognition in that one thing is recognized as representative of another. It is often suggested that alchemical texts employ decknamen (cover names or codenames) that act as simple substitution ciphers in the manner of the common understanding of the word ‘symbol’. While substitutions of this sort undoubtedly exist, the development of what the present author refers to as alchemical consciousness is something more than the simple memorization of symbol substitutes.

Here, the word ‘symbol’ is used in the sense articulated by Titus Burckhardt when he says that “True symbolism depends on the fact that things, which may differ from one another in time, space, material nature, and many other limitative characteristics, can possess and exhibit the same essential quality.”<sup>42</sup> The definition of symbol derived from this statement necessarily deviates from the common understanding. An alchemical symbol is not merely an arbitrary substitution of one thing for another, but a juxtaposition illustrating a qualitative relationship. The Ariadne’s thread which may guide the reader through the maze of alchemical symbolism is the ability to perceive essential functions and qualities.

It is often difficult to grasp whether an object employed within an alchemical text is a symbol, a substitution, or a thing to be interpreted literally. Metals such as copper, silver, and gold are some of the most ubiquitous examples of such objects. With regard to these metals, the *Muṣḥaf aṣ-ṣuwar* is exceedingly generous in its explanations through negative affirmation. Below we see Theosebeia asking Zosimos some questions regarding the Book of Chrysocola and the nature of what the thing called ‘chrysocola’ is:

**“She said: «Then why did they name it with the name of every body?» He said: «Because when it dissolves, it turns into what we name lead, and when it turns black, we name it copper, and when it solidifies, we name it tin, and when it turns into a white stone, we name it silver, and when it becomes red, we name it gold, and when it becomes fine dust, we name it rust and poison. Therefore do not think that these names and bodies are the names and bodies of ordinary people; they are names that the first sages invented for the chrysocola in its changing states. So they named it after the bodies of ordinary people in order to veil it from you. »”<sup>43</sup>**

The reader could not be expected to grasp exactly what the chrysocola refers to from this statement alone, however, based on this description it appears to be a name for the overall composition of the experiment.<sup>44</sup> Most importantly we learn that lead, copper, tin, silver, gold, rust, and poison are all not exactly what they are stated to be. These are invented names which have only a qualitative or gestural relationship with the true subject matter. From the beginning

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<sup>42</sup> Titus Burckhardt, *Alchemy: Science of the Cosmos, Science of the Soul* (London: Stuart and Watkins, 1967), 11-12.

<sup>43</sup> Zosimos (Abt/Fuad), 530. From *The 10<sup>th</sup> Book About the Other Work*.

<sup>44</sup> Chrysocola is described by Pliny as a substance for soldering gold. It was used anciently as a ‘metallic glue’. This connection of two substances may be the reason for its choice as a symbol.

we can eliminate any hypotheses regarding the transmutation or coloring of metals, because none of the metals mentioned are actually metals; they are merely symbols for another subject.

For each substance mentioned, the author effectively challenges the reader to speculate as to why these associations exist. For example, the author associates dissolution with lead, possibly because of its softness and relatively low melting point leading to an ease of smelting and casting. For each symbol mentioned (often posing as an ingredient in a recipe) one must always attempt to imagine qualities (its colors and properties) rather than the thing itself. Theosebeia shows continual confusion by the symbolic answers of Zosimos throughout the text of the *Muṣḥaf aṣ-ṣuwar*:

**“She said: «Then tell me about when the sage said: “Take the copper which we worked upon until it turns into silver, then roast it until it turns into gold.”» He said: «It is the stone which I explained to you before that when it gets cooked, it turns into dust, taking on the redness and the yellowness. The more it gets cooked and soaked, the stronger its redness becomes until it reaches the highest degree, taking on the purple colour which is priceless, and no colour is more precious than it. When you hear the sage saying copper, silver or gold, he means by them the colours of the elixir, and he is the one who said: “Return the silver so that it becomes gold, and [return] the gold so that it becomes aqzal-gold, and return it so that it becomes purple gold.” Do not be deluded by these colours which the sage named the bodies, because you do not need anyone of them except the one body which is the master of the bodies, and one water which is the master of the waters. And with regard to this, the sage said: “Only the water turns the copper into rust.” You should limit yourself to it, so do not search for anything else. It is the chrysocolla that is similar to the rust of copper which they ordered to be operated on in the pounding, and to soak with the water seven times.»”<sup>45</sup>**

