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Kenneth Cavalcanti (ed.)

The Alchemists in Search of the Philosopher's Stone

feat. Sir Isaac Newton, Harry Potter, Midas, Zosimos, Nicolas Flamel, Elias Ashmole, Geberus, Azoth, Homunculus, Magnum Opus, Iatrochemistry, Paracelsus, Hermes Trismegistus, Roger Bacon, Tycho Brahe, Robert Boyle, Jan Baptist van Helmont, Agrippa von Netesheim, Raymond Lully, George Starkey, Jorge Luis Borges

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"The Last Sorcerer": Sir Sir Isaac Newton and His Secret Recipe that Could Transform Lead into Gold and Help Achieve Immortality

Scientists, wizards, magicians, occultists and—generally speaking—alchemists looked for it centuries ago but a famous physicist did find it: one of Isaac Newton's 17th-century alchemy manuscripts, buried in a private collection for decades, reveals his recipe for a material thought to be a step toward concocting the magical philosopher's stone.
The *"philosopher's stone"* was a mythical substance that alchemists believed had magical properties and could even help humans achieve immortality.

The manuscript turned up at an auction at Bonhams in Pasadena, California, on February 16, 2016, where the Chemical Heritage Foundation (CHF) in Philadelphia bought it. The alchemy text will be available in an online repository for those interested in the history of modern chemistry, according to James Voelkel, the CHF's curator of rare books.

The handwritten document contains instructions for making "philosophic" mercury that Newton copied from a text by another known alchemist. Written in Latin, its title translates to "Preparation of the [Sophick] Mercury for the [Philosophers'] Stone by the Antimonial Stellate Regulus of Mars and Luna from the Manuscripts of the American Philosopher".

"This manuscript is of great interest to us because it is part of Isaac Newton's alchemical activity," Voelkel told Live Science. "It's a sign of his readings, interest and experiments in alchemy."
Up until the 18th century, alchemists believed that metals could be broken down into their constituent parts and be transmuted into other, more expensive metals, like gold. They developed extensive symbolism and wrote numerous manuscripts in secret codes, all as part of an elaborate process to weed out those who were unworthy of their lofty goals, Voelkel said. It was these early alchemical experiments that gave rise to modern chemistry, Voelkel added.
Making philosophic mercury was just one of the steps of the alchemical process. It could be used to make the philosopher's stone, a mythical substance that alchemists believed had magical properties. They believed that it could not only transform lead into gold, but also help humans achieve immortality. For those reasons, it was the most sought-after substance in alchemy, also called "chymistry" in 17th-century England.

Newton's recipe for philosophic mercury was originally written by an American chemist named George Starkey, Voelkel said. Starkey studied at Harvard University and moved to England in 1650 to work with eminent chemists of the time. He ended up working with Robert Boyle, one of Newton's contemporaries. But Starkey published under the pseudonym Eirenaeus Philalethes, allowing him to control other chemists' access to his experiments, Voelkel said. "This manuscript links Newton's

alchemical practice to the American figure George Starkey," Voelkel said. "He's probably America's first renowned, published scientist."
George Starkey (1628–1665) was a Colonial American alchemist, medical practitioner and writer of numerous commentaries and chemical treatises that were widely circulated in Europe and influenced prominent men of science, including Robert Boyle and Isaac Newton. After relocating from New England to London, England, in 1650, Starkey began writing under the pseudonym Eirenaeus Philalethes. Starkey remained in England and continued his career in medicine and alchemy until his death in the Great Plague of London in 1665.

Starkey was born in Bermuda, the first of at least five children of George Stirk, a Scottish minister and devoted Calvinist, and Elizabeth Painter. During his early years in Bermuda, Starkey displayed interest in natural history, as evidenced by his written entomological observations of various insects indigenous to Bermuda. After the death of his father in 1637, Starkey was sent to New England, where he continued his early education before enrolling at Harvard College in 1643 at the age of 15. Introduced to alchemical theory, he would later stylise himself as the "Philosopher by Fire". After graduating from Harvard in 1646, Starkey resided in the Boston area and earned a living practising medicine while at the same time experimenting in chemical technology.

