VI

ALCHEMY

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Introduction

The word *alchemy* is derived from the Arabic *alkimya,* which consists of *al* 'the' and a pre-Arabic noun, probably Egyptian *kamt, quemt,* or *chemi,* all of which seem to mean "black" or "black stuff" and could refer to the mud of the Nile, but apparently also to a black powder produced from quicksilver in a metal-manufacturing process developed in Egypt. At one time this particular powder was thought to be the basic substance of all metals.

Alchemy, the forerunner of chemistry, was an occult philosophy or science that sought to bring the macrocosm (the universe) into a close relationship with the microcosm (the human being). It was based on the law of cosmic sympathy and contained elements of astrology, mysticism, religion, and theosophy. A good deal of ancient alchemy is scientific in the modern sense of the word and highly technical in nature. Special apparatuses were constructed and applied under conditions that are reminiscent of modern research. But the ultimate goals of alchemy were not always "scientific" from the present-day point of view. Whatever important discoveries were made seem to have been more or less accidental and were not always fully recognized. Some were even kept secret, then forgotten, and had to be discovered again centuries later.

The main purposes of alchemy were the transmutation of baser metals into silver and gold, the creation of an elixir of life to prolong it, and the creation of a human being (*homunculus*). All these were useful, negotiable achievements that could give enormous power and wealth to the alchemist or to the king who employed him. At the same time, the alchemist seems to have worked on the discovery of his own soul—its purification and perfection.

Let us look at the practical aims in more detail. That precious metals such as gold and silver could be produced from baser ones like copper, iron, lead, and tin was, of course, an illusion, but even fake silver and gold were of great commercial value, as is costume jewelry today. Royalty,

nobility, and the rich wore the real thing, but the rest of the people for the most part were quite happy with an imitation. A superficial coloring of the baser metals—perhaps by adding small quantities of real gold or silver—already enabled alchemists to coat objects and thereby approximate the shining quality of silver or gold. The alchemists also came up with alloys that looked enough like precious metals to deceive anyone except a real expert.

In Egypt goldsmiths and metallurgists had considerable experience with various metals. When Hellenistic Egypt attracted Greek scientists, no doubt new progress was made. We have seen that magic in general, as well as astrology and other occult sciences and techniques, developed in Hellenistic Egypt as a result of an exchange of ideas between Egyptian practitioners and Greek scientists. The same might be said about alchemy. Presumably, as in the case of astrology, many ideas and traditions had been generated in Mesopotamia but later drifted toward Egypt, and by that time Greek scientists had arrived in Egypt. This reconstruction is largely speculative. It would seem, however, that any ancient knowledge available at the time of Alexander's conquest could have been developed by disciples of Alexander's own teacher, Aristotle. These disciples were invited by the Ptolemies to come to Egypt and work there.

All ancient civilizations were fascinated by gold—how to find it in the crust of the earth; how to wash it, fuse it, refine it; and, if it did not occur naturally, how to find ways of producing it artificially. Alchemy was no doubt encouraged by the kings of Egypt because it helped create new industries, especially the production of jewelry and cosmetics.

The oldest extant tract on alchemy, the Papyrus Ebers, a sixty-eight-foot roll discovered in the necropolis of Thebes, sometimes called the oldest book in the world, is an important document for *iatrochemistry,* that is, the medical use of chemistry or alchemy. It contains more than eight hundred prescriptions and recipes. One is entitled "a delightful remedy against death" and recommends half an onion mixed with the froth of beer. There is nothing magical about this, for both onions and beer were popular among the Egyptians. Other recipes are clearly based on the laws of sympathy, antipathy, or analogy. To protect one's clothes against mice, one had to rub cat's fat into them; just as living cats kept the mice away, the fat of a dead one worked as a protection. Some of the potions were given symbolic names—for instance, "dragon's blood"—to indicate their power.

Such recipes were kept in the royal archives and in temple libraries for centuries. They were jealously guarded, in the same way that industrial secrets are guarded today, to keep ahead of the competition, but also because they were thought to be based on divine revelation. In later an-

tiquity, Hermes Trismegistus, a combination of the Egyptian god Thoth and the Greek god Hermes, emerged as the god who had discovered alchemy and the other occult sciences and taught them to mankind. By this time alchemy had undergone the influence of Neo-Pythagoreanism, and the belief in numbers as symbols of cosmic forces had begun to play a role.

The Two Aspects of Alchemy

It is important to distinguish between the two aspects of ancient alchemy. On the one hand, it was an applied science, and its aims were practical and commercial. On the other hand, it was almost a religion, a mystic way of life. For us, it may be difficult to reconcile these two aspects, for at any given time or in any given practitioner one of the two aspects may have eclipsed the other. Perhaps we should use the term *alchemy* only when referring to the combination of the two aspects and speak of *ancient chemistry* when the religious element is absent.

The Practical Side

Alchemists were working on drugs that could restore health and prolong life. They also developed dyes and colors. We know that Tyrian purple, for instance, was much in demand in the days of the Roman Empire because of its richness and resistance to the wear of washing. The manufacturing process, which is roughly understood today, was a secret of the Tyrians, and as long as they maintained their monopoly, their profits must have been enormous. To compete, alchemists in other countries tried to develop dyes that were as attractive as Tyrian purple but easier to make and therefore cheaper, and to a certain extent they succeeded, for the indigo-dyed wrappings of some mummies are still amazingly fresh today.

In Hellenistic times and later, Egypt also had an important cosmetics industry. Perfumes, lotions, and different kinds of makeup (rouge for the cheeks, black powder to darken the eyebrows) were exported to other countries.

The ultimate aim of the alchemists—as of chemical researchers today—seems to have been to imitate and accelerate the processes that occur more slowly and less perfectly in nature, to achieve the same results faster and thus less expensively. One could say that they were trying to improve upon nature, to use natural resources in the most rational way.

