Alchemy and Alchemists

John Read, FRC

Professor of Chemistry in the University of St. Andrews, Scotland. *(Reprinted from* Nature, *Vol. 168, P. 759, November 3, 1951). This article was originally from a discourse delivered on August 10th, 1951 to the British Association of the Advancement of Science meeting at Edinburgh.*

Most people who think about alchemy in the present age (and there are not many who do) regard it as the pretended art of transmuting base metals, such as lead, into the noble ones, silver and gold. Liebig held the view that alchemy was never anything else but chemistry; from this point of view one may look upon alchemy as the chemistry of the Middle Ages. In its widest and truest significance, however, alchemy was a grandiose philosophical system which aimed at penetrating the mysteries of creation and of life; it sought to place the microcosm of humanity in adjustment with the macrocosm of the universe; the transmutation of one form of inanimate matter into another was merely an incidental alchemical goal.

The more one studies alchemy, the more complex it appears. It was, indeed, a vast network of rudimentary chemistry, interwoven with philosophy, astrology, mysticism, theosophy, magic, and many other strands. The associations of alchemy with religion and with psychology still offer wide fields of study; in recent years C. G. Jung, in particular, has expressed the opinion that alchemy is no less important to psychology than to chemistry.

Alchemy endured for more than a millennium, that is to say, from at least early Christian times until the end of the seventeenth century. But alchemy has long been outmoded, and so there is little realization at the present day of the extent to which alchemical conceptions and imagery permeated the thought and art of the Middle Ages.

Sketched in broad outline, the fundamental ideas of alchemy were: first, that all forms of matter are one in origin; second, that these forms are produced by evolutionary processes; third, that matter has a common soul which alone is permanent. The body, our outward form, being merely a mode of manifestation of the soul, is transitory and may be transmuted. Here are views which in their essentials bear a remarkable resemblance to those of modern physical science. Indeed, in this twentieth century "modern alchemy," as Lord Rutherford called it, has shown the possibility of bringing about many transmutations of elements.

Alchemical reasoning was mainly deductive and based on two *a priori* assumptions: first, the unity of matter; second, the existence of a potent transmuting agent, known as the Philosopher's Stone. From the postulate of the unity of matter it followed that this medicine of the metals became also the medicine of humans. In this guise the Philosopher's Stone was known as the *Elixir Vitae*, or Elixir of Life.

From this summary it should be clear that alchemy was much more than an experimental science. It was a philosophical system. In their true significance, the efforts made by the adepts to transmute metals were attempts to prove the truth of the broad philosophical system of alchemy by means of material experiments.

Origin of Alchemy

The universal patron adopted by the alchemists from early times and throughout the Middle Ages was Hermes Trismegistus, or Hermes the Thrice-Great. In this Greek equivalent of the Egyptian Thoth, the deified intellect, the alchemical fraternity recognized the father of the Hermetic Art and the author of the Emerald Table. The thirteen precepts of this Table formed the articles of association of the so-called "Sons of Hermes": it laid down in cryptic language the guiding principles of their creed.

Thoth, as depicted in ancient Egyptian temples, was sometimes shown with the *crux ansata* (the symbol of life) in the right hand, and a staff in the left. Linked with the staff were a serpent, a scorpion, a hawks's head, a circle, and an asp. Each of these representations had its particular symbolical meaning. Such symbolism was later characteristic of alchemy; and even modern chemistry, the daughter of alchemy, is to a large extent a science of symbols.

The origin of alchemy has often been ascribed to Egypt, otherwise known as Khem, the Biblical Land of Ham. Sometimes it has been supposed that alchemy arose farther to the east, in Chaldea, or even in China. The Chaldeans, as exponents of astrology, associated the Sun, moon and planets with specific metals and also with human organs and destinies. Still farther east, in ancient China, alchemical ideas may be traced as early as the fifth century BCE in the comprehensive religious and philosophical system known as Daoism. Much later, in the second century CE, Wei Po-Yang, "the father of Chinese alchemy," wrote the first treatise in Chinese dealing with alchemy, in which he described the preparation of the "pill of immortality," otherwise the *Elixir Vitae*.