From this statement we see further confirmation that copper, silver, and gold are all merely temporal adjectives describing the development of the ‘elixir’, and not actual metallic elements. The primary reason for their association is via a presumed color relationship. This is one of many passages from the *Muṣḥaf aṣ-ṣuwar* where Zosimos is clear that the experiment in question has only two components: a solid ‘body’ and a ‘water’. The problem proposed by the composition, this ‘chrysocolla’, is to determine the identity of the ‘body’ and of the ‘water’, to know how they are mixed both quantitatively and qualitatively, and to obtain the sought-for end. Copper in the above citation is then one of the names given to the bodily half of the interaction (i.e. the male nature). Rust is ordinarily understood to refer specifically to iron oxide. By ‘rust of copper’, Zosimos implies that the body of the experiment (copper) goes through a change similar to that of ordinary rusting. Copper was associated with blackness previously: “...when it turns black, we name it copper...”. One can imagine that a dark brown or blackish oxidized (“rusty”) copper color is invoked through this imagery (pure cupric oxide is black). As iron is made rusty by weathering (exposure to water), so is the male copper made rusty by exposure to the female moisture.

The stages of the composition are described as a series of color changes which undergo a specific order. The three primary color changes described by Zosimos (mentioned previously) are blackness (first), whiteness (second), and redness (third). There are also some secondary color changes described including a yellowness between the white and the red, and also a purple color following the red. As blackness is the first stage, the first chapter of the *Muṣḥaf aṣ-ṣuwar* begins with a lengthy explanation:

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<sup>45</sup> Zosimos (Abt/Fuad), 557-558. From The 12<sup>th</sup> Book about the Last Operation Only and Its Weight.

**“She said: «Show me, how this blackness comes into being. » He said: «Understand that when you first mix the things, and you cook them in the first cooking for some days, there appears to you the blackness about which I told you that all of it turns black. So when you see it like that, know that it is what they call their black lead. If you want, you can call it their black silver. Ponder over this despised, insignificant thing that operates on this honored one. No sage exists who worked this secret without mentioning it (their black silver or their black lead) and (without) writing a book about it, doing his best – with all kinds of ruses – to veil and to hide it from the ignorant and from those who do not merit it. And they praised it very much, but if they described it clearly and named it with its true name, the first of the ignorant people to see it would deny it. They would deny it all the more because it is easy to do, and because it (their black lead) is abundant among the people. If even an intelligent one of them would know it, he would despise it and doubt it. Therefore they disguised it with examples and names, and with this they veiled the science. They wanted thereby that only that sage should obtain the science from their books who is persistent in reading their books, being devoted to them and patient with the suffering which comes from the different statements in their books.»”<sup>46</sup>**

The present author can certainly attest to the suffering which the obscurity of the alchemical language engenders. A difficulty lies in understanding that rust of copper, black lead, and black silver are not the true names of the composition. These names are qualitative descriptors via their color and properties, but are also temporal descriptors indicating a transitory period of the work. While rust of copper might describe the exposure of the male nature to the feminine moisture, and lead was previously described as referring to the dissolution of the mixture, black silver shows the hoped for effect: The blackened mixture should be made white (the relative color of silver). The three names are the same composition, but each name approaches the composition from a different temporal perspective.

Two things (one solid, one liquid) are mixed together, cooked, and from these the body of the liquid mass takes a black coloration (either literally, or as a figurative ‘rotting’ or death of the male nature). One extremely important fact emerges from the above statement: The components of the mixture are common and available to all people. They are so common that the average person would doubt the potential of the mixture if they were told of the composition in plain language. This fact would seem to eliminate ingredients such as rare minerals or precious metals. Additionally, the mixing and the cooking is easy to perform, provided one is privy to the correct procedure. From the same passage, Zosimos describes this cooking:

**“But I tell you that if you do not turn everything into fine dust by cooking, the nature does not get pounded. So you must return it back to the cooking till it gets pounded and becomes fine dust and dissolves. This cooking is the (sieve) sieving. Agathodaimon said: ‘Cook the copper until its body becomes soft and tender.’ He means by soft and tender that he makes it turn into spiritual fine dust, having no touchable parts any more. Thus the sieving (sieve) of this pounding is the sieving (sieve) by cooking. Concerning that, a student of Hermes asked him: ‘We did not understand how you described for us the sieving (sieve).’ Hermes answered him: ‘O yes, put the natures in the vessel, then count six or seven until all of the water comes down. So this is the pounding.’ Know that if you make all of it turn into black water, then at this time you pounded its (that which is) finely pounded. And the sage named the sieving (sieve) of this pounding and cooking ‘the sieve’.”<sup>47</sup>**

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<sup>46</sup> Zosimos (Abt/Fuad), 144-145. From The 1<sup>st</sup> Book about the Learning.