Chemical processes such as oxidation, reduction, solution, smelting, and alloying were known to the ancient alchemists. Sulfur and mercury showed the most spectacular effects as far as changes in color and substance were concerned; hence, they were among the most popular. The

fermentation of barley into beer had been known for thousands of years in the Middle East; the fermentation of grape juice into wine was known to the Greeks of the heroic age; and the distillation of spirits may have been discovered by an Egyptian alchemist toward the end of antiquity, though the technique was apparently forgotten soon afterward and had to be rediscovered in the Middle Ages. The word *alcohol* is Arabic, but it originally designated the fine metallic powder (usually powdered antimony) that Near Eastern women put on their eyelids.

Some of the apparatuses used are known. The *alembic* is a simple distilling apparatus invented by Cleopatra (if not the queen herself, some unknown alchemist who worked for her). Its name is derived from an Arabic word that preserves the Greek *ambix* 'cup' or 'beaker', and it consisted of the *cucurbit* 'gourd-shaped vessel', and the *ambix* 'cap', which fed the distilled product into a receiver. According to tradition, the first double boiler also was invented by a woman, Mary the Jewess (it is still called *bain-marie* in French), and consisted of a flat vessel full of hot water in or over which other vessels could be placed so that their contents might be warmed, evaporated, or dried. The *kerotakis* was a closed vessel in which thin leaves of copper and other metals were exposed to the action of various vapors, for instance, the vapor of mercury. This device appears to have been a kind of *alembic,* or *circulatory,* that is, a still or retort that had its neck or necks bent back so as to enter its lower part. The *athanor* ("furnace" in Arabic) was a small domed tower that contained an egg-shaped glass vessel lying in a sandbath over a fire; a constant heat could be maintained using this apparatus.

Egyptian technology, long before the Hellenistic era, had reached a high level. There was, for example, a flourishing industry producing a variety of aromatic oils, perfumes, and blends of incense for domestic use and for export. Carefully blended oils were used for anointing both the living and the dead, but they also served as medications. Kings and priests were anointed with these precious substances, and they were rubbed into the altars and the statues of the gods.

Jars with the residue of perfumes have been found in Egyptian tombs. The ladies—and not only the ladies—wished to be as beautiful and well-groomed in the next world as they had been in this one. But ritual use in the cult of the dead is also possible: incense and aromatic essences could be burned as sacrifices for the deities and the deified dead.

In ancient Egypt, the perfume and incense industry was in the hands of the priests who had their own workshops in the sacred precincts. The making of aromatic oils and certain blends of incense (like the famous *kyphi*) was a sacred art, as we know from Exodus (ch. 30). Both the holy anointing oil and the sacred incense described by Moses were almost

certainly psychoactive ("entheogenic") and enabled the priests to "see God" or to hear God's voice. It may be assumed that Moses had learned the composition of these substances from the priests of Egypt.

Under the Ptolemies, thanks to Greek scientists who were now working in Egypt, alchemy must have made rapid advances. We know the names of several successful practitioners, and some works that belong to a later period were based on discoveries made at that time.

A few years ago, the ruins of an enigmatic building were discovered at En Boquet, in the world's lowest point, near the Dead Sea. There is every reason to believe—from the presence of vegetal matter, for instance—that this was an alchemical laboratory that specialized in the production of aromatic essences. The archaeologist who directed the excavations, Mordechai Gichon, called the site "Cleopatra's Workshop." We may never know whether the queen—like the Byzantine empress Zoe much later—personally supervised the production, but her interest in perfumes and poisons is well known.

When Plutarch, in a famous passage (*Life of Antony,* ch. 26) describes Cleopatra on her royal barge, looking like the goddess of love herself, surrounded by servants in theatrical costumes, he does not omit the "wonderful scents from many perfumes," designed no doubt to act on her Roman visitor's senses and, through them, on his brain.

Shakespeare (*Antony and Cleopatra* II 2, vv. 192–98) has developed what he found in Plutarch to conjure up a complex aura of sophisticated seduction by a gorgeous spectacle and a lavish display of powerful scents:

> The barge she sat in, like a burnish'd throne
> sat on the water: the poop was beaten gold,
> purple the sails, and so perfumed that
> the winds were lovesick with them; the oars were silver,
> which to the tune of flutes kept stroke, and made
> the water which they beat to follow faster,
> as amorous of their strokes. . .

Many achievements of ancient technology border on the magical, especially if their secret was well kept. In fact, they could be described as *Magia naturalis.* A good example is Greek Fire, a highly combustible mixture useful in naval warfare because it burned on water. Something like it was already used in Hellenistic times, but its invention is usually attributed to Byzantine alchemists. To a Byzantine theologian with an interest in magic, Michael Psellos, we owe a fascinating description of the secret rituals performed by the empress Zoe (c. 978–1050) in her private laboratory inside the palace; here she experimented with various per-

fumes, *aromata,* which, as Psellos carefully puts it, she "offered to God" (*Chronographia* 6, chs. 64ff.). In a sense, Zoe continued the tradition of Cleopatra.[1]

Many other simple devices continued in use throughout the Middle Ages. The earliest alchemistic tracts were written in Egyptian, but in the Hellenistic period the most important textbooks seem to have been in Greek. From Greek they were translated into Arabic, and from Arabic into Latin. Thus, a considerable body of information has reached the West, some of it in Greek, some only in translation.

The Spiritual or Mystical Side

The mystical side of alchemy is about as well documented as its practical side. It is marked by a quest for spiritual perfection, just as the search for precious metals involved the perfecting and refinement of raw materials. The process is best illustrated by the aphorism, "Out of other things you will never make the One, until you have first become the One yourself."