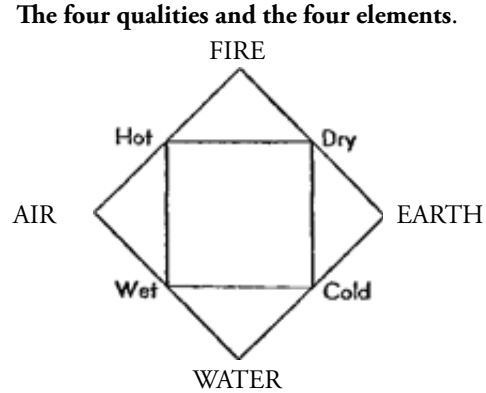
The ultimate origin of alchemy is thus a vexed question. There is little doubt, however, that alchemical knowledge and ideas were gathered from the ancient civilizations of Egypt, Babylonia, India, and China, and brought to a focus in Greece. From Greece this corpus of alchemy was transmitted to Islam, mainly through Syria and Persia. Eventually the accumulated knowledge of the Muslim alchemists, drawn from these various sources and augmented in its passage through Islam, was brought into Western Europe, chiefly through Spain.

Alchemical Theory

Alchemy, like modern science, had its guiding theoretical principles. The fundamental theory of alchemy was that of the Four Qualities and Four Elements, often represented in the diagram formed of an outer and an inner square.

The corners of the outer square carry the names of the four elements: fire, earth, water, and air. The corners of the inner square, situated at the mid-points of the sides of the outer square, are allocated to the four fundamental qualities: the hot, the dry, the cold, and the wet. The diagram shows that fire is hot and dry; earth, dry and cold; water, cold and wet; air, wet and hot. These four elements may also be looked upon as representing energy (fire) and the solid, liquid, and gaseous states of the aggregation of matter (earth, water, air).

The four qualities and the four elements.



This theory, usually ascribed to Aristotle, may be traced in Egypt and India as far back as 1500 BCE. It is the oldest theory of physical science, and it was very widely held, in one form or another, over a long period. It bears out the statement that "there is a great oneness in the human mind in the matter of broad principle in crude cosmical ideas."

According to the theory, water—one of the four elements of the material world—is an embodiment of cold and wet qualities. When the cold quality is replaced by the hot one, the element water is changed into the element air, embodying the wet and hot qualities. The idea of transmutation is thus implicit in the theory. Nowadays, of course, this process is viewed simply as a change of liquid water through the agency of heat into the gaseous form of the same substance, and there is no question of transmutation.

In essence, this ancient theory is based upon a primitive mode of thinking sometimes known as the Doctrine of the Two Contraries. This is dependent upon the recognition of a distinction between opposites, such as cold and hot, dry and wet. An apposition of outstanding importance in alchemy was that of the two opposed, or contrary, elements—fire and water. These two opposites came to light in a new guise in the sulphur-mercury theory of the metals, which seems to have been propounded by the Muslim alchemists in the ninth century CE.

The principle here known as "sulfur" was essentially an embodiment of combustibility, and "mercury" denoted the mineral spirit of metals and also liquidity or fusibility. It was held that when these two natural principles, engendered in the bowels of the earth, came together in a state of purity the result was gold; if they were slightly impure they gave silver; if they were markedly impure they furnished only the baser metals. Beyond this, it was supposed that in states of superfine purity they could give rise to something so much purer than ordinary gold that a small amount of this product (the Philosopher's Stone) would be able to transmute a very large quantity of a base metal into gold of ordinary purity.

The chief experimental task of the alchemical adept was to imitate, and even surpass, Nature in accomplishing such changes.

In the cryptic expression and symbolic representation of alchemy, sophic sulphur and sophic mercury (as the two principles were often called) assumed many forms. For example, they were known as Osiris and Isis, Sun and moon, Sol and Luna, brother and sister, masculine and feminine, active and passive, giver and receiver, fixed and volatile, wingless lion and winged lioness, and so forth.

It was supposed by the esoteric alchemists, or adepts, that the pure "seeds" of gold and silver (or quick-silver) could be extracted from these metals in the form of sophic sulphur and sophic mercury. These "seeds" cold then be combined, often in a liquid menstruum, to yield the Philosopher's Stone. The succession of the processes here concerned was known as the Great Work, leading to the preparation of the Philosopher's Stone, or Grand Magisterium. The Stone, resulting from the union of masculine and feminine principles, was often symbolized as an infant.

