

## **Jābirian Alchemy**

(A Translation of the Introduction and Chapter One, Section One  
of *Jābir Ibn Ḥayyān: Contribution to the History of Scientific  
Ideas in Islam: Jābir and Greek Science*)<sup>1</sup>

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(Translated from French by Keven Brown)

### **Introduction**

The first volume of this work was devoted to the study of literary problems arising from the Arabic manuscripts attributed to Abū Mūsā Jābir Ibn Ḥayyān, an alchemist who is said to have lived in the second century A.H. (eighth century A.D.) and to have been a disciple of the Shi‘ah Imām, Ja‘far al-Šādiq. We attempt in that work to arrange a critical bibliography of the writings of Jābir in order to restore the different categories of the Jābirian Corpus, and to establish the chronological succession of these categories. This raises the question of their authenticity, and we have concluded that these writings are apocryphal works composed by a school of Shi‘ite alchemists around the year 300 A.H. (912 A.D.). Finally, we investigate the relationships which exist between the writings of Jābir and the Muslim mystics, as well as the literary connections which unite them to ancient esoterism.

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<sup>1</sup> *Jābir Ibn Ḥayyān: Contribution à l’Histoire des Idées Scientifiques dans l’Islam: Jābir et la Science Grecque* (Paris: Les Belles Lettres, 1986; reprint of Volume 2 of 1942 Cairo edition). Volume 1, *Textes Choisis* [Selected Texts], was published in 1935. Note: Paul Kraus’ footnotes are only partially translated in this translation.

In this present volume, we propose to explain the principal scientific ideas contained in the Jābirian Corpus, and to look for the origin of these ideas. Despite certain inconsistencies, he expresses a large amount of coherent doctrines that demand to be examined in the light of ancient sources, of which we still retain at least some. It is necessary, then, to subject the various aspects of the Jābirian science to a systematic and historical analysis, and to realize the value of these texts for our knowledge of eastern Hellenism.

The writings of Jābir do not contain only pure alchemical knowledge, even though it occupies his writings to a preponderating degree, but one also finds a large number of treatises from other disciplines, such as medicine, astronomy, theurgy, mathematics, music, and the diverse branches of philosophy. In short, they comprise an entire encyclopedia of ancient sciences, as Islam received them.

In analyzing Jābir's theory of alchemy, at least in its general features, we will have occasion to show that it has few characteristics in common with what is left to us of the alchemy of antiquity. The eastern Hellenistic tradition from which this theory derives anticipates a tendency much more experimental and systematic; it avoids, in large measure, symbolism and allegories, employs products from the bodies of animals, and makes use of sol ammoniac, unknown in antiquity. As we will see, Jābir bases the transmutation of bodies on numerical principles, of which hardly any traces are found in the *Collection of Ancient Greek Alchemists*.

The tradition on which Jābirian science depends begins to show itself prominently in the exposition of the science of properties, for which Greek, even neo-pythagorean, inspiration can be established with great certainty. We are able, also, to delimit that part of Jābir's system which

can be traced to material for which it is necessary to look for its origin mostly in the East, in India, and perhaps in China.

Finally, analysis of the science of artificial generation, for which the supreme goal is the creation of the little man, the artificial man, will show us that Jābir is under the influence of theurgy and neoplatonic magic, and illumines a particular case of the survival of Pagan ideas in Islam.

These three "practical" disciplines as well as other "arts" treated in the *Corpus* rest on certain philosophical premises which constitute, without doubt, the most original part of Jābirian thought.

It is to the historical analysis of [Jābir's] cosmology and physics that the second part of this volume is devoted. In tracing the descent of the theory of elements down to Jābir, we will have occasion to show what part of it recurs here, besides Aristotelian ideas, from the Stoic and Neoplatonic traditions. This will lead us to what the author calls the theory of balance, a theory which has as its goal the reduction of all the phenomena of nature, and, in general, all the data of human knowledge, to laws of quantity and measure. As far as we can judge it, the theory of balance represents the most energetic attempt in the Middle Ages to establish a quantitative system of natural science. We will see Jābir restoring the degrees of intensity of the elementary qualities, for which he borrows the scheme from Greek medicine, with a series of characteristic numbers, and we will study the connection of these speculations to the *Timaeus* and to Pythagorean arithmology. Examining the special role that the number 17 plays in Jābir's speculations will give us occasion to restore, at least partially, an antique tradition disregarded until the present, which dates back to ancient Pythagoreanism. It is in the *Cratyle* and with the Pythagoreans that we will find the origin of Jābir's specu-

lations on the letters of the alphabet, speculations which form another aspect of the theory of balance and which have a close relationship to ideas held by Arab authors about the philosophy of language.

In searching for Jābir's immediate sources, we will have occasion to study the historical position of Arabic manuscripts attributed to Apollonius of Tyana and to recover an important chapter in Eastern Hermeticism. Furthermore, we will study the writings of Greek authors quoted in the Corpus. We will contribute, therefore, not solely to clarifying the history of their transmission in the East, but also understand them better in themselves.