Many alchemic operations can be understood as sacrificial offerings, as ceremonies to be accomplished after the alchemist himself has been initiated into some higher mysteries. A long period of spiritual preparation is indispensable. The ultimate goal of this process, as in the mystery religions, is salvation. Thus alchemy appears to be a Hellenistic form of mysticism. Because the soul is divine in origin but tied to matter in this world and isolated from its spiritual home, it must, as far as possible, purify the divine spirit inherent in it from the contamination by matter.[2]

In his search for the *materia prima,* the alchemist discovers hidden powers within his own soul. The symbols he draws and studies help him explore his collective unconscious; the reading and rereading of books derived from divine revelation may create the drowsiness of intoxication; watching the chemical processes in his laboratory for hours on end may produce a kind of trance or an exhaustion that leads to trance.[3]

Thus alchemy can be more than a science; it can be a way of life, like religion or magic. Even when there are no tangible results, the alchemist goes on reading, praying, meditating, and distilling. Perhaps he will make an important discovery, but it will come more or less by accident, as a by-product. Lead never turns into gold, and the philosopher's stone never materializes, but the search for perfection continues.

The alchemist's quest to improve matter, or to ennoble baser substances, appealed to those who had been trained in the great philosophical schools of Greece—to the Platonists, who believed that the creation was basically good, and to the Aristotelians, who believed that nature, though not perfect, strives toward perfection. Indeed, some of the basic philosophical principles of alchemy were no doubt derived from earlier

thought. The unity of all things, or rather their unity within diversity, had been postulated by the Eleatic school in the sixth century B.C. For the alchemists this principle was symbolized by the *Ouroboros,* the serpent that "eats its tail" and that carries the legend *hen to pan* 'all is one'. The legend has been explained or paraphrased: "One is all, and by it all, and for it all, and if one does not contain all, all is nothing." This rendering reflects the position of Plotinus, who said: "Everything is everywhere and everything is everything and every single thing is everything" (*Enn.* 5.8.4).

Unifying Concepts

Within the unity of all things there are opposites, such as the four elements—fire and water, air and earth—a doctrine that was known in India and Egypt long before the time of Aristotle. But these opposites are not absolute; one can be transformed into another, and the principle of change, transformation or transmutation, plays an important role in alchemy. Solid water (ice) resembles earth, whereas vaporized water (steam) resembles air, yet water and steam are the same substance. Fire can be thought of as the energy that brings about changes by the heat it produces: fuel is consumed, and the substance that boils in the apparatus changes in character. To the four material elements Aristotle added a fifth, the *quinta essentia,* or ether, a purer form of fire or air, the substance of which the heavenly bodies were thought to be composed, but which is also found in different degrees of admixture in the animal, vegetable, and mineral worlds.

The principle of transformation was clearly all-important to the alchemists. According to Ovid, it was one of the great cosmic laws, and in his *Metamorphoses* he traces the theme from the creation of the world—the transformation of chaos into cosmos—to the transfiguration of Julius Caesar into a star: *In nova fert animus mutatas dicere formas.* There are also hundreds of stories in Greek mythology telling of people being transformed into animals, trees, or stars.

Seeds become flowers and trees, caterpillars become butterflies, and human life from birth to death is a series of transformations or transitions. There is some wonderful magic at work in the universe, some real, some fantastic, like Ovid's fairy tales. If the unity of matter is accepted and the possibility of a powerful transforming agent is admitted, anything can become anything else. In a sense the gods of antiquity were the greatest alchemists; if nothing else worked, a prayer might produce results, and when there were results, the alchemist—like the astrologer or the magician—felt that he himself was a god: this was his reward.

In truth, we have come full circle. Alchemy and magic are closely

related; in fact, it is probably impossible to separate them. Many magical texts could be classified as alchemistic recipes. Alchemy and astrology also are related. During alchemistic operations the stars had to be watched, the names of the "planets" were transferred to certain metals, and the astrological symbols of these metals served to designate them: the sun was gold, the moon silver; Mars was iron, Mercury quicksilver; Saturn was lead, Jupiter tin.[4]

NOTES

1. For further discussion of Greek Fire and the empress Zoe, see the epilogue.

2. Festugière, *La Révélation d'Hermès Trismégiste,* 1: 260ff.

3. "Pray, read, read, read, reread, work, and you will find" (*ora, lege, lege, lege, relege, labora, et invenies*) is another aphorism. The mystic aspect of alchemy was described by the American scholar E. A. Hitchcock in *Remarks on Alchemy and the Alchemists* (Boston, 1857). See also T. Burckhardt, *Alchemy: Science of the Cosmos, Science of the Soul,* trans. W. Stoddart (Baltimore, 1967); and Biedermann, *Handlexikon der magischen Künste.*

4. Les Belles Lettres (Paris) is planning a new edition of Greek alchemistic texts (the Budé series) in twelve volumes, with introductions, French translations, and notes. The first volume, edited by R. Halleux, with an introduction by H.-D. Saffrey, was published in 1981 under the title *Les Alchimistes grecs.*

Texts

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The *Ouroboros,* the snake that bites its own tail, is a symbol often used by alchemists. It represents the unity of all forces and processes in the cosmos. To know one single thing by studying it carefully is to know everything. The macrocosm is reflected in the microcosm. The formula that supposedly explains the symbol seems to express the doctrine that the individual reality exists for the sake of universal reality, but also vice versa: the universe is there for the one thing. If the universe were not present, in a mystic sense, in the one thing, there would be no universe.

The mystic language of alchemic texts presents many problems. The written texts are not enough. No doubt the ancient study of alchemy needed a teacher to interpret them and fill in the gaps.

The *Ouroboros* (1:132–33 Berthelot)

One is all, and by it all, and for it all, and if one does not contain all, all is nothing.