<sup>47</sup> Zosimos (Abt/Fuad), 145-146. From The 1<sup>st</sup> Book about the Learning.

Several associations are revealed above: Pounding, sieving, and cooking all refer to the same task. To pound is to push downward or to flatten. By pounding Zosimos means that the liquid mixture is gently heated and vapor is given off, slowly reducing the overall volume of the liquid. As the water level reduces, it is 'pounded' down figuratively. A sieve is typically a meshed tool used for separating solids from liquids. This does not mean that the solid substance is strained from the mixture. Rather, it suggests that the substance becomes completely dissolved in the moisture, disappearing as if it were 'sieved' out. This suggestion is overtly confirmed by Zosimos:

**“She said: «And how, O Zosimos, does the water turn into fine dust, while it is water? » He said: «O yes. Do you not know that the body turned into water in the water?» She said: «Yes.» He said: «That body which turned into water in the water is what becomes its soul, and the water in it turns into fine dust. This is because that which should become water – before it falls into the water – was a body. Then, when the water surrounded it, it (the water) changed it (the body). Thus it turned into water mixed with the other water. When both are mixed, they together turned into one fine water. Know that and contemplate it.»”<sup>48</sup>**

The composition of the mixture is to be completely integrated by dissolution. The two things (body/male and water/female) are made to be a single 'fine' water.

Zosimos, in both the *Muṣḥaf aṣ-ṣuwar* as well as his authenticated writings, often illustrates these operations by writing of visions or dreams. The following appears to be a paraphrasing of one of the visions of Zosimos:

**“She said: «Then show me how they dispersed it (the science). » He said: «Did I not explain to you that in my great dream I saw that the killed one was cut into pieces: the two hands were cut up, the fingers were cut up joint by joint, vein by vein, and the bones and the veins were pounded until they became very fine like dust. What I am telling you about this dream corresponds to the statement of Agathodaimon, who said: “Pound and cook, pound and cook, repeat it, do not be impatient, and repeat it.” For the work on these things at the beginning of the mixing, the cooking, the soaking, the roasting, the heating, the whitening, the pounding, the roasting, the vaporisation, the rusting and the dyeing is one. If Agathodaimon had known that one pounding, one cooking and one soaking would be enough for it, he would not have repeated what he said. However, he repeated the statement “pound and cook”, (so that they would) cook it many times without losing patience and in order to disguise it from those who did not know these names. »”<sup>49</sup>**

It should be quite clear that this 'great dream' is probably not a true dream or vision. In all likelihood, the dream is a literary device composed with the specific intent of teaching about the operation. The body of the dead man is the symbol of the 'body' half of the operation's mixture. The pounding, as has been discussed, is the dissolution of this body in a liquid milieu. It is implied that the dissolution will not occur properly in a single iteration. The body must be repeatedly soaked in its moisture, and cooked down several times in order to attain the perfected mixture. Zosimos is quite generous by correlating a number of seemingly different activities, indicating that they all mean the same thing. One may speculate as to the reasoning behind these variations as follows:

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<sup>48</sup> Zosimos (Abt/Fuad), 146. From The 1<sup>st</sup> Book of the Learning.

<sup>49</sup> Zosimos (Abt/Fuad), 149. From The 1<sup>st</sup> Book of the Learning.

1. It is a mixing because two substances are initially mixed together.
2. It is a cooking because the two substances are cooked together after they are mixed.
3. It is a soaking because the body is soaked by the moisture.
4. It is a roasting or heating because the two substances are heated in order to dissolve the body.
5. It is a whitening, because the overall goal of the cooking is to make the blackness turn white.
6. It is a pounding because the liquid mixture is continually reduced downward.
7. It is a vaporisation because vapor is given off as the mixture is reduced by heat.
8. It is a rusting because the body is exposed to moisture (like weathering) during the cooking.
9. It is a dyeing because of the color changes that are undergone in the mixing and cooking.

We can see then how it is possible that all of these activities refer to different aspects of the same operation.