Research into the history of science in Islam is not yet sufficiently advanced so that we may hope to have supplied definitive solutions to a number of problems, often very delicate, arrived at in the course of this work. Moreover, the astonishing prolixity of the author and his declared tendency to never explain all of his ideas in a single place make the task of research particularly difficult. Normally, we take as a point of departure a characteristic text, establish [the translation of] the terminology in it as exactly as possible, and gather around it themes suitable for elucidation. It is only after this detailed analysis that we attempt to elaborate the system of the author and look, for the most important conceptions, for the tradition which leads them up to Jābir.

## **Chapter One: Jābirian Alchemy**

### **1. The Elixir**

The Jābirian theory of the transmutation of metals rests on certain mineralogical premises which are found again, in part, with other Arab authors. Under the influence of the

planets, the metals are formed in the womb of the earth, thanks to a proportionate mixture of sulfur and mercury.<sup>2</sup> The metals only differ according to their accidental qualities, which depend on the different forms of sulfur (which enter into their composition). For their part, these sulfurs depend on different [elements of] earth and on their position in relation to the heat of the sun during its circular movement. The most subtle, the most pure and equilibrated sulfur is the sulfur of gold, with which the mercury enters into a well-equilibrated condensation (to form gold). It is by reason of the equilibrium of its constitution that gold resists the fire, which is incapable of consuming it as it consumes the other metals.<sup>3</sup>

On the other hand, each of the metals is characterized on the exterior by two of the four elementary qualities (hot, cold, humid, and dry), the two other qualities being considered as residing in the interior of the body, from where, by clever processes, it is able to be extracted. Here, in the form of a table,<sup>4</sup> are the relationships existing between the metals and the elementary qualities:

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<sup>2</sup> This theory, which is not attested to in antiquity (see, however, I. Hammer-Jensen, *Die älteste Alchymie*, p. 142), is encountered for the most part in Arabic minerologies; cf. for example *Rasā'il Ikhwān al-Safā'* (ed. Bombay), II, 71; Ibn Sīnā, *k. al-shifā'*, I, 254; Qazwīnī, *Cosmographie*, I, 204 Wüstenfeld, and often elsewhere. The most ancient attestation is read in the *Book of the Secret of Creation*, attributed to Balīnās (cf. J. Ruska, *Tabula Smaragdina*, Heidelberg 1926, p. 151), a Hermetic work which has been utilized by the author of the Jābirian writings (cf. *infra*, chap. v, 5). From Arabic sources, this theory passed into the Latin literature of the Middle Ages, and is encountered also in the *Summa* of Geber.

<sup>3</sup> *K. al-īdāh* (in Holmyard, p. 54).

<sup>4</sup> Following LXX 32 (= *Selected Texts*, p. 467 ff.) Treatises 32-38 of the LXX Books are devoted to explaining this theory.

	On the Exterior	On the Interior
1. Lead	cold-dry; very soft	hot-humid; very hard
2. Tin	cold-humid; soft	hot-dry; hard
3. Iron	hot-very dry; hard	cold-humid; soft
4. Gold	hot-humid	cold-dry
5. Copper	hot-dry	cold-humid
6. Mercury	cold-humid; soft	Hot-dry; hard
7. Silver	cold-dry	Hot-humid

Each metal, therefore, contains in its own interior another metal having qualities diametrically opposed to it.

The primary root of silver is gold. But the coldness and dryness (of the mine) have rendered it ineffective, so that the gold has been pushed back into the interior and the nature that has predominated over it has become established on the exterior. In this way, its exterior has become silver and its interior gold. If one wishes to convert the silver into gold, it is necessary (first) to push back the coldness into the interior so that the heat can appear. Then it is necessary to push back the dryness into the interior so that the humidity can appear. It is in this way that (the silver) can be transformed into gold.<sup>5</sup>

Or again:

On the outside it is iron (= hot-dry) and on the inside it is mercury (= cold-humid). It is healed in the fol-

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<sup>5</sup> *Texts*, p. 470, 1 ff.

lowing manner: We diminish its dryness, then its humidity will appear and it will be transformed into gold. For when its humidity appears on the exterior, its dryness retires into the interior, according to the premise (which we have established). Or, we diminish its heat, and then its humidity will appear. Through the appearance of the humidity the heat will retire into the interior, and the (iron) will be transformed into a dry silver.<sup>6</sup>

In this way, the transmutation (*qalb* or *iqlāb*) of metals goes back to a simple change of elementary qualities. “All the bodies (metals) must be reduced to the nature of gold, seeing that it possesses an equilibrated nature.”<sup>7</sup> Just as the physician cures sick bodies by counterbalancing an excessive humour with a drug of contrary quality, so the alchemist employs medicaments appropriate to cure the “maladies” of metals. These medicaments are no other than elixirs.<sup>8</sup>

It is in the theory of the elixir that the true originality of Jābirian alchemy consists. Contrary to the Greek alchemists, as well as to most of the Arab alchemists,<sup>9</sup> Jābir

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<sup>6</sup> *Texts*, p. 468, 10.

<sup>7</sup> *Texts*, p. 469, 1.

<sup>8</sup> The *k. al-Khawāṣṣ*, chap. 6-11, treats the medical properties of the elixir and relates many anecdotes confirming the experiences of Jābir on this subject (cf. *Texts*, p. 303 ff.). One also finds there prescriptions for tinting stones, for ameliorating the taste of salt water, etc. The medical use of the elixir, so widespread with the Latin and Indian alchemists (cf. Praphulla Chandra Ray, *A History of Hindu Chemistry*, Calcutta 1903-9) seems unknown among Greek authors.

