

from library to laboratory

Newton started to read and make extracts from alchemical texts in the late 1660s. He soon began to carry out experiments for himself, in a laboratory that he had constructed at Trinity, and he amassed a substantial alchemical library. Quite apart from the intrinsic appeal of the quest for the transmutation of metals, alchemy offered answers to several questions that bothered Newton elsewhere in his work. The transformations in form, appearance, and perhaps even essence achieved by alchemical experiment seemed to reveal much about the composition and structure of matter. They also suggested how active forces might operate within and between material bodies. Alchemical ideas may even have informed the concept of divine action that Newton developed. They certainly provided him with evidence to support his belief that philosophical and religious truth was the preserve of a virtuous minority. The investigation of the mysteries of chemical transformation was perhaps Newton's principal activity in the years from the early 1670s until the mid-1690s.

52 king's college, cambridge, keynes ms. 32, p. 3

(figure 32)

21 × 16.3 cm

Michael Maier (1569–1622) was one of the alchemical writers who most influenced Newton and his contemporaries. Newton had copies of nine separate publications by Maier in his library (see catalogue number 53) and made a substantial manuscript anthology from Maier's work (figure 32), as well as copying other shorter passages. He was familiar with the text of Maier's *Symbola aureae mensae duodecim nationum* (Frankfurt, 1617) as early as the late 1660s, but probably copied the extracts from it that are on display in the 1680s or early 1690s. These provide a summary of book two of Maier's work, in particular his account of the alchemy of

figure 32
Extracts from
the work of the
alchemist,
Michael Maier,
King's College,
Cambridge,
Keynes Ms. 32,
p. 3.



Maria the Jewess, supposedly the sister of Moses and teacher of the princes of the Egyptians. According to Maier, who made her one of the twelve wisest philosophers, Maria spoke of the marriage of male and female elements through fire and in the smoke given off from 'the Hermetic vase'. This may perhaps have been a reference to the sublimation of black lead sulphide (PbS) to create yellow lead oxide (PbO), a process with which Newton could have been familiar from his many experiments with lead compounds and amalgams from the 1670s onwards (although see also catalogue number 53).

The history of alchemy that Maier provided in the *Symbola* was particularly important for the development of Newton's alchemical reading and research. Maier's work was one of the principal sources used by Newton to compile a list of chemical authors, perhaps in the early 1670s, which he continued to amend and expand into the 1690s. Although by no means a catalogue of Newton's alchemical library, this list and its successors certainly represented an assessment of those books that it would be desirable for a practising alchemist to read and own. Maier's influence was especially apparent in the increasing emphasis given in Newton's library to ancient and medieval alchemical authors during the 1680s and 1690s.

Karin Figala, John Harrison, and Ulrich Petzold, 'De Scriptoris Chemicis: Sources for the Establishment of Isaac Newton's (Al)chemical Library', in P.M. Harman and Alan E. Shapiro (eds), *The Investigation of Difficult Things* (Cambridge, 1992), pp. 135–79; John Harrison, *The Library of Isaac Newton* (Cambridge, 1978), pp. 188–9; Ulrich Neumann, 'Maier, Michael', and Heike Hild, 'Maria', both in Claus Priesner and Karin Figala (eds), *Alchemie: Lexikon einer hermetischen Wissenschaft* (Munich, 1998), pp. 232–6; Betty Jo Teeter Dobbs, *The Janus Faces of Genius* (Cambridge, 1991), pp. 122–3.

Sotheby sale, 13 July 1936, lot 43; purchased by Gabriel Wells for £34. J.M. Keynes wrote to Wells to ask about this manuscript on 25 August 1936 and was offered it for a ten percent commission by Wells on 4 September. The transaction was completed on 8 September.

53 michael maier, *Secretioris naturae secretorum scrutinium chymicum*
(Frankfurt, 1687)

(figure 33)

 $4^o: \pi^4, a-t^4$

16.6 × 11.2 cm

Trinity College, Cambridge, shelfmark nq 16/88

This book is one of nine separately published works by Maier that were in Newton's library at his death. Newton has marked numerous passages (see figure 33) by turning down the corners of the relevant pages. The

figure 33
Newton's copy of
Michael Maier,
*Secretioris naturae
secretorum scruti-
nium chymicum*
(Frankfurt, 1687),
Trinity College,
Cambridge,
nq 16/88, pp. 64-5.



opening on display (pp. 64–5), which is also indicated in this manner, discusses the transformation of so-called black lead into a pure white substance and its subsequent refinement through ‘cooking’ or heating. According to Maier, these were stages in the manufacture and purification of the philosopher’s stone. Maier cites works supposedly by the Arabic alchemists, Geber and Rhazes, and appears to refer to a series of amalgamations of lead, tin, and other metallic compounds. In his experiments of the 1680s (see catalogue number 14), Newton was often concerned with the combination of lead and salts of tin leading to changes in the form of both substances.

John Harrison, *The Library of Isaac Newton* (Cambridge, 1978), p. 188.

Listed by the booksellers who appraised Newton’s library for his executors; bought with the rest of the library by John Huggins in 1727. Bookplate of Charles Huggins. Bookplate of James Musgrave, with shelfmark C1–8. Presented to Trinity College, Cambridge, on 30 October 1943 by the Pilgrim Trust.

54 king’s college, cambridge, keynes ms. 62, f. 4r

(figure 34)

19.7 × 15.6 cm

Newton began reading alchemical books in the late 1660s. In 1669, he recorded that he had spent £1. 8s. on the *Theatrum chemicum* (1659–61), a six volume compendium of chemical works edited by Lazarus Zetzner (see catalogue number 3). At about this time, he also acquired a small volume containing copies of a number of miscellaneous alchemical texts in manuscript. Many of these texts had appeared in print. Some could be found in the *Theatrum chemicum*; several were included in Elias Ashmole’s *Theatrum chemicum Britannicum* (1652); others had been published separately or in other collections. Newton often kept extracts from printed books in small notebooks made by folding a sheet of paper into four. He treated his collection of alchemical manuscripts in a similar way, making extracts of particular works in the sheet of notes on display. In addition to copying the text of ‘The breif of Sr Edward Vere his book’, Newton also made drawings of the vessels and furnace recommended by the author for the distillation of mercury.

Betty Jo Teeter Dobbs, *The Foundations of Newton’s Alchemy* (Cambridge, 1975), pp. 88, 132, 137; King’s College, Cambridge, Keynes Ms. 67.

Sotheby sale, 13 July 1936, lot 108; purchased by Maggs Brothers for £16. Offered to J.M. Keynes for a twenty percent commission on 30 July 1936.

figure 34
 Drawings of
 chemical apparatus
 from Newton's
 notes,
 King's College,
 Cambridge,
 Keynes Ms. 62,
 f. 4r.



55 retort and crucible

Museum of the History of Science, Oxford

Newton would have used pieces of apparatus similar to these in his chemical experiments (see catalogue number 54). Tall, triangular crucibles are known to have existed from the sixteenth century and were being manufactured by John Dwight at Fulham in the 1670s and 1680s. They were often used for the heating of metals in the laboratory. Stoneware retorts were widely employed for distillation.

The examples of these objects that are on display were excavated from the rear of the Museum of the History of Science in Oxford, originally the site of the museum founded by Elias Ashmole and opened to the public in 1683. The basement of this building was used as a laboratory in the late seventeenth century. The design of these vessels was long lived, however, and they could equally well date from the mid-eighteenth century.

J.A. Bennett, S.A. Johnston, A.V. Simcock, *Solomon's House in Oxford. New Finds from the First Museum* (Oxford, 2000), pp. 30–47.