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The Precepts of Hermes Trismegistus were probably engraved on an emerald tablet at one point to emphasize their value. "Thrice-Greatest Hermes" is a Greek adaptation of the Egyptian god Thoth, and he was thought to have revealed to mankind all the arts and sciences, especially the occult sciences. The text of the *Precepts* is known from two versions: one in Arabic, attributed to Geber (or Jabir) Ibn Hayyan; the other in Latin. The Arabic version may reflect a lost Greek original; the Latin version is believed to depend on the Arabic.

There are thirteen precepts altogether and they are intended as a summary of the science of alchemy. The number *thirteen* may be significant as

a "magic" number; but discounting I (a brief preface designed to impress the reader) and XIII (a brief summary), there are only eleven precepts.

II. This precept is an affirmation that the microcosm reflects the macrocosm, and vice versa. The "wonders of the one Thing" expresses in language what the *Ouroboros* symbolizes visually: if you understand one substance perfectly, or if you can actually produce it, you understand the universe. This is a miracle, but then the world is full of miracles.

III. The "One Being" is the supreme god at whose command (the "One Word") the world was created. This god—like the Old Testament Yahweh—can reveal his secrets to mankind, either directly or through an intermediary such as Hermes. Thanks to divine revelation, creating the tiniest substance is, in principle, equivalent to creating the universe. The alchemist is on the same level as his god. But creating one substance is only the beginning of a process that continues ad infinitum. By transformation or adaptation of the "One Thing," other substances are created.

IV. Sun, Moon, Wind, and Earth are essential cosmic forces in any creative process. The Sun and Moon may represent gold and silver in the present context, but they could also be astrological influences that had to be considered in an alchemic operation. The Earth not only brings forth the food that we need but it also contains precious metals. The Wind spreads seeds, but it is also the Spirit, because *pneuma* in Greek covers both meanings.

V. The "One Thing" is *the* most perfect thing in the world (Father of Perfection" seems to be a Semitism, like "Sons of the Kingdom"). If the "One Thing" is done well, the whole world will be in fine condition.

VI. The "power" is the divine power operating through the alchemist. "Earth" represents any solid substance that can be used for a practical purpose. In order to be completely useful to mankind, the spiritual power should be transformed into material things. Alchemy is a domain where spiritual and material forces come into contact with each other and produce something of value.

VII. Earth is the coarse element, Fire the subtle one, but it is possible that the precepts were aimed at processes of refinement or distillation in general. To extract "Fire" from a coarser substance was one of the goals of alchemy.

VIII. The right substance, the right apparatus, the right procedure, was not enough. The alchemist had to acquire and cultivate a certain mental attitude. Nothing could be gained without mystic experience. The ascent and descent of the soul proceed through the planetary spheres (which represent material substances as well as qualities of human character and intellect).

IX. "Virtue" is the conventional translation of the Greek term *arete,*

which really means "effectiveness" or "power." To achieve power the alchemist must be a visionary. The creative process in the mind is even more important than the creative process in the test tube. The progress of alchemy as a science depended on new discoveries, new insights, new inventions, and these were thought to be divinely inspired.

X. Here the act of creating a substance in the alchemist's laboratory is compared with the greatest creative act, the creation of the world by the demiurge. The alchemists liked to think of themselves as semidivine figures.

XI. The "wonders that are here established" (or: "performed"?) must refer to the actual alchemistic operations described in a standard textbook or transmitted orally by a master.

XII. Hermes Trismegistus reminds the reader that his precepts are based on divine revelation. The "three parts of cosmic philosophy" are no doubt magic, astrology, and alchemy, for these were the three domains over which the "Great Thoth" of the Egyptians presided. The statement indicates how strongly the author believed that these three occult sciences formed a unity.

The traditional Latin text of the Emerald Tablet is given by H. Kopp, *Beiträge zur Geschichte der Chemie* (Brunswick, 1869), pp. 376–77. The Latin and the Arabic versions are compared by J. Ruska, *Tabula Smaragdina* (Heidelberg, 1926). Among the many attempts to make sense of the text, I mention the following: F. Barrett, *Lives of the Alchymistic Philosophers* (London, 1814), pp. 383–84; E. J. Holmyard, in *Nature* 112 (1923): 525–26; T. L. Davis, in *Journal of Chemical Education* 3 (1926): 863–75; R. Steele and D. W. Singer, in *Proceedings of the Royal Society of Medicine* 21 (1928): 41-57; M. Gaster, in *The Quest* 21 (1930): 165–69; L. Thorndike, in *Isis* 27 (1973): 53–62.

The Precepts of Hermes Trismegistus

I. What I say is not fictitious but reliable and true.

II. What is below is like that which is above, and what is above is like that which is below. They work to accomplish the wonders of the One Thing.

III. As all things were created by the One Word of the One Being, so all things were created by the One Thing by adaptation.

IV. Its father is the Sun and its mother the Moon. The Wind carries it in its belly. Its nurse is the Earth.

V. It is the father of Perfection in the whole world.

VI. The power is strong if it is changed into Earth.

VII. Separate Earth from Fire, the subtle from the coarse, but be prudent and circumspect as you do it.

VIII. Use your mind to its full extent and rise from Earth to Heaven, and then again descend to Earth and combine the powers of what is above and what is below. Thus you will win glory in the whole world, and obscurity will leave you at once.

IX. This has more virtue than Virtue itself, because it controls every subtle thing and penetrates every solid thing.

X. This is the way the world was created.

XI. This is the origin of the wonders that are here established [or, performed?].

XII. This is why I am called "Thrice-Greatest Hermes," for I possess the three parts of cosmic philosophy.

XIII. What I had to say about the operation of the Sun is completed.

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Zosimus of Panopolis (today Akhmim, on the east bank of the Nile in Egypt) is considered one of the great alchemists of the early Christian era. Scholars believe that he lived in Alexandria at some time during the fourth century A.D. and used its prestigious library. We know that he traveled to Rome at least once, for his own account of the trip survives in a manuscript in Cambridge, England.