<sup>9</sup> Thus, with Rāzī, organic alchemy occupies a relatively minor place and is relegated to a brief, final chapter in his *k. sirr al-asrār*; cf. J. Ruska, *Al-Rāzī's Buch Geheimnis der Geheimnis* (in *Quellen und Studien zur Geschichte der Naturwissenschaften und der Medizin*, VI,

maintains that the elixir can be produced not solely from mineral substances, but also from vegetable and animal substances. And he gives preference to elixirs produced from animal substances, those possessing a degree of organization much more elevated than the substances of plants and minerals. In the *Seventy Books*, he gives a list of the different schools which opt for a certain form of elixir:

Schools (*tawā'if*) which claim to produce the elixir from mineral substances, such as: (1) mercury; (2) sulfur; (3) sulfur + mercury; (4) yellow arsenic; (5) red arsenic; (6) all the arsenics; (7) (mineral) sol-ammoniac; (8) arsenic + sulfur + mercury; (9) arsenic + sulfur + ammoniac + mercury; (10) gold + silver; (11) mixture of sulfur + mercury; (12) marcassite; (13) magnesia; (14) glass; (15) lapis-lazuli, malachite, hematite (*shādanah*), cornaline ('*aqīq*); (16) all the vitriols, the salts, and the boraxes; (17) alcali; (18) hyacinthe, amethyst; (19) pearls, as well as the combinations of these minerals.

Schools which claim to produce the elixir by separating vegetable substances, such as red coral (*busad aḥmar*); olive (*zaytūn*); euphorbia (*lā'iya*); mezereon (*māzariyūn*); cucumber (*quttā' al-himār*); annual mercurial (*hashīshat al-samak*); aconite (*bīsh*); safflower ('*uṣfur*); kermes (*qirmiz*); rose of Rayy (*ward rāzī*); yellow jasmine; purslain (*baqla ḥamqā'*); fennel (*shūniz*); mustard (*khardal*); ginger (*zanjabīl*); pepper (*fulful*); cinnamon from China (*dārsīnī*); pyrethrum ('*āqirqarhā*); millet (*jāwars*); onion (*baṣal*); leek (*kurrāt*); anemone (*shaqā'iq al-nu'mān*);

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Berlin 1937), p. 53, 207-219. For the role of animal and vegetable alchemy in the system of Jābir, see also his *k. al-riyāḍ al-kabīr*, introduction.

citron (*utrujji*); mulberry (*tūt*); Egyptian soapwort (*kundus*).

Among the animal substances used, in particular, by alchemists, the *Seventy Books* enumerates: the lion, the viper, the fox, and other animals having excessive heat; among humans, especially those “in whom the bilious humour (*safrā*) preponderates, who possess lean bodies, such as the inhabitants of the Yamāma region and the maritime islands (*al-jazā’ir al-māliḥa*); among the Indians, especially the inhabitants of the valley of Sind; and the Copts who inhabit the interior of Egypt and the Magrib....If, however, one is not able to procure these substances, it is possible to use oxen, gazelles, and wild or domestic donkeys.”<sup>10</sup> Among the animal substances, Jābir discourses particularly upon marrow, blood, hair, bone, urine, and sperm, which are all used in the production of sol-ammoniac.

The variety of elixirs depend on the possibility of combining the substances of the three kingdoms. According to the *k. al-ahjār ‘alā ra’y Balīnās*, there are seven kinds of elixirs: (1) based on mineral substances; (2) based on animal substances; (3) based on vegetable substances; (4) animal and vegetable substances; (5) mineral and vegetable; (6) mineral and animal; (7) mineral, animal, and vegetable.

But how does one produce these different elixirs and especially the supreme elixir (*al-iksīr al-a’zam*), the universal panacea of all metals? It is not through experiment and by following the technical recipes of the ancient alchemists that one arrives at it. Such elixirs [as produced by these recipes] have only an approximate value. The production of

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<sup>10</sup> *Seventy Books*, 1 (f. 2).

the real elixir, on the contrary, must be based on sure principles and satisfy all exigencies exactly. Here are the reflections which Jābir made on his subject:

In the physical world all things are composed from the four elements, which are composed, in turn, from the four natures (elementary qualities). Through an ingenuous method, called the method of balance, Jābir thinks that he is able to establish the exact constitution of each body, by determining the part of it derived from each of the four natures. The alchemist should manage the changes which the body undergoes as soon as he is able to separate its elements and elementary qualities from each other, those properties with which nature operates. He will be able, then, according to his wish, to compose a new body, notably the different elixirs which are capable of exerting an influence on the metals.

This separation of substances into their elements and natures, treated in detail in the *Seventy Books*, takes place by means of distillation. Jābir emphasizes in several places that each thing belonging to one of the three kingdoms (*thalātha ajnās*) is capable of being distilled,<sup>11</sup> and that there are even means for distilling the hardest stones. His greater interest, however, lies with the separation of animal substances.

