
What Is (Was) Alchemy?*

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In Memoriam of our friend Jurek

A serious scientific journal seems to be the wrong place for a paper on alchemy. However, we believe that the history of science includes knowledge of the complex relations between specific scientific disciplines and what is called the “world-view” (Weltanschauung): the image of the world corresponding to a given stage of cultural development. The world-view, born of the “marriage” of Aristotle’s philosophy with Christian theology, was for many centuries largely predominant in Europe of the Middle Ages and of the Renaissance. The “scientific revolution” [1] of the 16–17th centuries: the birth of the “new cosmology” of Copernicus, Galileo, and Kepler and of the “new mechanics” of Galileo and Newton was limited to the physical science, but its direct consequence was the appearance of the “new philosophy”. The mechanistic, rationalist and empirical philosophy of the enlightenment rejected the magic elements of the medieval world-view.

Without actually being directly concerned by new theories or denied by newly discovered facts, a number of disciplines did not survive such changes in the intellectual climate. We will try to show how alchemy, an integral part of the medieval world-view, was doomed to death by the spirit of enlightenment well before its official death which coincided with the appearance of the modern chemistry of Lavoisier and Dalton. Only its phantom is still alive.

A brief history of alchemy

In order to understand alchemy, we must free ourselves from a number of legends. Alchemy was not proto-chemistry. It was not an occult science persecuted by church or state authorities. Neither was it the inheritance of the secret wisdom of Pharaonic Egypt due to Hermes Trismegistes (three times very great) — a fusion of the Egyptian god Thot and the Greek Hermes, considered by some other authors as a sage who lived in Egypt either in the 19th or in the 13th century BC.

Alchemy belongs to a restricted class of “sciences” which were not invented by the Greeks during the classical period. It seems to have appeared only at the beginning of our era in the Hellenistic world, this melting pot of Greek, Egyptian, and oriental philosophies and religions, with Alexandria as its intellectual

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capital. The set of fifteen manuscripts on alchemical, magic, and religious gnostic doctrines attributed to Hermes Trismegistes, known as the *corpus hermeticum* [2] and the famous *tabula smaragdina* (emerald tablet), considered as the summary of all alchemic wisdom, were written between 200 and 300 AD.

After the fall of the Latin Empire, alchemy was practically forgotten in Western Europe and even in Byzantium. In contrast, in the Islamic, Arabian–Persian world alchemy was rediscovered and developed in close relation with metallurgy and medicine. It came back to Western Europe in the 10–12th centuries, mainly through the Spain “of three religions”. Evidence of this path lies in the large number of Arabic words, such as elixir, alembic, or athanor, in alchemical terminology and the deformed names of Islamic scholars in Latin mediaeval manuscripts: Jabir ibn Hayyan (Geber) 720–780, al-Razi (Rhazes) \approx 850–940, ibn Sina (Avicenna) 980–1030 and al-Tohgrai (Artephius) ?–1120.

In the late Middle Ages (12–14th centuries), alchemy was studied by such eminent personalities as Albertus Magnus — Albert von Bollstädt (1193–1280), professor of philosophy and theology at the Universities of Cologne and Paris, or Arnaldus de Villanova (1235–1313), rector of Montpellier University. The alchemical treatise *Aurora Surgens* was attributed to Thomas Aquinas (1226–1275).

Alchemy attained the summit of its career during the Renaissance and Baroque years (1350–1650). It had its place at royal courts, the most famous being that of Emperor Rodolph II (1576–1612) in Prague, but also that of Philip II of Spain (1556–1598). It was protected by the popes. The attitude of the Reformers was also favourable, as shown by this remark by Martin Luther reported in his *Table talks* [3]:

The science of alchymy I like very well, and indeed, 'tis the philosophy of the ancients. I like it not only for the profits it brings in melting metals, in decocting, preparing, extracting and distilling herbs, roots; I like it also for the sake of the allegory and secret signification, which is exceedingly fine, touching the resurrection of the dead at the last day.

