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Journal Title: The Investigation of difficult things :  
essays on Newton and the history of the exact  
sciences in honour of D.T. Whiteside /

Volume: Issue:

Month/Year: 1992

Pages: 135-179

Article Author: Karin Figala, John Harrison, and  
Ulrich Petzold

Article Title: De scriptoribus chemicis....

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## **6 *De Scriptoribus Chemicis*: sources for the establishment of Isaac Newton's (al)chemical library**

KARIN FIGALA, JOHN HARRISON† AND  
ULRICH PETZOLD

### **Acknowledgements**

First of all, we wish to thank D. T. Whiteside for his kind and valuable help in dating the Newton manuscript to be discussed in this paper. One of the authors particularly (K F) is deeply obliged to him, since she has made demands both on his scholarship and on his friendly advice in the course of all her own Newtonian research in the last decades. We are indebted to Alan E. Shapiro for his communications in the field of watermark dating of Newtonian (al)chemical manuscripts and for his – and Peter E. Spargo’s – stimulating discussion of an early version of this paper. Last, but not least, we thank Margaret Kimball, the Stanford Archives and Manuscripts librarian, for kindly providing us with copies of the basic material for our study, and Richard Lorch for his efforts in translating parts of this paper.

A study of *De Scriptoribus Chemicis* was planned a long time ago when John Harrison – some years after the publication of his invaluable study, *The Library of Isaac Newton* (1978) – asked K F for her opinion on this manuscript, its possible source and significance. The contribution in honour of D. T. Whiteside, their common friend, seemed to both an ideal opportunity for realizing this long delayed project. Unfortunately, the development of this study took a tragic turn with the sudden and unexpected death of John Harrison. There was no opportunity to discuss the final version of this paper which had been substantially changed, when in the course of transcribing our basic manuscript UP identified further fragments of a related nature and suggested their incorporation together with a discussion of chronological aspects within the growth of Newton's library. Thus we had to decide to rework the draft left by Harrison to avoid reiterations and/or contradictions. For reasons of conclusiveness and consistency we have been unable to restrict such interventions to a few essential points. Harrison's text is now incorporated mainly into the initial section of this study, and into the introduction to our annotated transcription of Newton's *De Scriptoribus Chemicis* manuscript. We were, of course, able to base the introduction on Harrison's preliminary work but we also include our own further identifications of works traceable to collected editions or compendiums in Newton's possession. We refrained from designating the portions of any contributor and request that this study be read as our common effort. We hope that we have concluded our joint investigations in accordance with John Harrison's wishes and would like it to stand in part as a tribute to his own path-breaking work on the library of Isaac Newton.

(K F and UP)

## Introduction: Newton's manuscript *De Scriptoribus Chemicis* and its source

Thanks largely to the work of J. Harrison,<sup>1</sup> the contents of Newton's library as it appeared to his executors is now very precisely known to us. Thus we know what chemical and alchemical books – which concern us here – Newton once had possessed, except, perhaps, for volumes that had been lost during his lifetime or afterwards. Of course, we do not know *a priori* when or in what order this (al)chemical library grew. But a temporal reconstruction of his library seems to be rather important in so far as it would give us valuable insights into the development of Newton's interest in alchemy beyond the knowledge we may derive from the study of his manuscripts in this domain. It could, in principle, also help us to date parts of these manuscripts by using titles of books much as paleontologists use 'key fossils', i.e. to judge the date of origin of manuscript records by the presence or absence of quotations of verifiable books.

Unfortunately, the whole corpus of Newton's alchemical papers contain very little information from which we could deduce directly when any volume was acquired. On the other hand a whole series of hand-written documents and notes can be listed offering indirect evidence about Newton's ownership as well as about his quest for relevant literature. Thus our presentation and short evaluation of such material may serve as a first step towards more detailed studies concerning the formation of Newton's (al)chemical library.

