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The Philosopher's Stone

By James Evans, EG

Nothing is more precious than the red sand of the sea; it is the distilled moisture of the Moon joined to the light of the Sun, and congealed [...].

Attributed to the philosopher Anastratus (Waite, 1893, p.12).

Imbued with the power to transmute base metals into gold, the philosopher's stone – also known as the "tincture" or "powder" – has been a goal of industrious thinkers for centuries. Perhaps, however, the stone is not a singular entity. Elias Ashmole (one of the founding fellows of London's Royal Society) described four such stones in 1652:

- The mineral stone – *'that hath both the power of transforming any imperfect earthly matter into its utmost degree of perfection; that is, to convert the basest of metals into perfect gold and silver; Flints into all manner of Precious Stones; [as Rubies, Sapphires, Emeralds, and Diamonds, etc.] and many more experiments of the like nature.*
(Ashmole, 1652, prolegomena).
- The vegetable stone – with the power to manipulate plant-life.
- The magic stone – with the power to understand the language of creatures, to observe the whole world and, by observing heavenly bodies, predict the future.
- The angelic stone (which cannot be seen, or felt, but only tasted) – with the power to converse with angels (through dreams and revelations), ward off evil spirits, and grant eternal life.

The 'squared circle', symbol of the Philosopher's Stone (illustration XXI from *Atlanta fugiens*, 1618, engraved by Matthaeus Merian).

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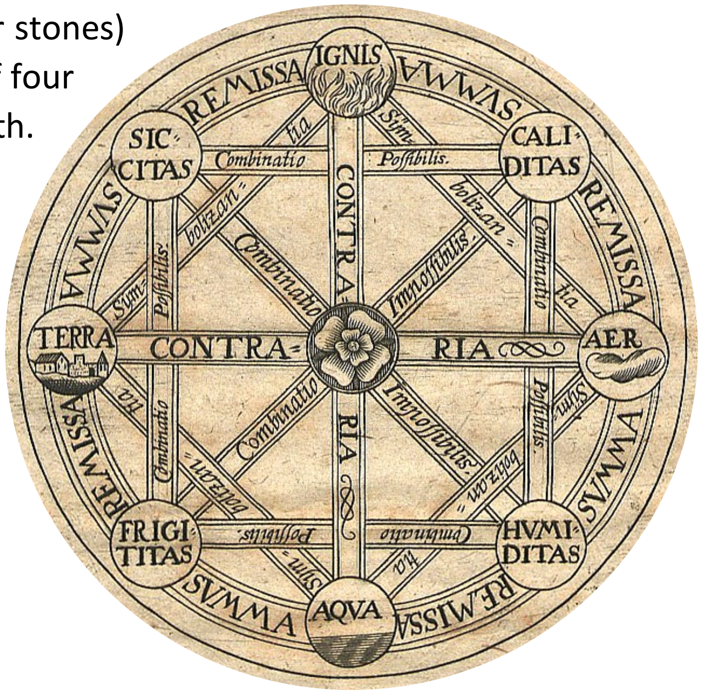
The Greek Philosophers

The quest for the philosopher's stone (or stones) was underpinned by an understanding of four classical elements: fire, air, water and earth.

This classical framework, first proposed by the Greek philosopher Empedocles, was later inherited by Aristotle (c. 350 BCE). Aristotle's notion of an element was surprisingly accurate, being *'a body into which other bodies may be analysed [...] and not itself divisible into bodies different in form'* (Aristotle, On the heavens, book III, chapter III). But given his limited means of chemical analysis, he adopted Empedocles' framework despite his familiarity with numerous modern elements, including: gold, silver, copper, tin, iron, carbon, lead, mercury and sulphur.



Leibniz's representation of the universe (1666) composed of four classical elements: fire (ignis), air (aer), water (aqua) and earth (terra); sitting between their Aristotelian properties of: dry (siccitas), hot (caliditas), moist (humiditas) and cold (frigititas).

In his work *Meteorology*, Aristotle outlined how the four elements interact in the field of physical geography. In particular, he considered two alleged constituents of evaporation (otherwise called 'exhalations'): one moist, called vapour; the other dry, like smoke. From these exhalations, Aristotle explained the cause of numerous meteorological and astronomical phenomena, from lightning to shooting stars. But when the exhalations were imprisoned within the earth, they would transform. The moist exhalation thus 'congealed' to form metals, whilst the natural heat of the dry exhalation turned it to stone.

Aristotle accounted for the many varieties of metal by acknowledging various admixtures of dry exhalation (i.e. earth) within the moist (water). The varieties of stone were more problematic, for he considered stone – or at least those stones unaffected by fire – to be composed entirely of earth. If they were all consistent in composition, how could they differ? The solution to this problem lay in Aristotle's notion of 'concoction', whereby the inherent 'heat' of an object would naturally bring about its perfection. We could therefore expect stones to mature within the ground, just as fruit ripen in the trees above.

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After Aristotle's death in 322 BCE, his close colleague Theophrastus became head of the Lyceum (Aristotle's school of philosophy). Theophrastus ran the school for 35 years, producing hundreds of scholarly works. The few that survive include *On stones*, which would become a key source for lapidary texts through the medieval period. From this work, we can infer the likely properties of a perfectly mature stone. We are told that precious stones gain in smoothness, density, brightness and transparency. Colour is clearly important, for lyngourians (lynx-urine-stones) from the male lynx are reportedly better than those from the female, which are more yellow. Finally, the stone most noted by Theophrastus for its value is 'anthrax': *it is red in colour, and when it is held towards the sun it has the colour of a burning coal. One might say that is has great value; for a very small one costs forty pieces of gold* (Theophrastus, c. 4C BCE, 18).