The present text is part of his work *On Completion.* It is corrupt in several places, even where the context is clear, and therefore the translation remains tentative.

The work is dedicated to Theosebeia, presumably a wealthy lady who was interested in Zosimus' alchemic researches. He makes it clear to her that the kings of Egypt had traditionally sponsored this kind of research, but under the strictest conditions of secrecy. He obviously has in mind the Ptolemies, who ruled Egypt from 323 until 30 B.C. We do not know whether these Macedonian kings continued an older tradition, but they clearly recognized the value of the natural resources of the country, and they encouraged scientific and technological research. Hellenistic Egypt manufactured metals, jewelry, textiles, perfumes, papyrus, and other goods on a large scale, and its economy depended on the export of these goods throughout the Mediterranean region. Some of these industries were royal monopolies, and the manufacturing processes were carefully guarded secrets. The research chemists who worked for the crown were not allowed to publish the results of their work. Any important discoveries were exploited by the government. In modern terms, the kings owned the patents. Similarly, all mining rights were owned by the government.

All this we learn from Zosimus, who wrote a few centuries later. He

defends the early alchemists who wrote about their work but were prohibited from publishing their most important discoveries. Only the Jews, he says, were the exception to this rule—they did not respect the prohibition. There was a large Jewish community in Alexandria. We know of the Jewish philosopher Philo. And a Jewish alchemist, Mary, is credited with the invention of the water bath, which is still called *bain-marie* in French cookbooks. Thus some Jewish scientists of the Ptolemaic period were not loyal subjects of the crown, according to Zosimus. At the same time, he credits them with preserving in clandestine fashion valuable knowledge that would otherwise have been lost completely when Cleopatra's empire collapsed. No doubt a good deal of Hellenistic technology was lost at that time because it had been kept secret. The enforced secrecy may explain why the fairly sophisticated chemistry of the period was classified as magic tinged with mysticism.

Zosimus, *On Completion,* excerpts (2:239–40 Berthelot)

Here is confirmed the Book of Truth.
Zosimus to Theosebeia greetings!

Madam, the whole kingdom of Egypt depends on these two arts: that of the appropriate things and that of the minerals. For the so-called Divine Art, whether in its dogmatic, philosophical part, or in that part which is mostly guesswork [reading *hypopteuousa* for *hypopiptousa*], has been given to its guardians for [their] support, and not only itself, but also those four arts which are called "Liberal Arts" and the "Arts and Crafts." Their creative application belongs [?] to the kings. Thus, if the king agrees [?], he who has a share of this knowledge from his ancestors, either by oral tradition [?] or having deciphered it from the slabs . . . but even he who had a full knowledge of these things did not practice them, for he would have been punished. In the same way, the workmen who knew how to strike the coins of the kingdom were not allowed to do this for themselves; they would have been punished. Similarly, under the kings of Egypt those who knew the technique of "cooking" and the secret of the "procedure" did not practice this for themselves but served the Egyptian kings, working to fill their treasuries. They had their own inspectors and supervisors, and there was strict control as far as "cooking" was concerned, not only in itself, but also in respect to the gold mines. For if anything was found by digging, the law in Egypt demanded that it be officially registered and delivered.

Some blame Democritus and the ancient authors [in general] that they did not mention those arts but only the "Liberal Arts." But why blame them? They could not do otherwise, since they depended [?] on the kings

of Egypt and boasted to be among the "Prophets" of the first order. How could they have revealed, and have made public, knowledge that was reserved for the kings [?], thus giving to others the power that controls wealth? And even if they could have done it [?], they were jealous of their knowledge. Only to the Jews did they secretly explain these techniques and write and hand them down [for them]. This is why we find that Theophilus, son of Theogenes, has recorded the locations of gold mines, and Mary [the Jewess] has described [alchemic] ovens, and other Jews similarly.

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The Greek text of the *Book of Comarius* reads like a translation from another language, or perhaps it was written by someone whose Greek was inadequate. It is certainly far removed from classical Greek. There are, in addition, textual corruptions introduced by the scribes. Texts that were put to practical use were often tampered with. The successive owners of such handbooks were no doubt practicing alchemists themselves, and they probably annotated their copies. Or if they copied a text, they were likely to leave out material that was of little interest to them. Hence, these treatises have survived in different versions or "recensions," and it is therefore impossible to reconstruct an archetype.

The language is that of a mystic in trance and can, perhaps, only be fully understood by other mystics. Or else it uses words with hidden meanings and is a language that must be learned by those who have been initiated.

An additional problem is created by the apparently deliberate gaps left in such texts by authors who were unwilling to reveal all the secrets of their art and who therefore forced their readers to study with a teacher. Certain things are to be explained later, but the explanations never come, either because the text is incomplete or because the author forgets his promise. (We encounter the same difficulty in astrological literature: none of the treatises we have is a complete textbook enabling the beginner to become a master in a series of steps, following practical examples. This was apparently not the way these subjects were taught.)

The *Book of Comarius* is dedicated to "Cleopatra the Divine," also called "the wise woman," but not necessarily the famous queen. The prayer at the beginning, with its unmistakably Christian character, must be considered a later addition, perhaps by a Byzantine monk who copied (or edited) a pagan treatise. For a long time alchemy was not banned by the Church as a form of magic: on the contrary, as centers of learning, the monasteries were probably among the few places where alchemy could be studied and where texts were available. The prayer at the beginning of this

text was perhaps designed to give an edifying character to the work and to place it above suspicion.

Comarius begins with a brief cosmogony and then turns to practical matters such as metals, colors, and apparatuses. A group of philosophers (i.e., scientists) is then introduced, and Cleopatra delivers to them the knowledge she has received from Comarius.