According to these views, in order to prepare the Philosopher's Stone an initial quantity of gold was necessary. The Stone (often described as a red powder) could then be used to convert base metals into more gold, so that the original gold was "multiplied," as the alchemists used to say. One of their favorite metals for "multiplication" was mercury and this choice has been curiously vindicated by modern observations that gold can indeed be produced by transmutation

The Alchemist. H. Spencer Lewis, FRC.

from mercury, although only in excessively minute amounts and at great cost.

In modern parlance it would be correct to call the Philosopher's Stone a catalyst. Here again the alchemists are vindicated; for what more potent catalyst could be imagined than the neutrons which start and maintain the explosive disintegration of uranium-235 into other elements? "Everything possible to be believ'd," wrote the English poet and mystic, William Blake, "is an image of truth… What is now proved was once only imagin'd."

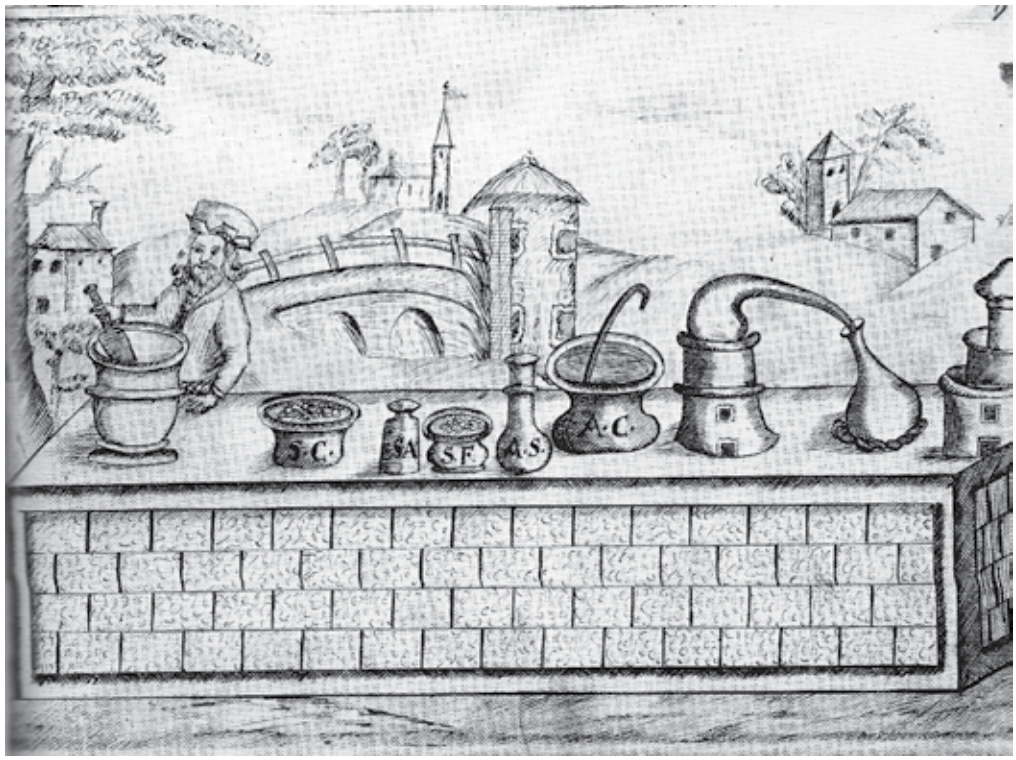
Alchemical literature abounds in cryptic descriptions and pictorial representations of the blending of sophic sulphur and sophic mercury in the synthesis of the Stone. For example, a wingless lion and winged lioness are shown in playful conflict, with a watery background (representing the liquid menstruum, or Hermetic Stream); an alchemist is depicted in the act of balancing equal weights of fire and water; the Hermetic Androgyne—half man, half woman—stands above a dragon, signifying the menstruum.