Despite his successful medical practice, Starkey immigrated at age 22 to London, England, in November 1650 with his wife, Susanna Stoughton, whom he had married earlier that year. Susanna is believed to be the eldest daughter of Colonel Israel Stoughton, and sister of William Stoughton, a future governor of Massachusetts. It is not entirely known why Starkey decided to leave New England. One clue points to his interest in alchemy and chemical technology. It is known that Starkey was acquiring great skill at building ovens to facilitate alchemical experiments. However, he complained that the region offered unsuitable material needed for their operation, and therefore believed that relocating to England could provide access to better material and higher quality laboratory implements as well. Around this same time he changed his surname to Starkey for reasons that are unknown.

Once in England, Starkey's reputation as an alchemist and chymical furnace maker grew among the scientific community and he soon acquired a network of colleagues from the circle of friends and correspondents of Samuel Hartlib—a group of social reformers, utopians, and natural philosophers. Within a few years, however, Starkey found himself in financial trouble and was consequently incarcerated because of debt—possibly twice sometime in late 1653 and again in mid-1654. Imprisoned for a brief period of time, Starkey returned to the practice of alchemy and medicine upon his release in late 1654. Additionally, he wrote and published a number of popular treatises. Yet, his most important work was written under several pseudonyms during the period prior to imprisonment when he was associated with the Hartlib circle. The most famous of these works, the *Introitus apertus ad occlusum regis palatium*, was published in 1667 after his death.

Little is known of Starkey's early education. Prior to the death of his father in 1637, Starkey most likely was tutored, perhaps by his parents or learned acquaintances of the family. After the death of the elder Stirk, Starkey was sent to New England around 1639 to continue his studies. In 1643 he matriculated at Harvard College, where he was exposed to a core curriculum in the classical languages and theology in addition to courses in logic, physics, mathematics, politics, and history. His studies soon focused on chemical philosophy and alchemist theory. During his years at Harvard, Starkey was introduced to alchemy through the physics curriculum, which included subjects on metallic transmutation and potable gold. In addition, he acquired a thorough understanding of corpuscular matter theory that was important to his alchemist work throughout his career.

During his final years at Harvard, Starkey became increasingly occupied with the practice of medicine. He was a devoted follower of the Flemish iatrochemist Jan Baptist van Helmont, and had been tutored in the practical applications of metallurgy. His medical practice appears to have been highly successful, which included iatrochemistry. Despite his flourishing practice, Starkey decided England could provide

better access to the tools required by an alchemist, which prompted him to sail for London with his wife in November 1650.

Upon his arrival in London, Starkey's credentials as an alchemist were quickly established. He acquired immediate acclaim in England as an alchemical *savant*, due in part to the well-connected network of scientific practitioners and colleagues he had been associated with in New England. It was at this time that the transplanted New England alchemist became involved with the Hartlib circle and the fictitious identity of Eirenaeus Philalethes (a peaceful lover of truth) emerged as a result of currents swirling within the group. Samuel Hartlib was a patron and promoter of applied science, including alchemy and iatrochemistry. Yet, there were individuals within this circle dedicated to preserving secrecy and the protection of knowledge, which may have initially inspired Starkey's alternate identity.

Starkey's move to London was followed by remarkable success in establishing a medical practice and producing and administering medicinal remedies to patients, including Robert Boyle. However, despite his success, Starkey abandoned his patients in 1651 to pursue the "secrets" of alchemy, which included the production of pharmaceuticals and the transmutation of metallic substances. For example, Starkey's "sophic mercury" was an amalgam of antimony, silver and mercury, which was supposed to dissolve gold into a mixture that when heated, would produce the mythical philosopher's stone, an agent for transmuting base metals into noble ones. It is also known that Starkey tutored Boyle in the practice of chemistry and experimentation, although Boyle never acknowledged Starkey's tutelage.