The primary source for this study was a manuscript, headed 'De Scriptoribus Chemicis'<sup>2</sup> and comprising five closely written pages of text which had been drawn up in Newton's hand on his typical quarto-sheets. It was formerly preserved with the bulk of Newton's alchemical papers<sup>3</sup> and is now located in the Stanford University Libraries – Department of Special

<sup>1</sup> J. Harrison, *The Library of Isaac Newton* (Cambridge University Press, 1978); for all references to books from Newton's library this work is quoted in the following as *HL*, succeeded by Harrison's item number.

<sup>2</sup> See Harrison, *Library*, pp. 8–9, where he makes mention of the *De Scriptoribus Chemicis* manuscript. KF was able to identify its source only after Harrison had published his *opus magnum*. An additional book-list, drawn up by Newton after 1697, is described *ibid.*, p. 9. From dash-markings mentioned by Harrison and discrepancies between the content of this list and Newton's final library, we may conclude a purpose quite similar to the material to be discussed here. However, these books concern different subjects, 'mainly classical literature, history, and mythology'.

<sup>3</sup> See section I, lot 6 in *Catalogue of the Newton Papers sold by order of the Viscount Lymington ...* [London: Sotheby, 1936]; for a slightly modified version of the Sotheby descriptions see 'Appendix A: The alchemical papers of Sir Isaac Newton', in B. J. T. Dobbs, *The Foundation of Newton's Alchemy or, The Hunting of the Greene Lyon* (Cambridge University Press, 1975), pp. 235–48. See also the introduction to our Appendix ('Transcription').

Collections, Manuscripts Division: Newton Collection (M132), Container 2, Folder 4.<sup>4</sup> Contrary to its comprehensive title this manuscript is not a commentary on (al)chemical writers and their work but a mere listing of eighty-four authors and titles of books, arranged in alphabetical order and supplied with successive page references; the majority of the works are in Latin, with the exception of a few in French. Furthermore, the majority of entries refer to printed books, again with the exception of a few titles 'in MS'. Unlike Newton's common application of references to and quotations from printed sources, these entries are strictly arranged bibliographically, i.e. almost all include author, title, place and date of publication, and frequently size. As a conspicuous peculiarity of this listing we find a dash at the beginning of fourteen of the works or, heading two other entries, a cross and once Newton's characteristic ☐ sign, while the remainder has no sort of introductory symbol. The whole set of notes is completed by an additional short listing of another six works, but now in English and without further bibliographical details. Newton had written this portion at the bottom of his last page, immediately following the final entry of his main list but clearly separated by indentation and a short line.<sup>5</sup>

The manuscript gives the firm impression that the main sequence, i.e. the first eighty-four items, was drawn up in a single operation: the handwriting, its regularity, and the evenness of presentation point strongly to this conclusion. Newton's short supplementary listing and one further insertion may seem to disturb this view, but he obviously added material to his notes while progressing with his completion of the list. The later entries, together with the said insertion that explicitly bears '1692' as a date of publication, were written with a sharper, final quill pen, and the internal evidence of the actual years of their publication and their quite different sources combine to make it plain that they were later supplements to the main body of titles. Professor B. J. T. Dobbs gave special attention to these supplements and dated the Stanford list to Newton's 'late period by the handwriting'.<sup>6</sup> Our own estimation of a much earlier dating of the main portion of this manuscript, i.e. to the early 1670s, was quite recently supported by the judgement of D. T. Whiteside. From his wide experience with the characteristics of Newton's handwriting, he places the date of origin into 'the late 1660s even before April 1669 when he [Newton]

<sup>4</sup> See also *Stanford University Libraries: Department of Special Collections – Manuscripts Division Register*, proc. J. Halpern (type-script, 1981); quoted as Stanford M132.

<sup>5</sup> See our Appendix ('Transcription'). All subsequent references to any title from Newton's *De Scriptoribus Chemicis* list (abbreviated *DSC*, followed by item numbers) are by item numbers; thus items [1]–[84] constitute the main list, items [Add 1]–[Add 6] the short supplementary listing; cf. also the introductory remarks to this transcript.