From the more practical precepts, the reader is led to general discourses on the wonders of nature. The symbolism is rich, the language mystic, and the frequent exhortations to the reader to listen to what clearly cannot really be understood increase one's frustration. In the concluding section, alchemy is described as providing a key to the mystery of resurrection, another reason for a Christian to study the subject.

Book of Comarius, Philosopher and High Priest Who Was Teaching Cleopatra the Divine the Sacred Art of the Philosopher's Stone, excerpts (3:289–99 Berthelot)

Lord, God of all powers, Creator of all of nature, creator and maker of all the celestial and supercelestial beings, blessed and eternal ruler! We celebrate you, we bless you, we praise you, we worship the sublimity of your kingdom. For you are the beginning and the end, and every creature visible and invisible obeys you, because you have created them. Since your eternal kingdom has been created as something that is subject to you [?], we implore you, most merciful ruler, in the name of your unspeakable love for mankind, to illuminate our minds and our hearts so that we, too, may glorify you as our only true God and the Father of our Lord Jesus Christ, with your all-holy, good, and life-giving Spirit, now and forever and ever. Amen.

I shall begin this book with the account concerning silver and gold that was given by Comarius, the philosopher, and Cleopatra, the wise woman. The book at hand does not include the demonstrations concerning lights and substances. In this book we have the teaching of Comarius, the philosopher, addressed to Cleopatra, the wise woman.

Comarius, the philosopher, teaches the mystical philosophy to Cleopatra. He is sitting on a throne. He has devoted himself to philosophy, which he ignored before [?]. Even now [?] he has spoken to those who understand mystical insight, and with his hand he has shown that everything is One and consists of four elements.

As an [intellectual] exercise he said: "The earth has been established above the waters, the waters on the tops of mountains. Now, take the earth that is above the waters, Cleopatra, and make a spiritual body from it, the spirit of alum. These things are like the earth and the fire, in respect of their warmth to the fire, in respect of their dryness to the earth. The waters that are on the mountaintops are like the air in respect of their

coldness, like the water in respect of their wetness with the air and the fire [?]. Look, from one pearl, Cleopatra, and from another one you have the whole [technique of] dyeing."

Cleopatra took what Comarius had written and began to put into practice the applications of other philosophers, to divide into four parts the beautiful philosophy [?], the one [that teaches that] the matter derived from the natures, as it has been taught and discovered, and an idea of the operations of its difference [?]. Thus [they say?], searching for the beautiful philosophy we have found that it is divided into four parts, and thus we have discovered [?] the general idea of the nature of each of them, the first having blackness, the second whiteness, the third yellowness, the fourth [?] purpleness or refinement. On the other hand, each of these things does not exist from its own general nature [?], but they depend [?] generally on the elements, [and so?] we have a center from which we can proceed systematically. Thus, in between the blackness and the whiteness, the yellowness and the purpleness [?] or refinement, there is the maceration and the washing [out?] of the species. Between the whiteness and the yellowness there is the technique of casting gold, and between the yellowness and the whiteness there is the duality of the composition.

The work is accomplished by the application of the breast-shaped apparatus, the first experiment consisting in separating the liquids from the oxides [?], and this takes a long time.

Next comes the maceration, which consists [?] of the mixture of water and wet oxide [?].

Third, the dissolution of the species, which are burned seven times in an "Askelon vessel." This is how one operates the whitening process and the blackening process of the species by the action of the fire.

Number four is the yellowing process by which one mixes [the substance?] with other yellow liquids and produces wax [?] for the yellowing, in order to achieve the desired goal.

Number five is the fusion, which leads from the yellowing to the gilding.

For the yellowing one must, as mentioned above, divide the composition into two halves. Once it has been halved, one of the parts is mixed with yellow and white liquids, and then you can blend it for any purpose you have in mind.

Again, if the fermentation is a refinement [of the species?], that is to say that refinement and fermentation [constitute the?] perfect transmutation of the composition of the gilding.

This is the way that you, too, must proceed, my friends, when you want to approach this beautiful technique. Look at the nature of plants and their origin. Some descend from the mountains and grow from the

earth; some ascend from the valleys; others come from the plains. Look how they develop, for you will [must?] harvest them at special times, on special days; you will pick them from the islands of the sea and from the highest place. Look at the air that is at their service and the nourishment that surrounds them, to make sure that they are not harmed and do not die. Look at the divine water that moistens them and the air that governs them, once they have been incorporated into one essence.

Ostanes and his followers answered Cleopatra: "In you is hidden the whole terrible and strange mystery. Enlighten us in general, but especially about the elements. Tell us how the highest descends toward the lowest, and how the lowest ascends toward the highest and how the one in the middle approaches the highest to unite itself with it and what is the element (that acts) on them. And (tell us) how the blessed waters descend from above in order to see the dead that are lying around, in chains, oppressed in darkness and obscurity inside Hades, and how the remedy of life reaches them and wakes them up from sleep and awakens them to an awakening [reading *eis gregorsin* for *tois ktetorsin* vel sim.], and how the new waters flow toward them, at the beginning of the descent and borne on the couch, descend approaching with the fire, and a cloud carries them, and out of the sea ascends the cloud that carries the waters."

Considering what had been revealed to them, the philosophers rejoiced.

Cleopatra said to them: "When the waters come, they awaken the bodies and the spirits that are enclosed in them and are weak. For again they suffer oppression, and again they will be shut up in Hades, and in a short while they grow and ascend and put on different glorious colors like flowers in spring, and spring itself rejoices and is glad at the beauty they wear.

"For to you who are wise I say this: When you take plants and elements and stones from their places they appear to be mature and [yet they are] not mature; for the fire tests everything. When they are clothed in glory and in shining colors from the fire, then they will appear to you as greater ones through their hidden glory, and [you will see] their exquisite beauty, and fusion [will be] transformed into divinity, for they get nourished in the fire, just as an embryo, nourished in its mother's womb, grows slowly. When the appointed month is near, nothing prevents it from coming out. Such also is the power of this admirable art.