As the inventor of curative drugs and philosophical mercuries, it is reasonable to assume that Starkey was concerned with guarding these inventions and preserving his trade secrets. The pseudonym 'Philalethes' allowed him to accomplish this by creating a fictitious identity under which a series of manuscripts and tracts were produced that proclaimed these discoveries while advertising that access to concealed alchemical knowledge might be obtained through Starkey, a "friend" of Philalethes and guardian of his manuscripts. It is also believed that Starkey's interest in concealing his work was driven by a desire to fashion himself as the "master of secrets" whose discoveries were "divinely sanctioned revelations". Certainly this might lift Starkey's socioprofessional standing in the minds of influential patrons within the Hartlib circle.

A few years after arriving in London, Starkey began to suffer from his own success. A variety of projects, from the manufacture of perfumes and pharmaceuticals to the production of sophic mercuries, were pulling him in different directions, straining professional relationships, and failed to generate sufficient income. The cost to personally fund these projects was leaving him financially unstable as debts increased. Finally, in 1653–1654, Starkey's creditors caught up with him. He was imprisoned twice for debt, and when not in prison, he avoided creditors by concealing his whereabouts. To make matters worse, he had lost the support of the Hartlib circle. It was necessary that a beleaguered Starkey reestablish his financial footing, restore his reputation, and attract new patronage.

The final years of Starkey's life were devoted to resurrecting his medical practice and manufacturing income-producing medicines. However, he never wandered far from his chymistry lab and his quest for Van Helmont's alchahest or the philosophers' stone. No doubt he continued his search for the perfect liquor alchahest, a medicinal solvent whose purpose was similar to theriac, an antidotal compound that was consumed to preserve health and prevent illness. Starkey's success in producing his alchahest was limited, and his quest for the philosophers' stone never came to fruition. Although he continued to produce medical treatises, three political pamphlets that he wrote in 1660 along with public disputes he engaged in with other medical practitioners and the Royal College of Physicians further tainted his career.

In 1665, the plague found London and George Starkey. For all of his belief in the ability of the Helmontian medicines to cure disease and prevent illness, the Helmontian alchahest Starkey prepared to combat the plague was ineffective. To the end, Starkey remained faithful to the Flemish iatrochemist that he revered.

George Starkey's alchemical laboratory expertise and formalised methodology were highly respected by the scientific community and became the basis for later practices in eighteenth-century experimental chemistry. His influence on Boyle's work and discoveries in chymistry is indisputable. It is perhaps the survival of Starkey's laboratory journals that is most important, for they provide the least opaque window through which to view the laboratory operations and methodological practices of a seventeenth-century alchemist. Also, Starkey's written works, especially under the name Philalethes, were widely circulated and enormously popular. They were read by notable men of science in the seventeenth century and well into the eighteenth century, to include Boyle, Locke, Leibniz, and Newton. Indeed, his writings were influential in the emerging field of chymistry by advancing the doctrine that chemical phenomena are the result of the interaction of insensible particles accompanied by chemical forces. Although George Starkey will probably never be regarded as a canonical figure in early modern science, his achievements nevertheless are significant and contribute to a wider understanding of the nature of science during this period and its historical development.

Although historians can't tell if Newton carried out Starkey's alchemy experiment himself, Voelkel said it was very likely that he did. In fact, Newton made notes and corrected a mistake in Starkey's original text. On the back of the manuscript, he also wrote down one of his own experiments for distilling lead ore.

Though best known for his study of gravity and his laws of motion, Newton also apparently wrote more than a million words of alchemical notes throughout his lifetime, historians have estimated, Voelkel said. But most of his handwritten manuscripts were sold by his descendants at Sotheby's in London in 1936. As a result, many documents were purchased by private collectors. Some of those were donated or sold back to public institutions over the years, Voelkel said. But this particular text resurfaced at Sotheby's in New York in December 2004, was offered again at Bonhams in 2009, and finally sold at Bonhams in Pasadena February 14, 2016.

English physicist and mathematician Isaac Newton produced many works that would now be classified as occult studies. These works explored chronology, alchemy, and Biblical interpretation (especially of the Apocalypse). Newton's scientific work may have been of lesser personal importance to him, as he placed emphasis on rediscovering the occult wisdom of the ancients. In this sense, some historians, including economist John Maynard Keynes, believe that any reference to a "Newtonian Worldview" as being purely mechanical in nature is somewhat inaccurate. Historical research on Newton's occult studies in relation to his science have also been used to challenge the disenchantment narrative within critical theory.