Alchemy was in excellent agreement with the intellectual climate of Renaissance Europe which was characterised by unlimited curiosity, a taste for adventurous enterprises and, as the other side of the coin, an absence of criticism which led to superstitious beliefs in magic and witchcraft. Its view of Nature is that of *Magia naturalis*, of mysterious forces acting between all the material and spiritual beings of the world [4].

The decline of alchemy in the 18th century Europe was due to two factors which will be discussed later: its conflict with the rational and critical philosophy of the enlightenment and the dawning of modern chemistry. It almost disappeared when chemistry became a science.

Principles of alchemy

As far as alchemical studies are concerned, we have at our disposal a rich library of manuscripts and books printed during the 15th to 17th centuries. They

are catalogued in Jung's book *Psychology and Alchemy* and on web sites such as <http://www.levity.com/alchemy> or http://www.hdelboy.fr/plan_alchimie. The authors of some of these books are known, others are anonymous. Many of the books were attributed to such famous personalities such as Hermes Trismegistes, Plato, Democritus or St. Thomas Aquinas in order to increase their prestige. Thus, 486 (sic!) alchemic treatises were attributed to Ramon Lull (1235–1315), one of the great medieval scholars.

Among these texts, we must mention the *Corpus hermeticum* brought to Western Europe from Greece in the XIV century, translated into Latin by the Florentine humanist Marcello Ficino and printed already in 1462, and the famous *Emerald tablet (Tabula smaragdina)* alleged to contain the *secretum secretorum* of alchemy. As an example of hermetic language, we reproduce here a translation of the *Tablet* into 17th century English by the famous alchemist . . . Isaac Newton [5]:

- 1) *Tis true without lying, certain & most true.*
- 2) *That wch is below is like that wch is above & that wch is above is like ye wch is below to do ye miracles of one only thing.*
- 3) *And as all things have been & arose from one by ye mediation of one: so all things have their birth from this one thing by adaptation.*
- 4) *The Sun is its father, the moon its mother,*
- 5) *the wind hath carried it in its belly, the earth its nurse.*
- 6) *The father of all perfection in ye whole world is here.*
- 7) *Its force or power is entire if it be converted into earth.*
- 7a) *Seperate thou ye earth from ye fire, ye subtile from the gross sweetly wth great indoustry.*
- 8) *It ascends from ye earth to ye heaven & again it desends to ye earth and receives ye force of things superior & inferior.*
- 9) *By this means you shall have ye glory of ye whole world & thereby all obscurity shall fly from you.*
- 10) *Its force is above all force, for it vanquishes every subtile thing & penetrates every solid thing.*
- 11a) *So was ye world created.*
- 12) *From this are & do come admirable adaptations whereof ye means (Or process) is here in this.*
- 13) *Hence I am called Hermes Trismegist, having the three parts of ye philosophy of ye whole world.*
- 14) *That wch I have said of ye operation of ye Sun is accomplished & ended.*

Alchemic treatises are full of comments giving different and contradictory interpretations of the mystery of the *Tablet*. The obvious conclusion is that we are dealing with something more than a mere description of technical procedures: a magical, esoteric philosophy closely related to proto-chemical “technology”. Its two faces, “material” alchemy and “spiritual” alchemy, are inseparable. We will, nevertheless, be obliged to describe these two faces one after the other.

Material alchemy

One of the key principles of alchemy is the possibility of transmutation of natural substances and, in particular, the transformation of ordinary (base) metals into silver or gold. This project looks absurd to anybody thinking in terms of the atomic structure of chemical elements and compounds, but it was compatible with the image of the material world elaborated by the ancient philosophers and confirmed by the every-day experience of the pre-industrial society.