We know that for the distillation fractionated from an organic substance, e.g. wood or flesh, gaseous and liquid substances separate out first, then combustible substances; finally, an insoluble residue of ashes remains. Jābir considered this chemical process to be the decomposition of the body into its elements. The liquid substance which

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<sup>11</sup> *Seventy Books*, 41 (f. 148): "Know that...whatever you cause to be distilled from among the three genera, whether from stones, plants, or animals, first, distill from it a white water."

becomes separated by distillation is, for him, the element of water, which forms part of the composition of the body. The gaseous substance, which he named oil or grease (*duhn*), he identified with the element of air. The combustible substance, named fire (*nār*) or tincture (*ṣibgh*), is identified with the element of fire. And the solid residue (*ard*) is identified with the element of earth. Through the distillation each body is divided, according to Jābir, into its four elements: water, oil (= air), tincture (= fire), and earth.

This theory teaches us that each of the so-called elements is composed, in turn, of two constituent natures connected to matter or substance. Book 47 of the *Seventy Books* gives the following table regarding this:

Fire =	heat + dryness + substance
Air =	heat + humidity + substance
Water =	coldness + humidity + substance
Earth =	coldness + dryness + substance

Therefore, an isolated nature (= elementary quality) is restored by eliminating in each element one of the two natures and by conserving the other. “Take first the distilled water, which is cold and humid, and extract the coldness from it by eliminating the humidity. The same is done with the oil: we eliminate its heat and its humidity remains. As for the fire, we eliminate the dryness from it, and it remains hot. Regarding the earth, we eliminate the coldness from it, and it remains dry. From these (isolated natures) we recompose the ‘bases’ (*arkān*) with which we work.”<sup>12</sup>

<sup>12</sup> *Texts*, p. 484. In the terminology of Jābir, *arkān*, as opposed to ‘*anāṣir* or *uṣṭuqṣāt*, designates the artificial elements produced, with which the alchemist operates; cf. also *k. al-ḥudūd* (*Texts*, p. 112, 1).

Thus, the four “natures” can be produced by the reduction of the elements artificially into one of their components:

Heat = fire without dryness

Dryness = earth without coldness

Coldness = water without humidity

Humidity = air without heat<sup>13</sup>

Already, the elements in a pure state, which Jābir believes he has found in the products of the distillation, can be used with success in certain alchemical operations. But the result of these operations will be much more effective if one is able to recover the natures from which the elements are composed. As everywhere in his alchemical system, Jābir distinguishes three degrees of purity for these natures, and, with that, three different kinds of alchemical operations: (1) the major work (*al-tadbīr al-a‘zam* or *al-bāb al-a‘zam*), which manipulates the natures into the pure state; (2) the middle work, where the natures are still in the impure state; and (3) the minor work, where one works with the elements, almost without reducing them to the simple natures.<sup>14</sup>

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<sup>13</sup> See *Seventy Books*, 47 (= *Texts*, p. 482, 11 ff.).

<sup>14</sup> See, for example, the *Seventy Books*, 43 (f. 159): “Water reduced in the final stage [of the treatment] will become entirely cold; in the middle stage: cold and a little humid; in the opening stage: cold and very humid.” The final stage is the most difficult (cf. *Seventy Books*, 52, f. 184); the beginning stage will make the second stage easy to adopt, which, according to the *Seventy Books*, 42, f. 156 (cf. also *Texts*, p. 479, 3), is the only stage explained in the *One Hundred and Twelve Books*.

The different kinds of elixir are only mixtures, more or less suitable, of the four natures and the four elements, mixtures which correspond to the constitution of the bodies to which they are applied. Here is how Jābir, in the *Seventy Books*, defines the function of the elixir:

The four principles (*uṣūl*) which act on the bodies belonging to the three kingdoms, and which influence them and determine their tincture, are fire, water, air, and earth. In truth, not an action occurs in the three kingdoms which is not the effect of these elements. It is for this reason that in this craft (alchemy), we rely on operations applied to the four elements, by reinforcing those among them which are too weak and by weakening those which are too strong; in short, by correcting what is deficient. Whoever succeeds, therefore, in manipulating the elements of the three kingdoms, will attain, therewith, to the knowledge of all things and will comprehend the science of creation and the craft of nature.<sup>15</sup> Do not let doubt confound thee, for the nature of each elixir derives from the elements and is constituted by them. It is thus, that in the elixir, we introduce a nature which prevails over the corrupt nature residing in the body. For example, with a thing which possesses a surplus of the watery quality, we introduce the fire to it and apply it to the extent necessary, without, however, allowing it to be consumed by the fire, which would only increase the damage. In this manner, the thing subjected to the action of the fire will become equilibrated and will be brought to the state desired.<sup>16</sup>

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<sup>15</sup> Allusion to the title of the *kitāb sirr al-khalīqa wa ṣanʿat al-tabīʿa* by Balīnās.

<sup>16</sup> Book 47 (= *Texts*, p. 481, 6 ff.). The present passage only deals with the elixir composed from the elements. The rules to follow to produce

A large part of the *Seventy Books*<sup>17</sup> is devoted to explaining this theory and to describing its application. Regarding the extremely diffuse character of the *Seventy Books*, the same processes are treated with more or less detail in many places. To give a summary idea of the Jābirian doctrine, we content ourselves to translate here some selected passages, most of which have been published in the volume of *Texts*. An exhaustive study on it is not feasible without first publishing all the texts.