The aim of the Zosimos of the Muṣḥaf aṣ-ṣuwar is often to show his student Theosebeia that while the recipes of the sages differ greatly in terms of ingredients and operative direction, they all refer to aspects of the same central experiment. Zosimos wishes to show Theosebeia how to think as one of the sages; to develop the alchemical consciousness. The development of this mode of thought is necessarily a psychological process. The ingredients (symbols) of the alchemical operation may be reduced to either a masculine nature, a feminine nature, or some combination of the two. However, the possibility of this reduction does not automatically indicate that the symbols themselves are psychic processes as the students of Jung might conclude. It is the opinion of the present author that these symbols reduce to chemical substances, and that it is the process of *understanding each sage's method of symbol-choice* that is itself the psychological process. This alchemical consciousness could be described as a merger of quantitative and qualitative faculties. This is quite different from the Jungian conception of individuation. For example, Abt suggests that “the goal of the alchemical work is precisely not an identification of the adept with the self, but the coagulation of a durable relationship of the adept’s soul with the self.”<sup>50</sup> For the present author, concepts such as the “self” or the “soul” are unnecessary for understanding either the chemical operations or the psychological methods of the sages. This is not to say at all that the alchemists lacked a deeply spiritual understanding of the work. There is much evidence to support alchemy as a spiritual framework – a mirroring of the cosmogonic function. At the same time, a very real psychological impact can be said to occur during the process of understanding these symbols. This is a personal experience that would be difficult to quantify in any scientific sense.

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<sup>50</sup> Zosimos (Abt/Fuad), 44.

## 5: Single Out the Natures

Given the information presented, how do we read the texts of the Greco-Egyptian alchemical tradition? What is the guiding thread that allowed Zosimos to make the breakthrough in understanding that so many of his contemporaries had failed at by taking the alchemical texts literally? Once again, the *Muṣḥaf aṣ-ṣuwar* provides a great service by stating clearly a methodology for approaching these texts.

**“She said: «And what about their statement that some black is more beneficial than the other.» He said: «Yes. So the intensity of making it black comes from performing the burning well and from diminishing the sulphurs. And the bad quality of the blackness comes from bad cooking and the incomplete maturation so that it cracks up whatever enters in it and ruins it, in the same way as the one who commits an error in the composition of the sulphur, the lead, the stones and in all of the things. I call the exalted God as my witness for what I order you, and I warn you. So when you do (emendation) any of their operations, you must make use of the similar ones, and be aware of the dissimilar ones which are not in accordance with each other. When you read the books, single out the natures on their own, and distinguish them from what they (the sages) obscured them with. And look at the metals, because they are the quickest things to enter in harmony with their companion, to mix with it and to join it. So make use of them, cook them in the same way as the cooking of the composition and mix them with the lime whose interpretation as a symbol is not spoken about. »”<sup>51</sup>**

When reading an alchemical text of the Greco-Egyptian tradition, each ingredient is taken to represent a ‘nature’ – either singular or composite. The names must be singled out and contemplated over to determine which nature or combination of natures are meant by a particular symbol. As each sage invented his own symbols, some of which are quite far-fetched, this is a difficult process that requires the cross-referencing of many texts. Zosimos indicates that one ingredient in particular, quicklime, has an importance in which its interpretation is not discussed. The present author takes this statement in the most obvious sense possible: Lime is not interpreted as a symbol, because quicklime is the true name of one of the ingredients of the operation. This is the only statement within the *Muṣḥaf aṣ-ṣuwar* in which a substance is explicitly declared to not be discussed.

One of the keys to ‘singling out the natures’ is the color of an object. This is especially true of metallic bodies that are used as ingredients in recipes. This is not a case of a metallurgical operation, but rather the mixing of natures using metallurgy as an analogy. Zosimos reveals that the color of a metal may indicate which nature it represents.

**“She said: «I do not understand what you are telling me!» He said: «I tell you that the composition is made of three things: the first three are the precious triangle and this matter must have a marrying and a completion. Thus you must know that the coppery body of Venus, which has many colours, is hot in its colour and nature, and when it is mixed with the shining moisture, both of them turn into a sparkling pyrite. They both made the yellow-coloured head lean, and they improved its colour, and made its smell delightful, because the subtle parts of these two are what (can) fix the gold, increase its benefit, and extinguish its splendour when the two were mixed and married with it**

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<sup>51</sup> Zosimos (Abt/Fuad), 456-457. From The 7<sup>th</sup> Book about the Mercuries.