"They suffer in Hades and in the tomb in which they lie from waves and ripples that follow each other, but when the tomb is opened, they will ascend from Hades like the babe from the womb. When the philosophers have contemplated the beauty [of this], just like a loving mother [contemplates] the baby to which she has given birth, they seek to nourish, like a baby, this art, [but] with water instead of milk. For the art imi-

tates [or: is like] the baby and, like the baby, it takes shape, and [there comes a time] when it is perfect in every respect. Here you have the sealed mystery.

"From now on I shall tell you clearly where the elements and plants lie. But first I shall speak in riddles. Climb to the top of the ladder, up the mountain covered with trees, and see: there is a stone on top. Take the arsenic from the stone and use it for whitening divinely. And see: in the middle of the mountain, underneath the arsenic, there is its bride [mercury?, or yellow arsenic, as opposed to the white one?], with whom it unites itself and in whom it finds its pleasure. Nature rejoices in nature, and outside of it there is no union. Descend to the Egyptian Sea and bring back from the sand, from the source, the so-called natron. Unite it with these substances, and they bring out the all-coloring beauty; outside of it there is no union, for the bride is its measure. See, nature corresponds to nature, and when you have assembled everything in an equal proportion, then natures conquer natures and rejoice in one another.

"Look, scientists, and understand! Here you have the fulfillment of the technique of bridegroom and bride having been joined and becoming one. Here you have the plants and their varieties. Look, I have told you the whole truth, and I shall tell it to you again. You must look and understand that from the sea ascend the clouds carrying the blessed waters, and they refresh the earth and make the seeds and the flowers grow. Similarly, our cloud, coming out of our element and carrying the divine waters, refreshes the plants and the elements and does not need anything that is produced by any other soil.

"Here you have the strange mystery, brothers, the completely unknown [mystery]; here you have the truth that has been revealed to you. Look how you sprinkle your soil, how you sprinkle your soil and make your seeds grow in order to harvest when it is ripe.

"Now listen and understand and judge correctly what I say. Take from the four elements the highest arsenic and the lowest arsenic and the white and the red, equal in weight, male and female, so that they are joined to each other. Just as the bird hatches and brings to perfection its eggs in warmth, so you, too, must hatch and polish [or, bring to perfection?] your work by taking it out and watering it in the divine waters and [warming it] in the sun and in burned places, and you must roast it in a gentle flame with the virgin milk and hold it [away] from the smoke. And enclose it in Hades and move it in safety until its structure becomes more solid and does not run away from the fire. Then you take it out of it, and when the soul and spirit have joined each other and become one, then you must throw it on solid silver, and you will have gold [of a quality] that the storehouses of the kings do not have.

"Here you have the mystery of the philosophers. Our fathers made us swear never to reveal it and never to divulge it, since it has divine shape and divine power. For divine is that which is united with the Godhead and accomplishes divine substances, in which the spirit is embodied and the mortal elements are animated; receiving the spirit that comes out of them, they dominate each other and in turn are dominated by each other, just like the dark spirit, which is full of vanity and despondency, the one that has power over the bodies and prevents them from growing white and receiving the beauty and the color in which they were clothed by the Creator (for body, spirit, and soul are weak because of the darkness that stretches over them).

"But once the dark, evil-smelling spirit itself has been disposed of, so that neither the smell nor the color of the darkness appears [any more], then the body is illuminated, and the soul and the spirit rejoice, because [reading *hoti* for *hote*] the darkness has gone away from the body. The soul calls out to the illuminated body: Wake up from Hades! Resurrect from the tomb! Come out alive from the darkness! Enter the process of becoming spiritual, of becoming divine, for the voice of resurrection has sounded, and the remedy of life has come to you. For the spirit rejoices again in the body in which he is, and so does the soul, and it runs fast and full of joy to embrace it, and it does embrace it, and the darkness does not gain power over it because it depends on light, and it cannot be separated from it forever, and it enjoys being in her house, because, hiding it in darkness, she found it filled with light. It was joined with it, since it had become divine according to her [?], and it lives in her. For it put on the light of godliness, and the darkness ran away from them, and all joined in love—the body, the soul, and the spirit—and they have become one in the one that hides the mystery. In the act of their coming together, the mystery was accomplished, the house was sealed, and a statue full of light and godliness was placed there, for the fire brought them together and transformed them, and from the lap of its womb it came forth.

"Similarly, from the womb of the waters and from the air, which ministers to them, it also brought them out from darkness into light, from grief to joy, from sickness to health, from death to life. And it clad them in divine spiritual glory, which they had never worn before, because in them the whole mystery is hidden, and the divine is there unchanged. For it is because of their courage that the bodies enter along with each other and, coming out of the earth, put on light and divine glory, because they grew according to their nature and were changed in their appearance and arose from sleep and came out of Hades. For the womb of the fire gave birth to them, and from it [the womb] they put on the glory. And it brought them to a single unity, and the image was perfected in body and soul and spirit,

and they became one. For the fire was subordinated to water, [as was] the earth to the air. Similarly, the air is with the fire, and the earth is with the water, and the fire and the water are with the earth, and the water is with the air, and they are one. For from plants and ashes the One came into being, and it was created divine from nature and by the divine, capturing and controlling all of nature. Look, the natures controlled and conquered the natures, and through this they changed the natures and the bodies and everything from their nature, for he who fled entered into the one who did not flee, and he who controlled entered into the one who did not control, and they were united with each other.

"This mystery that we have learned, brothers, comes from God and from our father, Comarius, the Ancient. Look, brothers, I have told you, the whole hidden truth [handed down] from many wise men and prophets."

The philosophers said to her: "Cleopatra, you have given us ecstasies by telling us what you have. Blessed is the womb that bore you!"