After purchasing and studying Newton's alchemical works, Keynes, for example, opined in 1942 at the tercentenary of his birth that "Newton was not the first of the age of reason, he was the last of the magicians." In the Early Modern Period of Newton's lifetime, the educated embraced a world view different from that of later centuries. Distinctions between science, superstition, and pseudoscience were still being formulated, and a devoutly Christian biblical perspective permeated Western culture.

Much of what are known as Isaac Newton's occult studies can largely be attributed to his study of alchemy. From a young age, Newton was deeply interested in all forms of natural sciences and materials science, an interest which would ultimately lead to some of his better-known contributions to science. His earliest encounters with certain alchemical theories and practices were during his childhood, when a twelve year old Isaac Newton was boarding in the attic of an apothecaries shop. During Newton's lifetime, the study of chemistry was still in its infancy, so many of his experimental studies used esoteric language and vague terminology more typically associated with alchemy and occultism. It was not until several decades after Newton's death that experiments of stoichiometry under the pioneering works of Antoine Lavoisier were conducted, and analytical chemistry, with its associated nomenclature, came to resemble modern chemistry as we know it today. However, Newton's contemporary and fellow Royal Society member, Robert Boyle, had already

discovered the basic concepts of modern chemistry and began establishing modern norms of experimental practice and communication in chemistry, information which Newton did not use.

Much of Newton's writing on alchemy may have been lost in a fire in his laboratory, so the true extent of his work in this area may have been larger than is currently known. Newton also suffered a nervous breakdown during his period of alchemical work, possibly due to some form of chemical poisoning (perhaps from mercury, lead, or some other substance).

Newton's writings suggest that one of the main goals of his alchemy may have been the discovery of the philosopher's stone (a material believed to turn base metals into gold), and perhaps to a lesser extent, the discovery of the highly coveted Elixir of Life. Newton reportedly believed that a Diana's Tree, an alchemical demonstration producing a dendritic "growth" of silver from solution, was evidence that metals "possessed a sort of life".

Some practices of alchemy were banned in England during Newton's lifetime, due in part to unscrupulous practitioners who would often promise wealthy benefactors unrealistic results in an attempt to swindle them. The English Crown, also fearing the potential devaluation of gold because of the creation of fake gold, made penalties for alchemy very severe. In some cases the punishment for unsanctioned alchemy would include the public hanging of an offender on a gilded scaffold while adorned with tinsel and other unspecified items.

He needed to be discreet about alchemy since: alchemy was a vector of heretical ideas and mobs were lynching heretics; alchemy provided technical knowledge about counterfeiting money. So, alchemy was considered dangerous.

Since the 1950s, the question of the nature and degree of influence of alchemy on Newton's main works, *Mathematical Principles of Natural Philosophy* and *Optics* has been actively discussed. At present, the understanding that there is a connection between the alchemical and natural science views of Newton has become generally accepted. Some historians of science express an opinion on the decisive nature of the influence of alchemy, occultism and hermetism on the theory of forces and gravity. A discussion of Newton's alchemical studies had a significant impact on the

Due to the threat of punishment and the potential scrutiny he feared from his peers within the scientific community, Newton may have deliberately left his work on alchemical subjects unpublished. Newton was well known as being highly sensitive to criticism, such as the numerous instances when he was criticized by Robert Hooke, and his admitted reluctance to publish any substantial information regarding calculus before 1693. A perfectionist by nature, Newton also refrained from publication of material that he felt was incomplete, as evident from a 38-year gap from Newton's conception of calculus in 1666 and its final full publication in 1704, which would ultimately lead to the infamous Leibniz–Newton calculus controversy.