**(= the gold). If you understand, then I have explained it clearly. Be careful not to neglect the three-folded nine.»<sup>52</sup>**

Copper is “hot in color”. We know that the masculine nature is “hot, dry, and strong” therefore copper as a symbol represents the masculine nature. This is in opposition to the watery feminine nature. This “copper” can be juxtaposed against the watery metal “mercury”:

**“She said: «Then tell me, O Zosimos, how does it come about that the sage said: “The mercury fights the copper.”» He said: «Indeed, he ordered you to solidify both of them, as the sage said: “Take the mercury and solidify it in the body of magnesia.” » She said: «Is the magnesia a male or a female?» He said: «It is a female. Do you not see when I told you that it has the power of the female, and it is what dissolves everything, and it is what turns the bodies into spirits, God willing? How astonishing you are! Do you not see when Democritus said: “When the magnesia is whitened, it does not let the spirits escape, nor does it let a colour appear on the copper.”»<sup>53</sup>**

Mercury is cold in color, and flows as a moisture; a fact which makes it a principal symbol of the female nature. When the sage says to mix the mercury with the copper, it is not out of an attempt to create a metallic alloy. Rather, he implies to mix the female nature with the male nature. The female nature fights with the male, and conquers it – the male is dissolved within the female leaving a composite “mercury”.

**“She said: «Then tell me about the question which Sīus asked Disqūus about the burning. Favour me with an explanation of their statement: “Mercury from cinnabar, while cinnabar is from mercury.” How can this be?» He said: «Yes. If you dissolve the body together with the mercury by the acacia (ašqunīa) and continue to cook the whole, the acacia will kill it. Then the body will turn into cinnabar. That is what the sages spoke of when they said: “It is rarely found. It is white in outer appearance and red in essence.” But they said: “Mercury from cinnabar” in order to disguise it from those who wanted to enter this work. And I have told you before that the sages described their work with any one of the crafts similar to it in order to cover it.»**

The initial statement “mercury from cinnabar” suggests that a single mercury (i.e. a liquid) is made from a composite of two things, just as actual cinnabar is from two things: quicksilver and sulfur. However, this is not the mercury of the people which is common quicksilver. The ‘body’ of the experiment and the ‘mercury’ form one mercury by the dissolution of the body. In other words, “cinnabar is from mercury”. The composite mercury is cooked down and solidified just as cinnabar is the solidification of ordinary quicksilver. The result of this coagulation is “white in outer appearance and red in essence”.

Ašqunīa is one of the symbols for the mercury, translated as “acacia/acacian” by Abt and as “Skythia/Skythian” by Hallum. This (female) substance is the “torturer of her husband” because she is the agent of the masculine natures destruction. In the context of the acetate hypothesis, this simply means that the female vinegar dissolves the masculine quicklime. When the reaction is completed, an acetate salt (white in appearance, but containing ‘red oil’) is deposited which is a composite substance in the same manner that the ancients recognized cinnabar was a composite substance.

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<sup>52</sup> Zosimos (Abt/Fuad), 279. From The 4<sup>th</sup> Book of the Composition.

<sup>53</sup> Zosimos (Abt/Fuad), 372. From The 5<sup>th</sup> Book about the Magnesia.

This “mercury”, which contains the male and female natures, is also called the “body of magnesia”. Zosimos states clearly that “magnesia” is one of the names of the female nature. The “body of magnesia” is then the composite nature after it has become solid and whitened. This magnesia was an important symbol for the schools of Democritus and Maria.

**“Know that the sages scattered the making of the magnesia in their books in a thousand places. So whatever you read in their books about any composition do not mind about that because it is one. With regard to what they described about the magnesia, it is the black lead.»** She said: **«Then tell me about this.»** He said: **«When you find in the books of Maria and Democritus the operation of the fiery one, the potash, the claudianus, the androdamus, the chrysocolla, and what is similar to this, indeed, by all of those they meant the operation of lead-copper, which we named the body of magnesia, and black lead. And also ponder over what you find about iron and the operation of silver, or about their operation of tin, copper, or litharge. By this he meant the operation of the magnesia that we named black lead and lead-copper. To make you more convinced: By their whole operation of making gold and making silver they meant lead-copper and the body of magnesia. Thus when they wanted to make it white, they made it white with the white sulphur, and when they want to make it red, they mixed the sulphur with the mercury. Then at this time they named it burnt copper. Therefore Agathodaimon said in many places: “Take the burnt, pounded, whitened copper.” By all this he meant that one which they named body of magnesia and black lead.»**<sup>54</sup>

Zosimos teaches that all of the recipes and compositions are actually one central composition written in many different ways. Above we are given an array of different symbols which Zosimos equates with one another. Lead, like mercury, is cold in color and soft to the touch – it represents the moist/cold/soft female nature. Lead-copper is not an alloy, it is a contrived name for the female-male composite substance. In the same manner the claudianus, androdamus, chrysocolla, body of magnesia, and many other symbols all mean the same thing: the conjunction of opposing natures. The *Muṣḥaf aṣ-ṣuwar* provides many clarifications on lead-copper, indicating that it is merely the name for a union of two substances.