Incidents from the Bible and from classical mythology were also freely adapted to alchemical ends. Thus, in an illustrated manuscript in the St. Andrews collection, the birth of Eve from Adam's rib, with the Serpent as onlooker, is depicted to symbolize the same fundamental idea as the Hermetic Androgyne. As an example of another kind, taken from a different source, Apollo and Artemis, with the terrorizing serpent of Juno, are selected from classical mythology in order to furnish a further pictorial illustration of the same conception. Some alchemists went so far as to insist that the whole corpus of classical mythology was nothing more than a complex medium designed expressly to record alchemical truths in concealed allegories and "abstract riddles of our Stone," as Ben Jonson phrased it in his play, *The Alchemist* (1612).

Alchemical Symbolism

Pictorial symbolism is an ingredient of the first importance in alchemy. Many of the designs were characterized by color schemes suggestive of heraldry. Among medieval examples, the so-called "figures of Abraham the Jew," dating from the early years of the fifteenth century, were held in great reverence by alchemists of succeeding ages. These figures were ascribed to Nicolas Flamel, a Parisian alchemist of great repute; they took the form of a series of elaborate frescoes, decorating the arcade of the churchyard of the Innocents in Paris. The designs, executed in color, were capable of a dual alchemical and religious interpretation. The Biblical story of the massacre of the innocents by King Herod formed a central feature of the series. Herod was pictured as "a King with a great Fauchion." Mothers were shown in the act of weeping "at the feet of the unpitiful Soldiers; the blood of which Infants was put in a great vessel, wherein the Sun and Moon came to bathe themselves." In other words, infants' blood was merely a cryptic representation of the liquid menstruum which was supposed to aid in the conjunction of sophic sulphur and sophic mercury.

As another example, an illustration entitled the *First Key of Basil Valentine* (ca. 1600) shows a king and queen as the central feature. Below the king a wolf leaps over a heated crucible, and near the queen an old man with a wooden leg manipulates a scythe around a cupel. An accompanying "explanation" directs the operator: "Take a fierce grey Wolf. Cast to him the body of the King, and when he has devoured it, burn him entirely to ashes in a great fire. By this process the King will be liberated; and when it has been performed thrice the Lion has overcome the Wolf, who will find nothing more to devour in him. Thus our body has been made fit for the first state of our Work."



The alchemical wolf, *lupus metallorum*, was "antimony" (stibnite, or native antimony sulphide), used in the heated crucible as an agent for purifying gold, since it "devoured" traces of metallic impurities. The wooden-legged ancient signified Saturn, that is to say, either the slow-moving planet of that name or the dull, heavy metal, lead. The scythe, like other sharp implements, symbolized fire. This part of the design therefore represents the cupellation of argentiferous lead, furnishing pure silver. In brief, the First Key of Basilius shows how to begin the preparation of sophic sulphur and sophic mercury, in readiness for the next operation of the Great Work.

Probably the finest artistic examples of the avowed symbolism of alchemy are the beautiful copper-engravings of Johannes Theodorus de Bry and his associates; these occur notably in various alchemical works of Count Michael Maier, such as *Atalanta Fugiens* and *Symbola Aureae Mensae*, published at Oppenheim and Frankfurt during 1617-18. These plates are boldly engraved; textures are conveyed by different systems of shading; human figures are drawn forcefully and correctly; the compositions have an effect of brilliance and solidity, enhanced by strong modeling and shadows.

Apart from such *ad hoc* pictorial representations of alchemical tenets, a strong alchemical influence pervaded much of the art of the Middle Ages. It found expression repeatedly in the painting, decorative architecture, sculpture, and colored glass of this era. Alchemical ideas and symbolism may be traced in detail, for example, in the work of such artists as Durer, Cranach, Giorgione, and Campagnola. It may even be claimed that every detail in Durer's masterpiece of engraving, *Melencolia* (1514), is capable of an alchemical interpretation: the doctrine of melancholy is inseparably bound up with the Saturn mysticism which permeates alchemy.[1]

Decline of Alchemy

The outstanding practical aim of alchemy until the sixteenth century was the transmutation of base metals into gold, whether from purely philosophical or

mercenary motives. Early in the sixteenth century Paracelsus endeavored to give a new direction to operative alchemy by insisting that its main goal should be the healing of disease rather than the making of gold. He envisaged alchemy as a handmaid of medicine, to be applied in the preparation of chemical remedies of mineral origin. He sought to liberate medicine from the obsession of the ancient Galenic order, and in this sense he takes rank beside such contemporaries as Luther, Copernicus, and Columbus as an emancipator of humanity from the trammels of authority. The ensuing period of iatro-chemistry or medico-chemistry, lasting until the eighteenth century, witnessed a slow decline of the old alchemy.