For Aristotle [6], matter (*hyle*), inert and shapeless by itself, gained its shape and properties by the action of form (*morphe*) which could be expressed by such factors as hot, cold, dry and humid, giving in turn, by their combination, four elements: earth (cold and dry), water (cold and humid), air (hot and humid) and fire (hot and dry). The elements were eternal and indestructible and by *synthesis* (chemical reaction), *mixis* (mechanical mixing) or *krasis* (dissolution) gave birth to different substances whose properties depended solely on the contents of each element. This idea, essential for all of Aristotle's physics was expressed by Empedocles in a beautiful metaphor [7]: *And as when painters . . . take many-coloured pigments to work with, and blend together harmoniously more of one and less of another till they produce likenesses of all things; so let not error overcome thy mind to make thee think there is any other source of mortal things that have likewise come into distinct existence in unspeakable numbers; but know these (elements), for thou didst hear from a god the account of them.*

It followed that, if the metals differed only by their composition, with the proper treatment it had to be possible to transform any base metal into silver and gold. The ancient blacksmiths (metallurgists) knew that grey or greenish *earth* (ore) mixed with *fire* gave a brilliant metallic copper and that the quality of bronze could be improved by changing the copper content in copper–tin alloy. So why not try to “improve” copper or lead in order to obtain pure gold?

This kind of “improvement” was not in contradiction with natural laws. The current belief at that time was that metals hidden underground grew and improved like foetuses in the womb of their mother until they changed into gold [8]. The role of alchemy was to accelerate this process by the quasi-catalytic action of the *philosophical stone*.

In modern (14th to 17th centuries) Western European alchemy, all metals were described as a specific case of Aristotle's four-element “theory”. This “model” was proposed by the Arabian alchemist Jabir ibn Hayyan (Geber) and was widely used in alchemy and medicine by Paracelsus (T. von Hohenheim 1493–1541) and his followers [9]. According to this model, all metals are composed of sulphur, mercury and salt, considered not as chemicals but as “essentials” which may be good (pure) or bad (impure). Mercury is responsible for their metallic character and fusibility whereas sulphur determines their colour and inflammability. Salt is an impurity. Thus gold contains good mercury and good sulphur while in copper, mercury is good but red sulphur is bad. In order to transform copper into gold,

one must separate its essentials, purify sulphur and melt them together [10].

The usual way to carry out such a transformation was by “synthesis” of the philosophical stone (*Lapis philosophorum*) which in spite of its name was not always a solid, but could be either a liquid (*elixir*) or a powder. It is not obvious whether *Lapis* and *elixir* are different names for the same product or two different products. *Lapis (elixir)* projected onto the base metal would transform it into silver or gold and constituted a powerful medicine ensuring longevity or even immortality when projected onto a man.

The production of the *Lapis (the Great Work — Opus magnum)* is a long process involving a number of steps (three to twelve according to different sources) described in different ways by different authors. In order to prepare the *Lapis*, the substrate must be submitted to a whole series of operations, their general rule being: *solve et coagula* — divide and bring together. The substrate (*materia*) was usually a mineral, stibine (antimony sulfide Sb_2S_3) or cinnabar (mercury sulphide HgS), but metals or organic compounds were also applied. For further treatment one could choose either the humid or the dry way. In the first case, the substrate was mixed with corrosive substances (acids, ammonium chloride) in a ceramic container (*philosophical egg* or *aludel*) and heated in a furnace (*athanor*). In the latter case, the mixture was melted in a crucible put in the flame.

The aim of the whole work was to separate solid and volatile fractions of the *materia prima*, purify each of them and then bring them together. In most recipes, one can differentiate three stages in the process characterized by three colours: black, white and red.

- the first of them — the work in black (*nigredo*) represented by the head of a raven corresponds to the “death” of the *materia (calcinatio)* followed by separation (*putrefactio*) of its different fractions.
- the work in white (*albedo*) consists of the purification (*olutio*) and separation of the purified components (*distillatio*). The shining white matter may be used for the transmutation of metals into silver.
- the final stage — the work in red (*rubedo*) involves the reunification of the separated and purified components (*coniunctio oppositorum*). The matter becomes multicolour (this step is called *rainbow* or *peacock tail*) and then turns to red. The last step is the triumph (*sublimatio*) indicating the formation of the *Lapis*, the symbol of which is a *hermaphrodite*.

This is the basic scheme of the work but important deviations from this scheme are current in the alchemic recipes.