**“She said: «I asked you to explain this matter for me, but you increased my perplexity about it. I do not deserve such treatment from you.»** He said: **«I tell you then, when we solidify this stone with the gum and the cold water, we name it lead-copper.»**<sup>55</sup>

The above laundry-list of names for the principal composition is mirrored closely in a text which Matteo Martelli has ascribed to pseudo-Democritus – a Democritean list of substances used for the “making of gold”:

**“Substances for the making of gold: take mercury produced from cinnabar, the body of magnesia, malachite that is the batrachion (little frog) – it is found among green stones –, claudianon, yellow orpiment, cadmia (zinc oxide), androdamas, processed alum, unburnt sulfur that is incombustible sulfur, pyrite, Attic ochre, earth of Sinope from the Black Sea, untouched divine water, if you understand the water produced only from sulfur; but if you understand it without qualification, water produced with lime; sulfur vapour, yellow sori, yellow flower of copper and cinnabar.”**<sup>56</sup>

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<sup>54</sup> Zosimos (Abt/Fuad), 377. From The 5<sup>th</sup> Book about the Magnesia.

<sup>55</sup> Zosimos (Abt/Fuad), 447. From The 7<sup>th</sup> Book about the Mercuries.

<sup>56</sup> Matteo Martelli. “‘Divine Water’ in the Alchemical Writings of Pseudo-Democritus”. *Ambix* 56 No. 1 (2009): 5-22.

If the Zosimos of the *Muṣḥaf aṣ-ṣuwar* is to be believed, then all of the substances mentioned above are variations of one central composition: these are the names of the things used in the making of philosophical “gold” (understood as a red distillate). Each ingredient listed appears to be a name of the philosophical stone which is also known as “our silver” or “black lead” or “lead-copper”, in addition to the names mentioned by Democritus. Divine water, without qualification, is “water produced from lime”.

One of the interesting differences between the European traditions of alchemy and the earlier Greco-Egyptian tradition is the role of mercury and sulfur. As can be seen above, mercury is the name of the composite nature in which the female dominates. However, sulfur can also be the name of the female (or composite) nature because sulfur easily flees the fire. This distinction is explained within the 25<sup>th</sup> Epistle of Zosimos:

**“Hence he teaches that ‘that amongst them which is stable on the fire [those] are the bodies and those that are fugacious are the sulphurs’. However, he commanded that the sulphurs must first be made to combat the fire and for this reason he said ‘the mineral [thing] when it is immersed in the body does not allow the fugacious things to escape’. Thus, he commanded us to transform the sulphurs in burning so that they combat the fire and claimed that without this nothing will come to be. He also claimed that there is a kinship between the two of them [sc. the stable and the fugacious?] saying ‘if they are sulphurs and there is a kinship between the two of them, then both of them are inflammable and neither remains stable on the fire’. However, I inform you that they are not sulphurs, save solely within [the context of] the Work, since they both burn with the burning of the (actual) sulphurs while they both remain stable against the onslaught of fire <against which> the sulphurs do not remain stable.”**<sup>57</sup>

The sages use the names of sulfurs to describe the nature that is fugacious. Like mercury, the names of sulfurs also describe the feminine/composite nature, but they are not actually sulfurs. This understanding is notably different from European traditions that view sulfur and mercury as opposing principals. While sulfur generally represents the masculine nature within the European tradition, sulfur and mercury can at times be used interchangeably within the Greco-Egyptian tradition. The sulfur (actually a moisture) is made to combat the fire through the reaction with the masculine ‘body’. This understanding of sulfur as the moist nature that wins over its enemy is confirmed within the *Muṣḥaf aṣ-ṣuwar*:

**“She said: «And how is the water of sulphur able to make the sulphur non-burnable, while both of them are sulphurs, and sulphurs are not resistant to fire?» He said: «The sages call many of the moistures with the name of sulphurs although they are not sulphurs. But they named them like that. Therefore Democritus said: “Put in the composition some non-burnable sulphur in order that the poison be submerged inside that sulphur.”»**<sup>58</sup>

The divine or sulfurous water does not necessarily contain elemental sulfur, rather sulfur is only the name of the moist aspect of the composition. This moist nature, understood as strong vinegar within the context of the acetate hypothesis, will flee the fire easily. When the vinegar is mixed with lime (i.e. the “water produced from lime” of Democritus) it becomes strong and is able to

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<sup>57</sup> Benjamin Hallum, “Zosimus Arabus”, 332-335.