Paracelsus was essentially a reformer and propagandist of the Renaissance. His chief contribution to alchemy was his modification of the sulphur-mercury theory by the introduction of a third principle which he named salt. In his system of the *tria prima*, or three hypostatical principles, sulphur, mercury, and salt stood materially for inflammability, metallicity, and uninflammability (fixidity) and mystically for the soul, spirit, and body of human beings. The second half of the seventeenth century found both the old alchemy and iatro-chemistry on the wane. Despite their excesses, both the alchemists and the iatro-chemists had done a great deal to accumulate chemical knowledge and to prepare the way for the incipient science of chemistry which was to arise in the second half of the eighteenth century.

It is sometimes held that the publication of *The Sceptical Chymist*, by Robert Boyle in 1661, heralded the end of alchemy. It is true that Boyle dismissed to his own satisfaction in this famous book the systems of the four elements and the *tria prima* and put forward the modern idea of an element; but the emergence of modern chemistry had to wait for more than another century. During this Indian summer of alchemy the stage was held by the Theory of Phlogiston, while the four elements and the three hypostatical principles hovered behind the scenes like ghosts reluctant to be laid…Phlogiston melted finally "into air, into thin air" with the discovery, in the second half of the eighteenth century, of the chemical composition of the ancient "elements" air and water and of the true nature of combustion. These discoveries ushered in the era of modern chemistry.[2]

Types of Alchemists

The term alchemist has been used throughout the ages to denote many kinds of people, with a real or professed knowledge of alchemy. These ranged from impostors and charlatans having no claim to the title, through puffers (souffleurs), goldmakers, skilled practicants, and scholastic philosophers, to adepts and religious mystics…

Scotland figures a good deal in the history of alchemy. Also in Scotland there are some outstanding collections of alchemical literature, particularly the Ferguson and James Young Collections in Glasgow, and others in St. Andrews, Edinburgh, and Aberdeen. A century after Damian's exploit, Scotland produced a mysterious itinerant goldmaker in the person of Alexander Seton, otherwise known as "The Cosmopolite." He has also been called "the chief martyr of alchemy"; for his dramatic career is said to have ended in tragedy at Cracow in 1604, as a result of his experiences in the torture chamber of the Elector of Saxony at Dresden.[3]

The numerous paintings of alchemists and alchemical interiors, notably by Brueghel, Stradanus, Teniers, Steen, Wijck, and other artists of the Low Countries, are mainly concerned with alchemists of the kinds that have been mentioned.[4] Such

genre representations of these painters and of artists in Italy, Spain, Germany, and other countries, are of great interest and value to historical science.