<sup>6</sup> Dobbs, *Foundations*, p. 112; for Newton's late insertion see *DSC* [24].

bought the *Theatrum chemicum*.<sup>7</sup> Further, (internal) arguments for this early dating will be discussed below.

The latest internal date, apart from the confounding ‘1692’ insertion, occurs within Newton’s own plain reference to his original source: ‘[...] promittebat Borellus A. C. 1654’,<sup>8</sup> a reference that can be verified undoubtedly by collation. Among the books on (al)chemical matters which Newton owned he had a copy of Pierre Borel’s *Bibliotheca chimica. Seu Catalogus librorum philosophorum hermeticorum. In quo quatuor millia circiter authorum chimicorum, vel de transmutatione metallorum, re minerali, & arcanis, tam manuscriptorum, quam in lucem editorum, cum eorum editionibus, usque ad annum 1653. continentur. Cum eiusdem Bibliothecæ Appendix & Corollario. ... (Paris, 1654, in 12°)*.<sup>9</sup> This work, consisting of an introductory twelve pages, followed by 276 pages of the main text in alphabetical order of authors and titles (including the ‘Appendix’ on twenty-four pages, the ‘Corollarium’ on twelve pages, and an ‘Epistola chimica’), ‘was the first of its kind’, as Ferguson acknowledged,<sup>10</sup> and was regarded by Bolton as ‘the first extensive catalogue of chemical books’.<sup>11</sup> It was from Borel’s book that Newton chose to copy out the entries which comprise the Stanford manuscript except for the final six entries (one of these was not mentioned by Borel and five were published after 1654) and the insertion of 1692 recording an English translation published at London.

There is little doubt that Newton looked upon Borel’s *Bibliotheca* as his

<sup>7</sup> Private communication to J. Harrison (1989). On Newton’s purchase of the *Theatrum chemicum* in April 1669 see note 58.

<sup>8</sup> See DSC [43]; see also [1]: ‘[...] Borellus vidit [...]’.

<sup>9</sup> HL 246; all references to the *Bibliotheca* in the present study are to this 1654 edition.

<sup>10</sup> J. Ferguson, *Bibliotheca chemica*, 2 vols. (Glasgow: Maclehose, 1906; repr. London: Verschoyle, 1954), vol. 1, p. 116. Borel was born at Castres in or about 1620, studied medicine at Montpellier University and, after obtaining his doctor’s degree at the University of Cahors in 1643, returned to practise medicine in his native town. In 1653 he went to Paris where he actively pursued studies of natural history, chemistry, optics, astronomy, antiquities, philology, and bibliography. He published several books on such subjects and also left a considerable list of projected works, none of which, however, was issued until his death in 1671 or afterwards. A reprint of his *Bibliotheca* – differing just in setting and pagination – was published at Heidelberg in 1656, which would suggest that the book was favourably received. For more details (and corrections) see J. Chabbert, ‘Pierre Borel (1620?–1671)’, *Revue d’Histoire des Sciences* 21(1968): 303–43; cf. also *The Correspondence of Henry Oldenburg*, eds. A. R. & M. Boas Hall, 13 vols. (Madison: University of Wisconsin Press; London: Mansell; London/Philadelphia: Taylor and Francis, 1965–86), esp. vol. 1, pp. 320–2, no. 119.