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the elixir from the equilibrated composition of the simple natures will be discussed more later. After his exposition (p. 484, 1 ff.), Jābir declares that each elixir is composed from the four "bases": (1) hot + dry = in all things, the tincture which has been separated from the oil; (2) hot + humid = air = the oil separated from the tincture; (3) cold + humid = the water distilled from each thing; (4) cold + dry = earth = the residue remaining after the distillation at the bottom of the retort.

<sup>17</sup> The first, second, fourth, and fifth groups of ten chapters. The theory of the decomposition of organic substances into their components is found already, and well elaborated, in the *One Hundred and Twelve Books*. See especially the description of the triple distillation in the *k. usṭuqus al-uss* II (Holmyard, p. 85, 10 ff.) and the titles: *The Book of Blood, of Sperm, of Hair* in this same collection, titles which certainly allude to the distillation of these substances and the production of the animal sol-ammoniac. Notice that here again (Holm. p. 85, 12) oil (= air) is called soul. According to several accounts contained in the *Seventy Books*, the *One Hundred and Twelve Books* only deal with the simple distillation into "elements," without coming to the much more difficult task of reducing the elements into "natures." Among the treatises posterior to the *Seventy Books* which are occupied with this theory, we mention again the *k. al-khawāṣṣ* (chap. 6-13). The four treatises, *k. al-zībaq al-sharqī*, *k. al zībaq al-gharbī*, *k. nār al-ḥajar*, and *k. arḍ al-ḥajar*, are a curious repetition of the doctrine of the *Seventy Books*, upon which they claim to comment. The symbolic terms "eastern mercury" and "western mercury" designate here the elements of oil and water (= "water of life"). As common elsewhere, the four products of the distillation are named *arkān*.

Here, to begin with, is a list of the operations necessary to produce the elixir:

1. Selection of a favorable time for the work (*iḥsān al-waqt*);
2. The first distillation (*taqtīr*), i.e. the separation of the four elements from which the animal substance is composed;
3. Purification of the water (*taḥhīr al-mā'*), i.e. the reduction of the element of water to coldness;
4. Purification of the oil;
5. Purification of the fire;
6. Purification of the earth;
7. Determination of the "weights" (*awzān*) with which it is suitable to compose the elixir;
8. Mixture (*khalt*) again of the natures, not by juxtaposition (*mujāwara*), but by total mixture (*mizāj kullī*);
9. Application of the elixir: (a) coloration of the mixture; (b) dissolution (*ḥall*) and congelation (*'aqd*); ceration (*tashmī'*); (c) projection (*tarḥ*) of the elixir on the metals; (d) repetition (*takrīr*) of the projection.<sup>18</sup>

Some accounts given of operations number 2 to 7 seem indispensable to us in order to comprehend the Jābirian doctrine. The third book gives the following description of the first distillation:

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<sup>18</sup> This list is repeated in several near variants in the first ten books of the *Seventy Books*. This part of the work [no. 9] has for its object the description of the same operations executed according to a still more accelerated cycle. In the first book the preparation of the elixir takes one year, while in the tenth book the same operation takes no more than seven days.

We put the substance in a cucurbit [large, gourd-shaped distillation flask with a wide mouth], which is placed in a pot filled with ashes. We heat this pot until the distillation reaches its term and the water is entirely extracted from it: this is then put aside. Next, we pour a little of this distilled water in the receiver so that, in the succeeding distillation, the descent of the fire and the air will be able to take place and nothing will attach to the glass (from which the receiver is made)...Then, we raise the heat until the fire and the air become entirely distilled and the distillation completely reaches its term. After that, put the product (i.e. the fire and the air) aside in the same fashion that you did for the water,...and take out, lastly, what remains in the cucurbit, in other words, the earth, and put it also aside.<sup>19</sup>

A brief exposition on the reduction of the elements into the natures is found in the *Seventy Books*, book 42:

We put the water into the cucurbit, where we have left a substance having a strong dryness, such as sulfur or a similar thing. Thus, the humidity of the water will be dried up by the dryness (of the sulfur) and by the heat (of the fire of the distillation): the humidity will be entirely consumed and nothing will remain (from the water) except the isolated coldness....We proceed

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<sup>19</sup> Other passages confirm that the fire (= the tincture) and the air (= the oil) only become separated through an additional distillation. According to LXX, 45 (f. 187), the oil is separated from the tincture by distilling them with some urine or myrtle. Books 11-13 of the *Seventy Books* treat the distillation of certain animal substances, such as blood, sperm, urine, marrow, hair, etc. Blood, for example, decomposes by the distillation into a white liquid (= water), a yellow liquid (= oil + tincture), which becomes divided into ammoniac (= oil) and into a red liquid (= tincture), and last is the residue (= earth) remaining at the bottom of the cucurbit.

in the same manner with the humidity which is in the oil—provided that one wishes to extract it from the oil, for the humidity is found only in the oil and the water—by eliminating its heat....As for the heat and the dryness, we proceed in the same manner as we did with the humidity and the coldness: we take the tincture, extract from it the heat, and eliminate the dryness. It is the same for the earth, which is cold and dry: we take it, extract its dryness and eliminate the coldness.<sup>20</sup>

### Characteristics of the Isolated Natures

**The Coldness:** We continue to distill the water until it becomes white and brilliant. Taken from the cucurbit, it will condense into flakes resembling salt. Hence, the term.