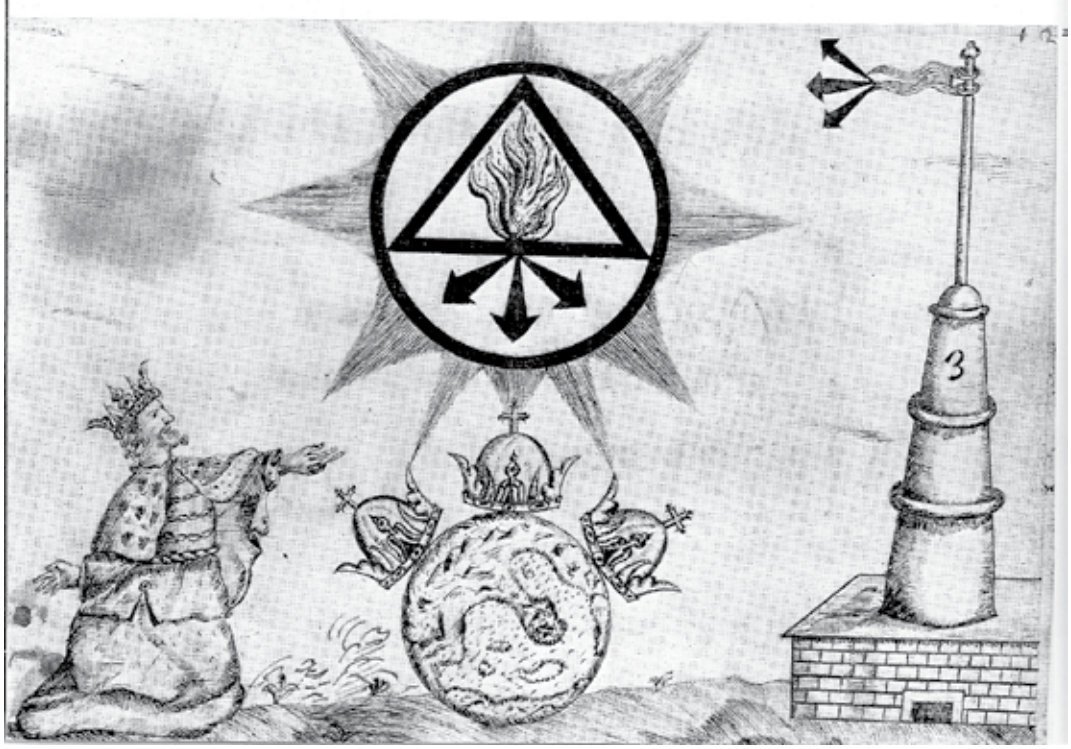
Alchemists of a severely practical type, who were interested chiefly in chemical phenomena and in the discovery and application of new substances and processes, are typified by such men as Brunschwick, Agricola, Libavius, and Glauber; the scholastic philosophers by Roger Bacon and Albertus Magnus; and the religious mystics, who viewed alchemy as "the Divine Art," by Ripley and Khunrath.

Alchemical Music

Among the mystical alchemists, Count Michael Maier calls for special mention. He was physician, private secretary, and alchemist to the Emperor Rudolph II (the so-called "German Hermes") at Prague, early in the seventeenth century. A man of many accomplishments, Maier was also a philosopher, mystic, classical scholar and musician. He was a voluminous writer of great credulity, and he carried to extremes the alchemical interpretation of Egyptian and classical mythology. This subject forms the chief theme of his *Atalanta Fugiens* (1618), a quaint and fascinating work handsomely embellished with fifty copper-engravings by de Bry and his school. Each engraving is provided with a cryptic title and a Latin epigram written in elegiac couplets. Each epigram is set to music, in the form of so-called *fugues*, which are in reality canons in two parts against a repeated *canto fermo*. In allusion to the classical legend, these three parts are termed, "Atalanta, or the fleeing voice," "Hippomenes, or the pursuing voice," and "The apple in the path, or the delaying voice."

Presumably, in view of the alchemical belief in the beneficent influence of music, the final processes of the Great Work, carried out in the sealed Vessel of Hermes and directed by prayer as well as by chemical and astrological influences were sometimes undertaken to the accompaniment of musical chants or incantations. To the religious mystics among the alchemists these processes would partake of the nature of a religious ritual, and it would be natural for them to introduce music from one of these closely related activities to the other. It must be emphasized also that alchemical theories and ideas came largely from ancient Greece, and that the alchemists followed Pythagoras and Plato in ascribing a particular importance to number and harmony in the interpretation of Nature and the universe.

In 1935, some of these alchemical canons[5] were sung in public for the first time by members of the St. Andrews University choir, at the Royal Institution in London. Fuga XVIII may be mentioned as typical: "Whatever active principle there is in nature, it sends out its force in all directions and loves to multiply the same." It is of interest that some manuscript notes of *Atalanta Fugiens* made by Sir Isaac Newton, and now in the St. Andrews collection, bear a special mark of emphasis beside this particular epigram.



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1. For a detailed alchemical interpretation of Durer's *Melencolia* see *The Alchemist in Life. Literature and Art*, 57-62 (London and Edinburgh, 1947).
2. Op. cit., pp. 8-9.
3. A detailed account of Seton, and of his rescuer and successor. Sendivogius is given *in Humour and Humanism in Chemistry,* 37-65 (London 1947). The same work also deals fully with James IV and Damian (pp. 16-36).
4. Alchemical paintings by artists of the Low Countries and others are reproduced in the work mentioned under (i) above.
5. Some of Maier's alchemical music is reproduced in *Prelude to Chemistry* (London, 1936; 2nd edit., 1939; and New York, 1937).