<sup>11</sup> H. C. Bolton, *Select Bibliography of Chemistry*, 3 vols. (Washington: Smithsonian Institution, 1893–1901), vol. 1, p. 7. An edition of the *Bibliotheca* of 1676 mentioned by Bolton cannot be confirmed.

prime guide on bibliographical material relating to matters chemical and alchemical. The present location of his copy of this work of reference is unfortunately unknown nor was its condition ever described in detail. Further indications of Newton's confidence in Borel as a reliable authority, however, are provided by scattered manuscript notes in some surviving books from his own library. For example, in his copy of *Tractatus aliquot chemici singulares summum philosophorum arcanum continentes...* (Geismar, 1647),<sup>12</sup> at the end of the book's preface which is signed 'L.C.' Newton added 'id est Lud. Combachius. Vide Bibl. Chem. p. 64'. Similarly on the title-page of his *Enarratio methodica trium Gebri medicinarum, in quibus continetur vera lapidis confectio...* ([London], 1678),<sup>13</sup> Newton wrote 'Vide Borelli Bibliothecam Chemicam p. 20' where the same title is included within the entry for a manuscript in the possession of 'D. de Loberie, Paris'. It is perhaps more significant to see how Newton appears to have deciphered the code employed by Michael Maier at the foot of p. 160 of his *Themis aurea; hoc est, De legibus Fraternitatis R. C. tractatus...* (Frankfurt, 1618).<sup>14</sup> The last seven lines of Maier's text are printed in an apparently meaningless jumble of letters. Newton's annotations returned the lines to understandable Latin, and underneath he added the key to the permutation of five letters which enabled him to break the code. In this case he failed to acknowledge that Borel had already supplied the solution. In his 'Epistola chimica' addressed to Thomas de Riolet, Borel had discussed 'Ænigmatis Maieriani, in Themide aurea, Referatio', and on the following page offered his 'Explicatio'.<sup>15</sup>

Borel's compilation was not the only bibliographical tool on (al)chemical matters which Newton ever had at hand. At least during the very late 1680s he came into the possession of a small volume, entitled *A Catalogue of chymicall books. In three parts. In the first and second parts are contained such chymicall books as have been written originally, or translated into English: with a large account of their titles, several editions and volumes....* (London, 1675),<sup>16</sup> which had been collected and published by the London bookseller William Cooper. This booklet was a most useful complement to the *Bibliotheca chimica*, since Cooper had restricted himself to English editions, and afforded valuable insights into the development of contemporary (al)chemical publishing up to

<sup>12</sup> HL 1623.      <sup>13</sup> HL 554.      <sup>14</sup> HL 1049, and Harrison, *Library*, p. 21.

<sup>15</sup> Borel, *Bibliotheca*, pp. 275 seq.

<sup>16</sup> DSC [Add 1]. On Cooper see Ferguson, *Bibliotheca chemica*, vol. I, p. 135, and S. J. Linden, *William Cooper's Catalogue of Chymicall Books 1673–88: A verified edition*. Garland reference library of the humanities, 670 (New York: Garland, 1987); also L. Rostenberg, 'Restoration scientific publishing: [4.] William Cooper, specialist in alchemy', *The AB Bookman's Yearbook* 1980/1: 77–106, on 102 seq., and her recent *The Library of Robert Hooke. The Scientific Book Trade of Restoration England* (Santa Monica, Calif.: Madoc, 1989); see note 44.

Newton's days. Significantly, Newton purchased a late reissue of the original *Catalogue*, enlarged by an inserted 'Continuation and appendix ... to ... 1688'. Knowledge of this additional work of reference, however, does not contribute substantially to the knowledge of Newton's bibliographical pursuit for his own copy bears no conspicuous signs of use.<sup>17</sup> In the case of Borel's *Bibliotheca*, there are no recorded signs at all. Thus any study of Newton's continuing concern for printed sources on alchemy has to be based exclusively on manuscript records.