Most of the scientist's manuscript heritage after his death passed to John Conduitt, the husband of his niece Catherine. To evaluate the manuscripts, physician Thomas Pellet was involved, who decided that only "the Chronology of Ancient Kingdoms", an unreleased fragment of "Principia", "Obsevations upon the Prophesies of Daniel and the Apocalypse of St. John" and "Paradoxical Questions Concerning the Morals and Actions of Athanasius and His Followers" were suitable for publication. The remaining manuscripts, according to Pellet, were "foul draughts of the Prophetic stile" and were not suitable for publication. After the death of J. Conduitt in 1737, manuscripts were transferred to Catherine, who unsuccessfully tried to publish theological notes of her uncle. She consulted with Newton's friend, the theologian Arthur Ashley Sykes (1684—1756). Sykes kept 11 manuscripts for himself, and the rest of the archive passed into the family of Catherine's daughter, who married the John Wallop, Viscount Lymington, and was then owned by the Earls of Portsmouth. Sykes' documents after his death came to the Rev. Jeffery Ekins (d. 1791) and were kept in the family of the latter until they were presented to the New College, Oxford in 1872. Until the mid-19th century, few had access to the Portsmouth collection, including David Brewster, a renowned physicist and biographer of Newton. In 1872, the fifth

Earl of Portsmouth transferred part of the manuscripts (mainly of a physical and mathematical nature) to Cambridge University.

In 1936, a collection of Isaac Newton's unpublished works were auctioned by Sotheby's on behalf of Gerard Wallop, 9th Earl of Portsmouth. Known as the "Portsmouth Papers", this material consisted of 329 lots of Newton's manuscripts, over a third of which were filled with content that appeared to be alchemical in nature. At the time of Newton's death this material was considered "unfit to publish" by Newton's estate, and consequently fell into obscurity until their somewhat sensational reemergence in 1936.

At the auction many of these documents, along with Newton's death mask, were purchased by economist John Maynard Keynes, who throughout his life collected many of Newton's alchemical writings. Much of the Keynes collection later passed to eccentric document collector Abraham Yahuda, who was himself a vigorous collector of Isaac Newton's original manuscripts.

In recent years, several projects have begun to gather, catalogue, and transcribe the fragmented collection of Newton's work on alchemical subjects and make them freely available for on-line access. Two of these are *The Chymistry of Isaac Newton Project,* supported by the U.S. National Science Foundation, and *The Newton Project,* supported by the U.K. Arts and Humanities Research Board. In addition, The Jewish National and University Library has published a number of high-quality scanned images of various Newton documents.

Of the material sold during the 1936 Sotheby's auction, several documents indicate an interest by Newton in the procurement or development of the philosopher's stone. Most notably are documents entitled *Artephius his secret Book*, followed by *The Epistle of Iohn Pontanus, wherein he beareth witness of ye book of Artephius*; these are themselves a collection of excerpts from another work entitled *Nicholas Flammel, His Exposition of the Hieroglyphicall Figures* which he caused to be painted upon an Arch in St Innocents Church-yard in Paris. Together with *The secret Booke of Artephius, And the Epistle of Iohn Pontanus: Containing both the Theoricke and the Practicke of the Philosophers Stone*. This work may also have been referenced by Newton in its Latin version found within Lazarus Zetzner's *Theatrum Chemicum*, a volume often associated with the *Turba Philosophorum* and other early European alchemical manuscripts. Nicolas Flamel, one subject of the aforementioned work, was a notable, though mysterious figure, often associated with the discovery of the philosopher's stone, hieroglyphical figures, early forms of tarot, and occultism. Artephius, and his "secret book", were also subjects of interest to 17th-century alchemists.

Also in the 1936 auction of Newton's collection was *The Epitome of the treasure of health written by Edwardus Generosus Anglicus innominatus who lived Anno Domini 1562*. This is a twenty-eight-page treatise on the philosopher's stone, the Animal or Angelicall Stone, the Prospective stone or magical stone of Moses, and the vegetable or the growing stone. The treatise concludes with an alchemical poem.

Many of the discoveries and mathematical formula found within Newton's *Philosophiæ Naturalis Principia Mathematica* can be linked, often very directly, to his occult and alchemical studies. Much of his research into the movement of heavenly bodies was influenced by his belief that there are invisible, occult forces at work in the orbits of celestial bodies. Other natural philosophers, most notably Descartes, tended to object to this notion and insisted instead that action depended on physical contact, proposing that celestial objects were moved about by a great many small particles.