The Silk Road

Aristotle's most famous student, Alexander the Great, spread Greek culture eastward through his conquest of Persia and into India. His city of Alexandria became a melting pot; both figuratively (with an expansion of material and cultural trade) and more literally... for it was here that the practice of alchemy took root. The city was the likely source of writings from the legendary sage Hermes Trismegistos (known as the Hermetic Corpus), which would blend the alchemical processes of evaporation and condensation with analogous spiritual concepts during the early Christian period (in the first three centuries CE).

The eastward push of Alexander's Macedonian Empire ended with his death in 323 BCE. With the Roman Rupublic then expanding through the Mediterranean, it was left to China's Han dynasty to complete the East-West links of the Silk Road in the first century BCE (attracted by the tall and powerful 'heavenly horses', bred by descendants of Alexander's soldiers who had settled in another of his cities, Alexandria Eschate – literally 'the furthest Alexandria').

The goods traded across the Silk Road were necessarily of high value. Silks from China. Nephrite jade from mines to the East of the Pamir Mountains, as well as lapis lazuli and spinel from Badakhshan (to the West). The most lucrative goods from the expanded Roman Republic were cloth and glassware, with the crystal-clear 'Alexandrian Glass' being most highly prized.

Glass alabastron (used to hold perfumed oil), produced in Alexandria, c. 100 BCE – 100 CE.[1]

Alexandria's artisans were renowned for their skill at fusing gold leaf between layers of Alexandrian Glass (as shown by the elaborate lotus-motif bowl and flamboyant alabastron, pictured). They would have understood the impact of different metals on the colour of glass (the Chinese writer Yu Huan noted ten colours of Roman glass, with Alexandrian Glass being produced with the addition of antimony) (Lopez; Gonzales, 2011, p.49). Perhaps this was the cause of Emperor Diocletian's ban on Alexandrian alchemy at the end of the third century CE. Adding metals to glass is a viable method of assaying (Bycroft, 2026), and Diocletian was implementing significant monetary reforms in the face of a continually debased Roman currency.

Bowl of sandwich gold glass, likely produced in Alexandria, c. 250 BC.[2]

A range of alchemical ingredients were also traded across the Silk Road. Lead served pharmaceutical purposes in the form of litharge, and cosmetic purposes in the form of cerussite ('white lead'). Copper served artistic demands for pigments of blue (azurite) and green (malachite). Arsenic sulphide was similarly used as an orange-yellow pigment; it's common name, 'orpiment', means 'gold pigment'. Indeed, Pliny reported the emperor Caligula having refined a large quantity of the mineral to (allegedly) obtain gold. But of greatest relevance to the philosopher's stone was cinnabar – a mineral of mercury sulphide that was abundant in Western China (as well as Almadén in modern Spain). Cinnabar could be decomposed into mercury (used for gilding) and sulphur (for gunpowder), then recombined to form the scarlet powder vermillion (the precious 'red sand of the sea', which was variously employed as a pigment or an elixir of eternal life).[3]

As David Brafman summarised in his work, *Art of alchemy*:

> *Since red cinnabar ore could be broken down chemically into pure mercury and sulfur, then reconstituted as a brilliant vermilion whose color surpassed the original, the elementary experiment and its ingredients offered a paragon for the alchemical aim to perfect nature.* (Brafman, 2023, p.85)

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An early twentieth century filigree brooch, with vermillion-lacquered carved wood.

Whilst many alchemists sought to accelerate the natural 'ripening' of the mineral world (inspired by the theories of Aristotle), the art's greatest impact was in the production of material goods.

By the early ninth century, alchemical practice had migrated East, to the court of Hārūn al-Rāshīd (made famous as a setting for *The Arabian Nights*). It was here that Jābir ibn Ḥayyān (aka Geber) continued the craft-based tradition of alchemy, along with the Alexandrian exploration of glass (Geber published the first recipe for iridescent glass, known as *abu qalmun*).[4] More theoretically, Geber proposed a new model for the vegetative growth of minerals; which he supposed were fed by a combination of the most fiery of earths (sulphur), and the most watery (mercury).

A seventeenth century map of the earth's interior, with channels of fire and water (by Athanasius Kircher).

Alchemy's tendency to spiritual metaphor and symbolism was perhaps no surprise, given the constant cross-cultural trade, the occasional ban, and of course the immense value posed by a secret means of transmutation. But over the course of the 'Islamic Golden Age', alchemy became increasingly quantitative (before progress was halted by the Mongol siege of Baghdad in the thirteenth century).

Alchemy's final transmutation to chemistry was completed by Antoine Lavoisier at the end of the eighteenth century, leaving the enigmatic practice of alchemy to endure in myth and legend. Meanwhile, the philosopher's stone was hidden in plain sight, for the *"stone which is not a stone"* (as the early alchemist Zosimos of Panopolis described it) was none other than the bright scarlet pigment, vermillion.

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Notes

[1] Image of a glass alabastron, part of The British Museum collection, museum number: 1985,0602.1 © The Trustees of the British Museum. Used under a Creative Commons licence CC BY-NC-SA 4.0.

[2] Image of a glass bowl, part of The British Museum collection, museum number: 1871,0518.2 © The Trustees of the British Museum. Used under a Creative Commons licence CC BY-NC-SA 4.0.

[3] In the thirteenth century, the Venetian explorer Marco Polo reported Indian yogis living to two hundred years, due to an elixir made from quicksilver (mercury) and sulphur. By this point, the practice of drinking vermillion potions was already ancient (Brafman, 2023).

[4] It is unclear whether Geber was an individual or a group of scholars, though the distinction is inconsequential for our purposes.

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