Spiritual alchemy

The purpose of the alchemic operation (*Opus alchymicum*) is much more ambitious than a simple chemical reaction. In any case, in the world of alchemy, all parts of the universe are so strongly interrelated that everything can influence

and be influenced by everything else. Each human action to some extent modifies the whole world. In medieval theology, the earth (and not only human nature) is corrupted by the Original Sin of the first parents; this conviction was based on several statements contained in *Genesis* [11]:

cursed is the ground for thy sake; in sorrow. . . ; thorns also and thistles shall it bring forth to thee

and in the letters of St. Paul [12]:

For the earnest expectation of the creature waiteth for the manifestation of the sons of God. For the creature was made subject to vanity, not willingly, but by reason of him who hath subjected the same in hope. Because the creature itself also shall be delivered from the bondage of corruption. . .

The aim of the *Opus* is to restore the initial health of nature, and the gold obtained in this operation is just a sign, a symbol of this “resurrection”. Many alchemic texts insist on the analogy between *Lapis philosophorum* and Christ the Redemptor. Since the relation between *Lapis* and the alchemist is particularly strong, the success of the *Opus* transforms a simple craftsman (*artifex*) into an initiate (*adept*). According to Michael Maier [13], *our chemistry stirs up the artifex to a meditation of the heavenly good. . . so that . . . he feels himself as it were new born*. In close contact with the *Lapis*, the body and the soul of the adept acquire the “quality of gold”.

Because of the strength of interrelation between the different parts of the universe, the success of the *Opus* in turn depends on the positions of the stars and planets at different stages in the operation, but also on a large number of factors which are not known. Because of these unknowns, the success or failure of the project cannot be predicted. From this point of view, the *Opus* is completely different from the scientific experiment, which is supposed to be reproducible in unchanged conditions.

Obviously, the moral factor, the purity of the alchemist’s soul, is the essential condition for the realization of the work; religious and spiritual exercise is thus necessary and, for this reason, the alchemist’s laboratory usually contains an oratory with an altar for ritual prayers.

Rosarium Philosophorum

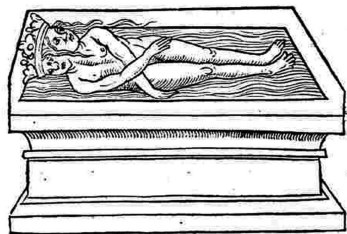
Instead of a review of different alchemical treatises, we prefer here to make a brief presentation of one of them, the famous *Rosarium Philosophorum* attributed to Arnaldus de Villanova and published in Frankfurt/Main in 1550. Rather than the original, we will discuss its summary *Collectanea Lacinii* [10] (all quotations are taken from it) and focus our attention on the set of 20 beautiful engravings discussed by Jung [14], McLean [15], and Voss [16]. They illustrate the “material” *Opus* of extraction of the *Lapis* from gold and silver by a story involving the Solar King and the Lunar Queen. It must be kept in mind that, in the world-view of *Magia naturalis*, close relations existed between metals and “planets”,

the sun being closely related to gold and the moon to silver. According to the *Emerald tablet: The Sun is its father, the Moon its mother*. In one of the first engravings, we see the King and Queen accompanied by a dove, which plays the role of intermediary in the *Opus* (Fig. 1).



Silver and gold are dissolved in mercury: *because bodies when dissolved become spiritual... the solution of the body means coagulation of the spirit*. This action is represented by the bathing of the Royal Couple in the *philosophical fountain*. In contrast to the current scheme, *Coniunctio sive Coitus*, represented by their sexual embrace (Fig. 2), takes place at the beginning and is followed by the purification of the black body corresponding to the *nigredo* stage and represented by the Couple merged into one body with a single crown (Fig. 3) and apparently dead (*conceptio sive putrefactio*). The black body is then divided into solid and volatile parts and purified by a series of operations for the *removal of all that is black, corrupt and fetid...* These are defined as follows: *Solution is of the gross into the subtle. Purification is of the dark into the bright, Reduction is of the humid into the dry...* and so on. Purification is represented in the next figures (Figs. 4 to 6), showing the King's soul rising to heaven, the rain washing the bodies and the soul returning from the clouds to join and resuscitate the double body. A further symbol is the death and resurrection of the dove, shown in the bottom of Fig. 6. The result of these operations is the *white elixir* (albedo) represented by the naked, winged lunar hermaphrodite standing on the crescent moon between the lunar tree and the dove (Fig. 7).