Again, Cleopatra spoke to them: "What I have told you concerns heavenly bodies and divine mysteries. For through their changes and transformations they change the natures and clothe them [?] in an unknown glory, a supreme glory that they did not have before."

The sages said: "Tell us this, too, Cleopatra, Why is it written: 'The mystery of the hurricane. . . . the art is a body, and like a wheel above it; just like the mystery, and the course, and the pole above, and houses and the towers and the most glorious encampments'?"

Cleopatra said: "The philosophers were right to put it [the art] there, where it had been put by the Demiurge and the Lord of all things. And, look, I tell you that the pole will move as a result of the four elements, and that it will never stop. These things have been arranged in our own country, in Ethiopia, and from here the plants, the stones, and the sacred bodies are taken; the one that put them there was a god, not a man. Into everyone the Demiurge placed the seed of power. One greens, the other does not green; one is dry, the other wet; one tends to combine, the other to separate; one dominates, the other is subordinate; and as they meet, some dominate the others, and one rejoices in another body, and one imparts splendor to another. One single nature results that pursues and dominates all natures, and the One itself conquers the nature of fire and earth and transforms its whole nature. And look, I tell you what is beyond it: when it is perfected, it becomes a deadly drug that runs through the body. For just as it enters its own body, it circulates in the [other] bodies. For by decomposition and warmth a drug is obtained that runs unhindered through every kind of body. At this point has the art of philosophy been accomplished."

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Theophrastus (c. 371–c. 281 B.C.) studied in Athens under Aristotle and became his successor as head of his school, the Peripatus. He lectured and wrote on most of the subjects that his master had investigated, including physics, metaphysics, ethics, politics, physiology, and biology. Of his vast literary output only a fraction has been preserved. Besides his *Characters* (see the portrait of the "Superstitious Person" [*no. 3*]), we have the *Investigation of Plants,* the *Causes of Plants,* and *Concerning Odors,* in which he deals with the production of aromatic essences used as ointments and perfumes or as medications. Olive oil and wine, two of the major products of Attica, were at the base of a large industry that exported cosmetics, spices, and medicines, among other things. In his treatise, Theophrastus already seems to describe the *bain-marie,* an invention usually ascribed to the "Jewess Mary," a famous alchemist in Egypt in a later period.

When he speaks of "tastes" and "odors" he seems to have in mind "things that we taste" and "things that we smell," that is, condiments and perfumes.

What is true of many technical treatises that have come down to us from antiquity, in prose or verse, is true of this text: no one could become a perfumer or a mixer of culinary spices by reading Theophrastus. He only tells us the bare essentials. We must assume that some industrial secrets were involved.

Theophrastus, *Concerning Odors,* 8.14–16, 21–23

Tastes and odors alike are derived from these two things: the methods the makers of spices and perfume-powders apply, that is, mixing dry [solid] substances with dry [solid] substances. The experts who mix ointments or flavor wines, on the other hand, mix liquids with liquids. The third method that is commonly used is that of the perfumer who mixes dry [solid] with liquid substances. This is the way in which all perfumes and ointments are composed. But you should also know which ingredients mix well with which, and what [aromatic] combinations work well together, just as it is in the case of tastes. For those who make mixtures have this very same object in mind: it is as if they were seasoning [a dish]. So much for the ingredients and the methods used by the experts to attain their goal.

The composition and preparation of perfumes have, so to speak, only one object: to make the odors last. This is why olive oil is used as a base, for this substance keeps them for a very long time and is also very convenient to use. Olive oil is by nature not at all well suited to receive an odor, because it is viscous and greasy, and of all the different oils, this is espe-

cially true of the greasiest, such as almond oil. But sesame oil and olive oil are most . . . [something seems to be missing in the text].

They [the perfumers] mostly use oil from the Egyptian or Syrian *balanos* [*Balanites aegyptiaca*], for it is the least greasy. The olive oil most in use is that which is pressed from "coarse olives" in the raw state, because it seems to be the least greasy and the thinnest. This is used when it is new, not when it is old. The one that is kept for more than a year is useless, as it has turned thick and greasy. This [the new one] is the most suitable, because it is the least greasy.

Some say that oil from bitter almonds is best for ointments. They are abundant in Cilicia where an ointment is made from them. It is said that this is suitable for the finest perfumes, like the oil from the Egyptian *balanos* by itself; the shells [of the fruits], when thrown into the oil, give it a pleasant smell, for they are [also thrown into the one] made of bitter almonds. It does not really make any sense to seek a base that has very little odor of its own, like the oil that is pressed from "coarse olives" in a raw state, and yet, at the same time, they use these [the oil derived from *balanos* or bitter almonds]. For almond oil is pungent. Perhaps [they do it], because olive oil acquires a bad smell when it is cooked. This needs further investigation.

Almost all spices and aromatic scents except flowers are dry, hot, astringent, and biting. Some also have a certain bitterness, as we said above, for example, iris, myrrh, frankincense, and (perfumed) ointments in general. However, the most common properties are astringency and the warming element; those are actually the effects they produce.

They [spices and perfumes] are all given their astringent quality by exposure to fire, but some of them acquire their special odors even when they are cold and not exposed to fire. It also seems that, just as with flowers [vegetable dyes], some are used in cold and some in warm baths; so it is with odors. But in all cases the cooking—whether to produce the astringent quality or the special odor—is done in vessels standing in water and not in direct contact with the fire, the reason being that the heating must be gentle; if there were direct contact with the flames, there would be considerable waste, and the perfume would smell of burning.

There is less waste when the perfumes acquire their special odors by exposure to fire than when they are left cold, because the perfumes exposed to fire are first steeped in fragrant wine; for then they absorb [*anapinei*] less, while those treated in a cold state, being dry, absorb more, as, for instance, bruised iris root.