### *De Scriptoribus Chemicis* and related manuscripts: new approaches to Newton's (al)chemical library

At about the time that Newton left Cambridge – the scene of his extensive studies in alchemy, theoretical and practical – he wrote the most important of the manuscripts documenting the formation of his private library on the subject. An inventory headed *Lib. Chem.*<sup>18</sup> records the holdings of the collection about 1696–97, shortly after he settled in London. From this we know that at this time Newton possessed 112 (113) titles in 139 volumes of an almost exclusively alchemical nature.<sup>19</sup> Another datable document, a bookseller's delivery note 'Books for Mr Newton', gives information about a further twelve titles of alchemical and related literature that he acquired



- <sup>17</sup> The 'Continuation' (1688) was not considered by Harrison; cf. the collation of Newton's copy [Babson 403] in *A Descriptive Catalogue of the Grace K. Babson Collection of the Works of Sir Isaac Newton...* (New York: Reichner, 1950), pp. 183–4, and Linden, *Cooper's Catalogue*, pp. xli–xliv (who only knows of two copies of the enlarged 1688 reissue – but not of this one). The Babson *Catalogue* refers to 'one entry ... marked, apparently in Newton's writing'.
- <sup>18</sup> Babson Institute Library, Babson Park, Mass.: Babson [418]; see *Catalogue of the Babson Collection*, p. 192 (with reproduction of f. 1r facing p. 177). The catalogue entry ('A List of 119 Alchemical Books, or author's names, arranged under nationalities, forming part of Newton's Library, with his press-marks') is misleading as the compilers mixed up the descriptions of two different manuscripts forming together lot 3 of the Sotheby sale in 1936. Babson [418] is only part 2 of the original Sotheby item whereas part 1 ('A list of 119 [recte: 121] Writers on Alchemy, arranged under nationalities') is now preserved at St Andrews University; cf. note 24. In 1982 J. Harrison prepared a preliminary study of *Lib. Chem.* (and sent his manuscript to KF for cross-checking). In view of the importance of the manuscript in the establishment of Newton's (al)chemical library, the present authors hope to edit Harrison's introductory essay together with his scholarly work of identifying Newton's short-titles in this list in a forthcoming study. None of the following references (in the following abbreviated *LC*) to books appearing in Newton's *Lib. Chem.* manuscript of 1696–97 could have been made without Harrison's preliminary work.
- <sup>19</sup> See Harrison, *Library*, pp. 8–9, and 41–2. The count of titles and volumes has been slightly revised compared to Harrison's.

around 1702, in this case predominantly in French.<sup>20</sup> Together, *Lib. Chem.* and this post-1700 bill may be considered as an important reference for the following reflections for they tell us the titles of those books that Newton demonstrably possessed and give us a *terminus ante quem* – or even an actual date – for their acquisition. In the course of our discussion, however, we hope to show that there is more evidence for the acquisition of alchemical books by Newton about or after 1700 than these documents alone, and the consideration of years of publication of other books in his library, would suggest.

There is another group of records and notes of quite a different kind. Of these ‘bibliographical papers’ the earliest and most important is the one reproduced and commented upon here, the *De Scriptoribus Chemicis*. Further notes based on the same source, Borel’s *Bibliotheca chimica*, have come to light from our casual inspection of Newton’s alchemical papers, but they differ from the first list both in fullness of detail and in dating. These are, briefly, a revised version of *De Scriptoribus Chemicis*, and a concise draft of extra items. Also to be considered here are the above-mentioned additions and insertions to these originally homogeneous excerpts – additions that must be dated individually and which have been taken from more recent sources. The importance of this group of manuscripts as a whole lies in their mainly being lists of desiderata. It is true, that the first of these excerpts, the *De Scriptoribus Chemicis* list, also contains some references to extant manuscripts (owned by French or English collectors) and a few pseudo-biographical notes on chemical writers. At first sight this may lead one to believe that it is not simply a list of titles that Newton wished to incorporate into his (al)chemical library. However, internal evidence as well as a comparison with the later excerpts from the *Bibliotheca* make it quite plain that this was its main purpose. As his main inventory of desiderata, Newton’s repeated transcriptions from the *Bibliotheca* would gain particular importance for by comparing the various lists – so far as they are datable by handwriting or internal evidence – at least an approximate period can be deduced for the accession of books in his library.