PHILOSOPHORVM.
CONCEPTIO SEV PVTRE
factio



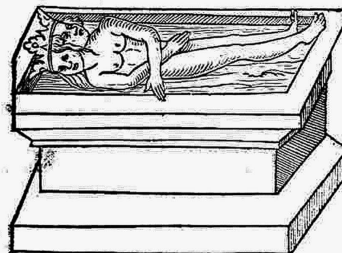
Soye ligen könig vnd künigin dot/
 Die sele scheydt sich mit grosser not.

ARISTOTELES REX ET
Philosophus.

Nunquam vidi aliquod animatum crescere
 sine putrefactione, nisi autem fiat putridum
 inuanum erit opus alchemicum.

*icy gissent de
 la veine, Pas
 sejourner ainsi
 brannant de*

ROSARIVM
ANIMÆ EXTRACTIO VEL
impregnatio.



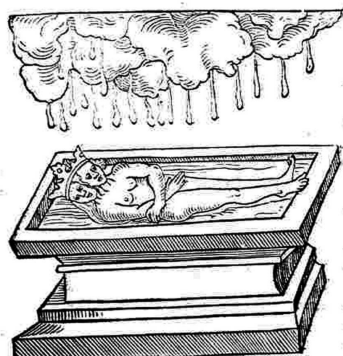
Soye teylen sich die vier element/
 Aus dem leyb scheydt sich die sele behende.

*icy se despartent les quatre elements
 et l'ame sort du corps subitement*

De 4

3

PHILOSOPHORVM
ABLVTIO VEL
Mundificatio.



Sie salt her Tamo von Himmel herab/
 Vnd wäscht den schwarzen leyb im grab ab-

5

*icy tremble verser en ciel en bas
 et l'ame les corps noirs dans la fosse*

K III

PHILOSOPHORVM
ANIMÆ IVBILATIO SEV
Ortus seu Sublimatio.



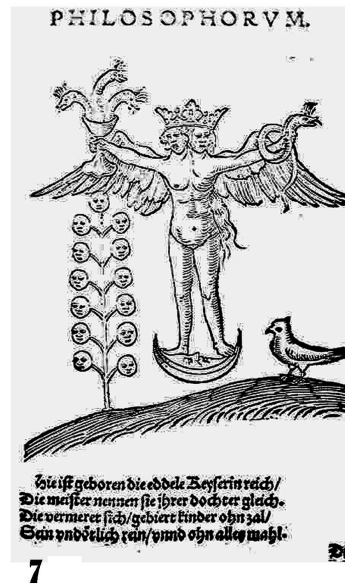
Sie schwingt sich die sele herndder/
 Vnd erquicket den gereinigten leyb nam wider-

*icy l'ame redescend en bas et ravige
 l'ame le corps redige*

6

The whole operation is then repeated in a slightly modified way and the *rubedo* stage is reached: the solar hermaphrodite (*the child of the work*), in ceremonial dress, is surrounded by the solar tree, the lion and the pelican, symbol of the charity (Fig. 8). The last figure represents the resurrection of Christ, a clear reference to the Christ — *Lapis* analogy.

Rosarium shows how close the relation is between the techniques of material alchemy and the philosophy of spiritual alchemy.



Alchemy as science — alchemy as magic

The technology of material alchemy is not essentially different from chemical practice and some of the by-products of alchemical experiments constitute important discoveries. One can thus wonder whether alchemy was anything other than the early stage of development of chemical science.

From the beginning of this paper, we have laid stress on the perfect agreement between material alchemy and the overall world-view originating from Aristotle's physics and maintained until the scientific revolution of 16–17th centuries. In a world built by the mixing of the same four elements in different proportions, the transmutation of metals was quite a realistic project. It must be noted that alchemy was never in competition with any other more rational theory or technique, it was as "scientific" as Aristotle's physics and astronomy.