**The Humidity:** We distill the oil until what results from this is a gluey and very elastic substance....This substance will never solidify. On the contrary, if the heat of the fire touches it, it will dissolve and become air, which requires, however, a long time.

**The Heat:** By the treatment, we cause the tincture to become a transparent, brilliantly deep red body, shining and never dull.

**The Dryness:** It is hard, dull, dry, or even in the form of a powder of atomic constitution,<sup>21</sup> which reduces its volume by the contraction (of its particles), and augments by their expansion.<sup>22</sup>

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<sup>20</sup> Texts, p. 473, 3 ff.

<sup>21</sup> This is probably the sense of the expression *habā' lā juz' lahu*. The term *habā'* firstly means the particles of dust which can be seen dancing in a sun beam....The Arab alchemists have derived from *habā'* the verbs *habba'a* and *tahabba'a* to designate the pulverization of substances.

<sup>22</sup> LXX 42 = Texts, p. 474, 4 ff.

To obtain an exact idea of the processes of which Jābir speaks, we give next in translation a detailed description of the reduction of the oil and of the water. These purely technical passages contain, among other things, precise information on the apparatus used for distillation.<sup>23</sup>

### Reduction of the Oil and the Humidity

It is first necessary to extract the oil from the tincture and to separate them from one another....Having extracted it from the tincture, we operate with the oil in three ways. We subject it either to the complete process—for use in the major operation (*bāb a'zam*)—or to the secondary process—for use in the middle operation (*bāb awsaṭ*)—or, lastly, to the tertiary process—for use in the minor operation (*bāb adwan*).

If one desires to use this oil for the major operation, we take it after the extraction, distill it with water, and repeat this moist distillation seventy times.<sup>24</sup> This number of distillations is indispen-

<sup>23</sup> The description of alchemical apparatus occupies a large part in the writings of Jābir. Several treatises in the *One Hundred and Twelve Books*, such as the *k. al-'Amāliqa* (books 23-24) and the *k. al-atyān* (book 81) are devoted exclusively to it. In the *k. al-khawāṣṣ*, chapter 68, one can read supplementary accounts on the apparatus of smelting (*ālat al-sabk*), of distillation (*ālat al-taṣṣīl/taqtīr*), of mixing (*ālat al-mizāj*), and of ceration (*ālat al-taṣhmī'*). In the introduction of the *k. musaḥḥahāt Iflātūn*, the author talks about the various dimensions of cucurbits as well as the clay used to cement them.

<sup>24</sup> In the dry distillation, the cucurbit is placed in a pot (*qidr*) filled with ashes; in the moist distillation, on the other hand, a cauldron (*mirjal*) filled with water is used. See a detailed description in the *Seventy Books*, book 41 (f. 151): “It is preferable to distill by moisture....To do this, take a cauldron and pour water in it until it is half full or less; then attach the retort in it, in which is the oil which you wish to distill. The lower part of the retort should be equal with the top of the water. Then

sable—if one wishes to make use of it in the operation mentioned—for otherwise the oil will be destroyed. After this, we subject it again to distillation until its hot part is eliminated and only its humid part remains. We put a sponge soaked with whitened verdigris into the cucurbit, or another (drug) which can be substituted for it, put the oil into the cucurbit, and distill it. We continue to repeat this process, by subjecting whatever is distilled each time to a new distillation and renewing the sponge for each distillation. In this way, the oil will become, after each distillation, more and more dark, until it assumes the color of the earth (*turāb*), or a color darker still, and becomes sticky to whatever it touches and adheres to it. At this time the preparation of the isolated humidity, which is only connected to substance (*jawhar*), is accomplished [cf. p. 6]. This will take place after seven hundred distillations. If one does not know the color characteristic for this stage, one must count the number of distillations, for, on the one hand, the work arrives at the characteristic color through the correct number (of distillations), and, on the other hand, the characteristic color is a sign of the number of distillations.

The secret of this operation is summed up, therefore, as follows: we first subject the oil to seventy distillations without using the sponge. Then we add the sponge to it when putting it in a condensation vessel supplied with stems of bamboo.<sup>25</sup> This sponge

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heat it gently and [gradually] increase the flame. Have a care that only the lower half of the retort is in the water....As for immersing the retort in the water and distilling it by boiling, this would be too severe.”

<sup>25</sup> These stems of bamboo and myrtle mentioned in the text seem to serve, by way of a filter, to moderate the distillation; cf. LXX, 41 (f. 151): “so that it is distilled by the stems purely.”...As to their exact function in the distillation apparatus, it is certainly necessary to take these accounts in the proper sense. For, according to the *k. al-zībaq al-*

should not be used in the moist distillation which preceded. The narrower [the neck of] the vessel which contains the stems, the better....