<sup>58</sup> Zosimos (Abt/Fuad), 186. From The 1<sup>st</sup> Book of the Learning.

resist the fire – it becomes an incombustible sulfur. This is the reaction of acid and base forming salt – a recapitulation of the cosmogonic function – the marriage of fire and water.

The classic recipe for the divine or sulfurous water is that of the Leiden Papyrus:

**“The discovery of sulfur water: mix one drachma of lime and the same quantity of sulfur that has been crumbled in a vessel containing strong vinegar or the urine of a virgin boy. The liquid is then burnt by applying fire below so as to make it like blood; filter to remove sediment and employ it neat.”**<sup>59</sup>

The reader will immediately recognize that this recipe contains the core elements of the operation of On Quicklime: lime and vinegar. It should be clear that if urine were substituted for vinegar, an entirely different chemical composition would occur.<sup>60</sup> When the sages say “use X or Y or Z”, this is a strong hint that the ingredients are symbolic, and that the natures must be singled out.

Given the insight provided by the *Muṣḥaf aṣ-ṣuwar*, it is possible to suggest a symbolic reading of the recipe. Lime may be singled out as the masculine nature, and according to the acetate hypothesis is the true name of this nature. However, sulfur, strong vinegar, and urine can all be names of the female/moist nature. Sulfur is a contrived name for the moist nature because it is fugacious and it “burns” the male, while the name of every moisture, urine included, signifies the female nature. This leaves one part of the male nature and three parts of the female nature. If strong vinegar is taken as the true name of the moisture, then we are left with the operation of Zosimos: On Quicklime. It cannot be said with any certainty whether this symbolic reading of the Leiden recipe represents the true understanding, but the possibility of a symbolic reading must be recognized.

The *Muṣḥaf aṣ-ṣuwar* gives instructions for the water of sulfur that are not present in the Leiden recipe:

**“She said: «And what is the things that the sage ordered you to cook in the dung-fire?» He said: «It is the elixir. He ordered us to cook it on a gentle fire until the incombustible sulphur solidifies. So ponder over what Maria said about the operation of the elixir and something.» She said: «What is the elixir and what is this ‘something’?» He said: «It is the sour ferment whose fermentation was prolonged, as she said: “Take the water of sulphur and some of a body and put both on to the heat of ashes, so it solidifies at once in the other composition.” And also ponder over the statement of God’s prophet Moses, peace be upon him, when he mentioned the solidification of the sulphur, saying “Solidify the water of sulphur on a gentle fire.” But here Maria made the truth clear when she said: “Take the plate and mix it with the flower of gold, so that it becomes white and becomes red, except that the other white is white in outer appearance but in essence and in its interior it is red.” So this work does not need to be pounded by hand, but it needs alum that is put in a double vessel and waters in order that the poisons do not reach it, otherwise what is in the vessel gets ruined.»**<sup>61</sup>

From this we see the intended use of the ‘water of sulfur’ – it is to be solidified in order that its redness can be extracted from the solidified body. We can understand this extraction from the discussion of the different measures of fire within the *Muṣḥaf aṣ-ṣuwar*:

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<sup>59</sup> Martelli, 8.

<sup>60</sup> Note the experimental work in the following: Lawrence M. Principe, *The Secrets of Alchemy* (Chicago: University of Chicago Press, 2013), 10-11.

<sup>61</sup> Zosimos (Abt/Fuad), 548-549. From The 11<sup>th</sup> Book about the Other Composition.

**“He said: «Know that for this work, when you put it in its vessel, you must divide the fire into four parts: In the first part, when you cook the things, your fire should be gentle, like when the dyers cook their dyes, so that the things mix with each other. When you know that they have mixed, make the fire in the second composition stronger than it was before, so that the things solidify and turn into a stone. Concerning the third part, when you want to destroy the stone in order that the redness appears, you can only destroy it and extract that redness from it with a strong fire. Strengthen the fire for it to absorb that gum by the strength of the fire, because that gum only dries with a strong fire. So strengthen the fire more than it was before. If you are concerned that your glass vessel might dissolve in the fire, cover its outside with fine clay. This is the measure of the fire of the emaciation. Concerning the fire of the gum, which is the fourth part, from which the flowers appear, it is gentler than this third fire. So be careful with the fire, and know that whether this work is successful or ruined depends on the measures of the fire.»”<sup>62</sup>**