There are, however, fundamental differences between alchemy and modern chemistry:

- the modern chemist tries, as far as possible, to isolate the system under study from the remaining parts of the world and to fix all the parameters in order to get a quantitative answer which will confirm or deny his theory. In these conditions, the theory is falsifiable, which is the usual criterium of its scientific status [17]. Such a criterium cannot be satisfied by the alchemist who believes in the infinite chain of interrelations between all material and spiritual beings in the world so that it is impossible to isolate any fraction of it from the others.

- in view of the interrelations between the infinite number of processes occurring simultaneously in the universe, the conditions of an alchemic experiment cannot be defined and reproduced. The fundamental requirement of experimental science, that of the reproducibility of experiments performed in identical conditions, is therefore meaningless in the alchemic world. Even when all experiments give negative results for many centuries, their failure does not mean that the theory is wrong. It means only that some mysterious factor was systematically but accidentally unfavourable when the previous operations were attempted. The alchemist will thus repeat the same procedure many times in the hope that something will change in the universe so that his next attempts will be successful. This hope will be further reinforced if he believes that somebody in the past realized the *Opus*. No modern scientist would be so patient! He would certainly try to understand the reasons for his misfortune and would question the validity of his theory.
- the modern chemist tries to define the area of validity of his theory deduced from an experiment involving a limited class of systems. The ambition of the alchemist is to formulate general laws which govern the whole universe. He believes in the analogy between the micro- and macro-cosmos which allows extrapolation of the results of his experiments to an extended class of phenomena.
- the alchemist considers himself as a part of the system under study so that the success of the *Opus* depends not only on its material parameters but also on the soul and spirit of the “operator”. In the modern methodology, the “operator” does not faithfully follow or accelerate the predetermined course of Nature. He regards Nature as a simple “object” of his empirical and rational investigation.

All these features — inseparability of material and spiritual factors, interrelations between apparently non-related phenomena, analogy used as a logical argument, the operator as a part of the process under study — are characteristic of the world-view of magic and esoterism [18] and have no place in the scientific view of the world. In spite of similar experimental techniques, alchemy and chemistry belong to two different intellectual formations.

Decline of alchemy

The decline of alchemy in 18th century Europe is mainly due to its conflict with the rationalistic, empirical philosophy of enlightenment. Mysterious interrelations between all parts of the world have no place in the mechanistic view of the material world introduced by Descartes and Gassendi. According to Jung [19]: *Its method of explanation, obscurum per obscurius, ignotum par ignotius... was incompatible with the spirit of enlightenment... but this conflict... only gave le coup de grace to alchemy. Its inner decay began at least a century earlier ... when*

many alchemists deserted their alembics and melting pots and devoted themselves entirely to the (Hermetic) philosophy. . . [which] lost the empirical ground under its feet and aspired to bombastic allegories and insane speculations. . .

The bond between material and spiritual aspects of alchemy, essential for the traditional world-view, was now broken. After this divorce, material alchemy became proto-chemistry. There was no revolution and there were no important discoveries: the ideas of modern chemical science germinated within the body of alchemy as a re-interpretation of ancient knowledge. It is interesting to follow how the first true chemical theory (wrong but important as a first step) was built: sulphur (one of three “essentials” of each metal in alchemy) was considered by Johann Becher (1635–1682) as “inflammable earth” and for Georg Stahl (1660–1734) became “phlogiston” — a component of each inflammable body lost when the body is burned. At the same time, the *Skeptical Chymist* (1661) by Robert Boyle contains the first definitions of the chemical compound as opposed to mechanical mixtures.

Nevertheless, alchemy resisted. Robert Boyle, one of the fathers of modern chemistry, was an alchemist and Isaac Newton spent more time reading alchemic treatises and performing alchemic experiments than on elaborating the whole of Newtonian new physics [5]. Until the end of 18th century, the pioneers of “pneumatical chemistry” (Priestley, Cavendish, Scheele) classified the gases obtained in chemical experiments not as chemical elements or compounds but as modifications of the element Air: “air of fire” or “deflogisticated air” (oxygen), “nitrous air” (nitric oxide) or “inflammable air” (hydrogen).