The second book of the *Principia* has not withstood the test of time. Much of the work within this volume revolved around measuring air resistance on the motion of pendulums and spheres. Some believe that the main corpus of this work was ultimately an effort to refute Descartes's Cartesian theory of Vortices, according to which, planetary motion was produced by whirling fluid vortices that filled interplanetary space. This motion supposedly carried the planets with them. As a spiritual man, and as an alchemist, Newton was determined that the motion of heavenly bodies was motivated by invisible forces, that natural phenomena were motivated by forces spiritual, not merely physical.

A fragmentary alchemical text which, in 1975, became "generally accepted as" to be penned by Newton. Its authorship was immediately questioned by Karin Figala, and in 1988 William Newman conclusively proved it to be a composition by George Starkey; this fact has been repeated in a dozen publications since, and no scholar now thinks the "Key" is Newton's.

William Newman, a leading scholar of the history of science, has collected many of Newton's alchemical writings. Newton's various surviving alchemical notebooks clearly show that he made no distinctions between alchemy and what we today consider science. The very same pages in which we find the recordings of his legendary optics experiments we also find various recipes culled from arcane sources. "Alongside sober explanations of optical and physical phenomena such as freezing and boiling," Newman says, "we find 'Neptune's Trident', 'Mercury's Caducean Rod' and the 'Green Lion', all symbolising alchemical substances".

Determining that many of Newton's acclaimed scientific discoveries were influenced by his research of the occult and obscure has not been the simplest of tasks. Newton did not always record his chemical experiments in the most transparent way. Alchemists were notorious for veiling their writings in impenetrable jargon, and Newton made matters even worse by inventing symbols and systems of his own. That is part of the reason why, despite Newton's reputation, many of his manuscripts have still not been properly edited and interpreted. "They are in a state of considerable disorder," Newman says.

Even where the text can be deciphered this only gets you so far. "Although we can make educated guesses about his chymical work from reading," Newman says, "there are often too many variables in chemical research to make it possible to predict an exact outcome from Newton's notes." So Newman and his colleagues set out to repeat the experiments Newton described - using exactly the same conditions.

In a manuscript from 1704, Newton describes his attempts to extract scientific information from the Bible and estimates that the world would end no earlier than 2060. In predicting this, he said, "This I mention not to assert when the time of the end shall be, but to put a stop to the rash conjectures of fanciful men who are frequently predicting the time of the end, and by doing so bring the sacred prophesies into discredit as often as their predictions fail.

Newton extensively studied and wrote about the Temple of Solomon, dedicating an entire chapter of *The Chronology of Ancient Kingdoms Amended* to his observations of the temple. Newton's primary source for information was the description of the structure given within 1 Kings of the Bible. In addition to scripture, Newton also relied upon various ancient and contemporary sources while studying the temple. He believed that many ancient sources were endowed with sacred wisdom and that the proportions of many of their temples were in themselves sacred. This belief would lead Newton to examine many architectural works of Hellenistic Greece, as well as Roman sources such as Vitruvius, in a search for their occult knowledge. This concept, often termed *prisca sapientia* (sacred wisdom and also the ancient wisdom that was revealed to Adam and Moses directly by God), was a common belief of many scholars during Newton's lifetime.

A more contemporary source for Newton's studies of the temple was Juan Bautista Villalpando, who just a few decades earlier had published an influential manuscript entitled *In Ezechielem explanationes et apparatus urbis, ac templi Hierosolymitani* (1596-1605), in which Villalpando comments on the visions of the biblical prophet Ezekiel, including within this work his own interpretations and elaborate reconstructions of Solomon's Temple. In its time, Villalpando's work on the temple produced a great deal of interest throughout Europe and had a significant impact upon later architects and scholars.

As a Bible scholar, Newton was initially interested in the sacred geometry of Solomon's Temple, such as golden sections, conic sections, spirals, orthographic projection, and other harmonious constructions, but he also believed that the dimensions and proportions represented more. He noted that the temple's measurements given in the Bible are mathematical problems. Newton believed that the temple was designed by King Solomon with privileged eyes and divine guidance. To Newton, the