A short *excursus*, presenting Newton’s different attempts to compose

<sup>20</sup> Bodleian Library, Oxford: MS New College 361/II (Ekins Papers), f. 78r–78v; see Harrison, *Library*, p. 9. R. S. Westfall, ‘Alchemy in Newton’s library’, *Ambix* 31(1984): 97–101, discussed the ‘Ekins list’ rather as documenting Newton’s interest in the French language than in alchemy at the time after 1700; see also R. S. Westfall, *Never at Rest. A Biography of Isaac Newton* (Cambridge University Press, 1980), p. 531, and also his ‘Newton and alchemy’, in *Occult and Scientific Mentalities in the Renaissance*, ed. B. Vickers (Cambridge University Press, 1984), pp. 315–35, on p. 332 seq. On the controversy in general and the ‘Ekins list’ in particular see also K. Figala & U. Petzold, ‘Alchemy in the Newtonian circle: personal acquaintances and the problem of the late phase of Isaac Newton’s alchemy’, in J. V. Field and Frank A. J. L. James, eds., *Renaissance and Revolutions: Humanists, Scholars, Craftsmen and Natural Philosophers in Early Modern Europe*.

authors' lists or establish principles of classification within the vast amount of alchemical writers. may further elucidate the peculiarities of what we call 'bibliographical records'.<sup>21</sup> The heading of *De Scriptoribus Chemicis* suggests the close relationship, if not a direct correlation, to another Newton manuscript, entitled 'Of Chemicall Authors & their writings'.<sup>22</sup> Similarly to *De Scriptoribus Chemicis* its 'English counterpart' is a comprehensive listing of 120 authors' names (including anonymous tracts) in alphabetical order, each entry summarizing details on their lives and/or significance of works. But unlike the former, this manuscript bears no references to available editions of any of the works specified. Instead it bears unmistakable quotations of its sources throughout: *Of Chemicall Authors* was compiled from the 'historical' representation of alchemy as Newton found it in the work of the German Michael Maier, especially in his *Symbola aureæ mensæ duodecim nationum...* (Frankfurt, 1617).<sup>23</sup> This manuscript from the early 1670s was followed by a series of classifying listings which again in essence were based on the work of Maier, but had been expanded by Newton to some more contemporary names. Thus he drafted a table of authors' names arranged by nationalities<sup>24</sup> and compiled a bundle of chronological listings arranged by approximate dates (of origin or publication of major works) which comprise elaborated sets (e.g. 'Authores antiquissimi' or 'vetustissimi' to medieval and fifteenth- to seventeenth-century authors) as well as preliminary drafts, sets without subdivision and sets of selected authors ('Authores magis utiles' or 'optimi').<sup>25</sup> The whole of these rather semi- (or bio-) bibliographical records gives the impression of being the nucleus of Newton's own proposed chronology of alchemical writers or, in analogy to his unique key word



<sup>21</sup> The authors owe the insertion of this paragraph – contrary to our initial tendency towards disregarding any consideration of such 'non-bibliographical' materials – to the valuable suggestions of P. E. Spargo who also made his own copies of two documents (the following Babson and St Andrews MSS) available to us. A detailed discussion of the significance of Newton's classified authors' lists would need a separate study.

<sup>22</sup> Babson [419]; dated to 1670–75 by handwriting.

<sup>23</sup> See e.g. *ibid.*, f. 1r: 'Symbola aureæ mensæ Majeri lib 6.', etc.; on Newton's holdings of Maier's works see note 84. Other sources are 'Mairi [sic] Emblem 7' (f. 2v; cf. note 85), 'Bernh: Trevisan[us]' (f. 1r, etc.; text publ. in *Theatrum chemicum*, vol. I, and *Tractatus aliquot chemici...* [1647, cf. note 12]), 'Flammellus [...] Hieroglyph [...] Cap 5' (f. 4r; most probably MS excerpt; cf. note 90).

<sup>24</sup> St Andrews University, Chemical Department, Special Collections: MS Newton 3 (no heading).