Know that this oil of the first degree reaches its perfection after it is sublimated and the humidity (to which it is reduced) becomes elastic and dark. When adding the water to it,<sup>26</sup> it is necessary that this possess the same degree of purity and be only cold. Likewise, the fire (which we add to it) must not be other than pure heat, and the earth, pure dryness. As for the weights, we use equal quantities from each of the elements in this operation.

In regard to the extraction of oil for the secondary operation, this is easier than for the first. It possesses, however, a less powerful tincture and has less utility. The treatment is the following: We first separate the oil from the tincture by a humid process. Then we distill the oil by itself in water forty-nine times, after which we put it in the condensation cucurbit and subject it to a dry distillation, while using stems (of

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*gharbī*, which forms part of the *Five Hundred Books*, “it is not a matter here of the (natural) myrtle which you think, for we have the custom of concealing the real names of things and giving to them the name of a familiar thing.” This passage follows a largely incomprehensible allegory, according to which the stems of myrtle correspond to what Māriā has called the “steps of gold” (*salālīm al-dhahab*) and Democritus, “the green bird.” The whole exposition of the *Seventy Books* is declared to be a riddle (*ramz*), requiring an allegorical interpretation, the result of which is to totally evaporate the technical meaning of the prescriptions in the oldest collection. One has the impression that the author of the *Five Hundred Books*, different from those of the *Seventy*, has made the oldest collection the subject of his meditations. At the same time, the comparison permits one to study both the apex and the nadir of Jābirian alchemy.

<sup>26</sup> In order to recombine from the oil (humidity) and the water (coldness) a new body, i.e. an elixir.

bamboo), until the completion of seventy distillations. Sometimes up to one hundred distillations are added to the aforementioned forty-nine. Some people, however, limit the number of distillations in the vessel supplied with stems to seventy....

As to the tertiary operation, we first subject the oil to the moist distillation by distilling it twenty-one times with stems of myrtle. Next, we put it in the condensation cucurbit and assure [the sealing of] the joint by inserting either a single stem, which is better, or several stems. After that, we apply the dry distillation to it until the completion of forty-nine distillations. The oil will now be able to be used. The basis of this tertiary operation is forty-nine distillations, just as the basis of the secondary operation is seventy, and the basis of the major operation is seven hundred distillations....

Have a care lest you introduce an element derived from one operation into another operation, for this will lead to ruin and will bring everything to nothing....In the major operation it is necessary to use the water made in the major operation, and likewise with the fire, the oil, and the earth; in the secondary operation, the water, the earth, the oil, and the fire derived from the secondary operation; and in the tertiary operation, the water, the fire, the earth, and the oil derived from the tertiary operation.<sup>27</sup>

### **Reduction of the Water and the Coldness**

First we extract the white distilled water from one of the stones [primary substances] we desire. It will be, without doubt, cold and humid, conformable to the

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<sup>27</sup> LXX 46 = *Texts*, p. 477, 9 ff.

preceding account...The process (of reduction) takes place in three different ways:

If one wishes to use it for the Great Work, which cannot be surpassed by anything, it is necessary to extract all of the moisture contained within it. We take, then, this water, place it in a cucurbit, put in the cucurbit a sponge saturated with sulfur, distill the water, and then pour it again into the cucurbit. This process of distillation should be continually repeated until the water is transformed into coldness and becomes a pure white substance, which, when it is touched by air, will congeal into a white body, and when it is touched by the slightest degree of humidity, will dissolve again into water. It is evident that this coldness is not [absolutely] solitary, but is connected to substance (*jawhar*). The more the indicated distillation is repeated, the more the distillate should improve, allowing itself to be employed in the Craft and becoming efficacious. In pursuing this operation we come to a limit which cannot be surpassed....

The second way of treatment: After the distillation, we take the white water, which is cold and humid, and subject it to the moist distillation in a cucurbit such as we have just described. We put the water into a cucurbit that is in a container full of water, and execute the distillation three times. Then the water will become purified, less so, however, than in the case of the complete operation. Next, we put the water into a cucurbit, the middle of which is very narrow, and insert branches into it to fill up the orifice at the middle of the vessel. Then we commence distilling once again. We make first seven distillations with the sponge, continuing, thereafter, to distill the water in the condensation vessel....

The third way of treatment: It is necessary to first distill the water of the Stone. Then we subject the water to a triple moist distillation, and then take it and

put it in the condensation cucurbit, where we place in it branches of bamboo as needed so that the joint between the cucurbit and the branches will be solid. After this, we continue to distill according to the degree of purity we wish to obtain. These [three] degrees have been dealt with in the preceding books...This is a summary of all the processes applied to the water as far as concerns these three ways, which are suitable for all the products of animals.<sup>28</sup>

In the same manner that the reductions of the water and the oil (into the coldness and the humidity) were accomplished, the reductions of the tincture (into the heat) and of the earth (into the dryness) are performed.<sup>29</sup> It is clear that each of the purified elements already possesses certain remarkable qualities which allow it to be used, by itself, as an elixir. Thus, the oil reduced (by seven hundred distillations) to the humidity is able to soften any hard body<sup>30</sup> and to give the color of gold to certain metals. On the contrary, the oil which has only undergone the minor operation (seventy distillations) is only able to soften copper. These effects, which serve at the same time as tests of the success of the aforementioned operations, are examined abundantly in books 15 and 51-57 of the *Seventy Books*.<sup>31</sup>

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<sup>28</sup> LXX 44 (f. 165). See also LXX 2 (f. 9) for a more detailed description of the treatment for reducing the water and the coldness.