Alchemy disappeared when chemistry became a true science deducing general laws from quantitative measurements. Condemned to death as incompatible with this new science, alchemy survived in the margins of modern culture. It found asylum in esoteric sects such as the Rosicrucian movement and in the mystic tendencies of freemasonry until it reappeared as a part of the “post-modern” antiscientific trend of the 20th century.

“Modern” alchemy

After a long period of lethargy, interest in alchemy reappeared within the mainstream of occultism and theosophy represented by Helen P. Blawatsky (1831–1891), founder of the Theosophical Society and, in France, by Albert Poisson (1865–1894) and Emile Grillo de Givry (?–1929), who published several books on the history of occult sciences but also practiced material alchemy. Later still, a mysterious person, whose real name has not been identified, published under the name of Fulcanelli the books about alchemic symbols in XV century churches and castles: *Le mystère des cathédrales* (1926) and *Les Demeures philosophales* (1930). He claimed to be an *adept* who some centuries before had carried out the *Opus magnum* and gained extraordinary longevity.

Small groups of active alchemists still exist, have their web sites such as <http://www.dmoz.fr> and <http://www.orifaber.com>, their reviews (*Chrysopœia* in

France) and their editors such as *Arbre d'or*, which recently published *Traité de l'Elixir* by J. Nobs.

Several representatives of the antimaterialistic tendencies in anthropology (Mircea Eliade) and psychology (Carl Jung and his followers such as Marie-Louise von Frantz) returned to spiritual alchemy, to its philosophy and to its language. Under the charm of alchemy, some historians (such as Serge Hutin [20] and René Alleau [21] in France, for example) tried to convince themselves that several famous alchemists had succeeded in carrying out transmutation owing to their knowledge of natural forces not known to the modern science.

The discovery of nuclear reactions opened the gate to speculations about “nuclear alchemy” used by ancient adepts. Obviously, “nuclear transmutations” could not be realized with the technology at the disposal of alchemists, even if they can now be carried out on a microscopic scale. Let us give an example: a single isotope of mercury, necessary for optical-pumping experiments, was prepared from gold by “reverse alchemy”, less expensive than the separation of Hg isotopes. Only one isotope of gold ${}_{79}\text{Au}^{197}$ is stable and yields in the reaction ${}_{79}\text{Au}^{197}(\text{n},\gamma) {}_{79}\text{Au}^{198}$ the β^- radioactive 198 gold isotope which decays with formation of a single ${}_{80}\text{Hg}^{198}$ isotope of mercury. After six months' irradiation of a sample of gold in a nuclear reactor, 0.02% percent of its mass was transformed into mercury [22]. The efficiency of nuclear alchemy is much too low for any wider practical applications.

It is interesting to note how the place occupied by alchemy in our modern world is restricted compared to that of astrology, which not only remains an important component of the popular world-view but is also the object of serious investigations. This difference merits a detailed study, but it seems to us that one of the important reasons is the difference between the characters of the “orphans” left after the separation of the alchemy–chemistry and astrology–astronomy Siamese twins. Chemistry was unable to produce the philosophical stone or the elixir of immortality, but its successes in the field of medicine and the invention of new products changing everyday life are highly appreciated. One can thus abandon alchemic dreams for chemical reality.

On the other hand, the successes of astronomy and astrophysics are amazing, but their influence on the human condition is limited and they do not offer what astrology promised to give, namely the knowledge of our character and of our future. No scientific or pseudo-scientific discipline is able to replace astrology as a false key (but still a key) to human souls and destinies.

Conclusion

We have tried to show that alchemy was an integral part of the world-view born at the beginning of our era from the marriage between Christian theology and Greek philosophy. Its philosophy of nature was a compound of scientific and magic elements. This view was incompatible with the new world-image originating

from the scientific revolution of the 16–18th centuries which rejected the spiritual aspects of alchemy and triggered its decline. Alchemy did not survive the rise of the modern chemistry of Lavoisier and Dalton.

Alchemy's long life was not in vain; alchemy prepared the ground on which chemistry was built: chemistry inherited its knowledge of a number of chemical compounds and reactions as well as a wide range of experimental techniques which remained practically unchanged until the introduction of physical methods in 20th century chemistry.

Acknowledgments

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