In the context of the acetate hypothesis, the first measure of the fire describes the initial mixture of quicklime and vinegar. The two are gently heated on ashes or dung until the male nature completely dissolves within the female nature. When the dissolution is complete, the fire is increased in order to solidify this ‘water of sulfur’ into the philosophical stone – calcium acetate. A very strong fire is required to sublime the stone and extract the acetone and ‘red oil’ from within. The flowers are a symbol which represents the subtle aspect of any substance. The following gentle fire may represent the rectification of the distillate in order to separate the subtle aspect (red oil) from the general liquid (acetone).

Although the ancients did not possess the chemical terminology of the modern era, the ‘natures’ described by Zosimos appear to be the qualitative equivalent. These natures can be used to describe not only the ingredients of principal alchemical reaction, but also the remainder of the reaction.

**“She said: «Then tell me about your book, whose summary is that the four bodies are dyed, whereupon they dye, and the sulphurs turn into smoke and then go away.» He said: «My lady, know that the dye of the bodies which is extracted from them in the cupolas, is a new dyeing spirit. Therefore the sage named it a vapour. As for the sulphurs, they become smoke and go away, and nothing remains of them except the taste of the copper alone, which is its spirit. » She said: «Why did the spirit of the copper remain among them? » He said: «Because the copper has a nature that unlike the nature of anything else. And when it gets mixed with the sulphurs and gets married with them, it holds them and they (the sulphurs) hold it (the copper). In the case of all other things, they have not natures, neither in marrying nor in mixing. Therefore they do not remain, and from them no spirits arise in a vapour, nor in anything else. But in the case of the copper, when it is mixed with its sulphurs, they (the sulphurs) rejoice in it (the copper), and it rejoices in them, so it (the copper) holds them (the sulphurs), and they hold it.»”<sup>63</sup>**

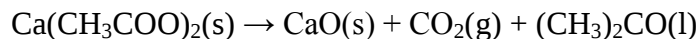
Just as copper was previously juxtaposed with mercury, so too is copper mixed with sulfur. This is not a matter of exposing metallic copper to sulfurous vapor in order to color the metal. Copper is the name of the masculine nature, and sulfur, like mercury, can be used to indicate the feminine nature. The cupolas mentioned are a symbol of the distillation apparatus (the alembic) – just as the cupola is covering for people, so is the alchemical cupola a covering for the distilled

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<sup>62</sup> Zosimos (Abt/Fuad), 491-492. From The 8<sup>th</sup> Book about the Operation.

<sup>63</sup> Zosimos (Abt/Fuad), 199-200. From The 1<sup>st</sup> Book of the Learning.

spirit.<sup>64</sup> A dye is extracted from the white stone (a sublimation), and this dye is (aptly) named ‘vapor’. The most important statement of the above citation may be that “nothing remains of them except the taste of the copper alone”. Let us recall the chemical reaction of the sublimation proposed by the acetate hypothesis:



When calcium acetate is sublimated, acetone (though not only acetone) is given off as a vapor. However, calcium oxide remains in the cucurbit. The acetate hypothesis holds that copper is one of the names of quicklime – the masculine nature, while sulfur is the name of the female nature: strong vinegar. When the acetate stone is distilled, nothing remains except the copper – calcium oxide. Zosimos has no method to confirm this fact chemically, but he can use the sense of taste to confirm a similarity between the starting product (quicklime) and the remainder (also quicklime).

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<sup>64</sup> Zosimos (Abt/Fuad), 518. The fugacious natures are shown perched underneath a symbolic cupola.

## **6: Concluding Remarks**

It is the opinion of the present author that the Democritean maxim “nature rejoicing in nature” actually describes the process of a chemical reaction. This is not a general statement, but rather refers to a very specific experiment in which two substances are mixed to form the philosophical stone. While it may certainly be argued that applying the teachings of the *Muṣḥaf aṣ-ṣuwar* to earlier Greco-Egyptian alchemical texts is speculative, the present author is confident that the results of such an approach will ultimately be extremely fruitful. Many of the recipes of the Greco-Egyptian tradition are completely nonsensical when taken in a literal sense. By singling out the natures, it may become possible to understand these recipes as hidden aspects of a principal work – the central teaching of the Zosimos of the *Muṣḥaf aṣ-ṣuwar*. This paper represents only the initial attempt at such an understanding, and should be “taken with a grain of salt”.