<sup>29</sup> Detailed descriptions about these second two reductions are found in books 48 and 50 of the *Seventy Books* as well as in each book of the first ten. We dispense with going into the details here.

<sup>30</sup> Cf. LXX 46 (= *Texts*, pp. 480-481).

<sup>31</sup> For example, we translate here a passage describing the effects of the water purified by the premier method (LXX 52, f. 184): “We redden leaves of copper, or iron, with the fire, and then immerse them four, five, or ten times in the water. If the water whitens the copper and makes it as soft as wax, it is perfect. Otherwise, it is necessary to

Several chapters of the *k. al-khawāṣṣ* are also devoted to this theme.<sup>32</sup>

A mixture of several elements will be more effective still.<sup>33</sup> And when we mix, by observing certain arithmological rules, the products deriving from the reduction of the four elements, we obtain an elixir that excels all the others in power and in the extent of its application.

In the second and third books of the *Seventy Books*, Jābir gives this doxographical table on the proportion between the fire and the earth in a mixture [from the standpoint of different schools]:

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subject it to distillation once again. The whiteness with which the water has endowed the copper should, moreover, only be removed by a new application of red color. Furthermore, it penetrates into the interior of the copper and is not limited to its surface.” On the effects of the purified fire (LXX 51, f. 182): “One *dānaq* of the fire applied to one *dirham* of pure, clean and living mercury will solidify the latter and make it an elixir able to transmute twenty dirhams of silver into gold.”

<sup>32</sup> Cf. especially chapter 8, beginning: “Thou shouldst know that the elements (*arkān*) of this thing are four: water, oil, fire, and earth. And they become through three different treatments three waters, three oils, three fires, and three earths, each possessing many great and amazing properties. So understand! We will set forth on this theme what is worthy of our book, God willing.”

<sup>33</sup> Cf. for example LXX 53 (f. 185) on the mixture of the water with the fire: “Know that if the water is purified it can be tested with the purified fire; in other words, take eleven dirhams of the first treated water and one dirham of the treated fire, pulverize the fire in a mortar (*ṣalāyat*), then irrigate it with the water gradually so that the fire will become dissolved in the water....It will turn into a red water more beautiful than safflower and kermes. Pour it on what thou desirest so that it will redden it. It will make it either a deep, clear red, or a golden yellow, depending on what it touches.”

	Fire	Earth
1. A school of savants (= partisans of the Sphere)	1	12
2. The partisans of the Sphere, adepts of the natures	4	12
3. A group belonging to the partisans of the natures	3	12
4. Another group	2	12
5. First school of the partisans of the planets	1	7
6. Second school of the partisans of the planets	2	7
7. Third school of the partisans of the planets	3	7
8. The partisans of the natures (our school)	1	4
9. The partisans of truth (those who use reason)	1	3

Another list, indicating the proportions of all four elements in a mixture according to the same schools, is given in LXX 17 (f. 81):

	Fire	Earth	Water	Air
1. The partisans of twelve, i.e. of the Sphere	1	12	3	2
2. The partisans of the seven planets	1	7	6	4
3. The partisans of the proportion 1-3	1	3	12	2
4. The partisans of the four natures	1	4	5	8

After this list, Jābir criticizes the proportions attributed to the partisans of the Sphere (*falakiyya*) and to the partisans of the planets (*aṣḥāb al-kawākib*),<sup>34</sup> giving preference

<sup>34</sup> These critiques may be due to the aversion evident throughout the Corpus with respect to purely astrological speculations.

to those of the *dahriyya*<sup>35</sup> and especially to the partisans of the natures (*aṣḥāb al-tabā'*). In fact, the proportion 1:4:5:8 comes closer than all the others to the constant proportion 1:3:5:8 adopted by Jābir in the *Kutub al-Mawāzīn* as well as in all the subsequent collections of the Corpus. It is curious to observe, however, that the sum of the proportions given in the *Seventy Books* is always 18, while the system of the *Kutub al-Mawāzīn* is based upon the characteristic number 17. Thus, the *Seventy Books*, discussing the best mixture suitable to produce the elixir from the elements and natures, only relates it to the experience and the method of the alchemist, while the information in the *Kutub al-Mawāzīn* rests on certain arithmological speculations establishing *a priori* the constitution of everything in the world. It would be rash to attempt to reconcile these evident contradictions. They seem to us to demonstrate that the two groups of writings do not originate from the same author.

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<sup>35</sup> The appellation *dahriyya*, employed in Muslim Theology to designate the atheistic philosophers, i.e. partisans of the eternity of the world (*dahr*) and of fatalistic astrology, principle adversaries of the *mutakallimūn*, is rarely encountered in Jābir. The *k. al-taṣrīf* (= *Texts*, p. 421, 5) discusses their doctrine of the eternity of the world, and the *k. al-mīzān al-ṣaghīr* mentions them as well as the Manichaeans. None of the known sources attribute to them a predilection for the number three.