<sup>25</sup> King's College, Cambridge (Keynes Collection; in the following generally quoted as Keynes MSS): Keynes MS 13A (early part: mid- or late 1680s)/B (middle part: early 1690s)/C (late part: after 1700); part B contains an extra Borel excerpt (see note 36). On Keynes MS 13 in general see also Dobbs, *Foundations*, p. 174.

compilation *Index chemicus*,<sup>26</sup> of an ‘Index auctorum chemicorum’. Thus the main characteristics of the *Of Chemicall Authors* group of manuscripts are their common source – Maier’s *Symbola* – their commented listing of writers and works and the absence of bibliographical data. In contrast, the *De Scriptoribus Chemicis* group is based on a common source of completely different nature – Borel’s *Bibliotheca* – and merely enumerates authors, titles of their works, and data specifying particular editions. It is the last-named class of authors’ lists that we understand by Newton’s ‘bibliographical records’.

Of course we dare not deny any interdependencies between both the *Of Chemicall Authors* and the *De Scriptoribus Chemicis* groups. There are some few demonstrable links<sup>27</sup> as well as a remarkable correspondence within the choice of authors and titles. But in the context of compiling information on (al)chemical primary sources *Of Chemicall Authors* might be regarded as a possible recommended-reading guide. *De Scriptoribus Chemicis*, however, is undoubtedly aimed at definitely available prints of separate or collected text editions. Newton’s reasons for compiling the list, the use for which it was intended, and his motivation for singling out these particular items may be revealed by the following considerations.

First, there are the above-mentioned marginal signs to indicate single titles or publications. These markings do not relate in every instance to Newton’s own library; they do not relate in any instance to that of Trinity College where the holdings of (al)chemical books were very modest during his long residence there.<sup>28</sup> Some of these particular works are repeated, in another form, in as many as three subsequent lists within the *De Scriptoribus Chemicis* group, but may be shown to have been in Newton’s final library. Others, marked as well as unmarked editions, appear only in the first list, but were incorporated into his library, too. Yet others recur once or twice, without having ever been in Newton’s possession. This procedure of selecting, further selecting by marking, and repeating within a subsequent choice suits perfectly an arrangement of

<sup>26</sup> See R. S. Westfall, ‘Isaac Newton’s Index chemicus’, *Ambix* 22 (1975): 174–85.

<sup>27</sup> See Keynes MS 13, f. 3v: ‘Democritus de Arte sacra cum Synesij et Pelagij Comment. Coloniae 1574 in 16.’; this is the only entry within authors’ lists that gives bibliographical data copied by Newton from Borel or from his own previous versions of *De Scriptoribus Chemicis*; see *DSC* [47]/[81a] and [51]. Some textual equivalents in Babson [419] and *DSC* items originate from correspondences of Maier’s *Symbola* and Borel’s *Bibliotheca*; a few pseudo-biographical *DSC* items, too, may be considered as such links.

<sup>28</sup> P. Gaskell, *Trinity College Library: the first 150 years* (Cambridge University Press, 1980), pp. 241–8, where under the Catalogue headed ‘Medici’ there are eight works which could be considered (al)chemical; see also Trinity College Library: Add.MS a.101 and Add.MS a.107.

desiderata lists ‘in progress’. The interpretation is confirmed by the comparison of these listings with their ‘result’, Newton’s final library. Thus the category of repeated and/or marked items comprises foremost hardly obtainable sixteenth-century issues; the holdings of such volumes in Newton’s library are rather fragmentary. The category of non-recurring entries comprises a great number of works that Newton possessed at least in translation or by collected editions; all the contemporary – and therefore available – English language titles, published in the second half of the seventeenth century and recorded by Newton in addition to his Borel excerpts, came into his library without exception.

Further evidence comes from an amazing feature of *De Scriptoribus Chemicis*: the total absence of such prominent and – especially for Newton’s own attitude towards alchemy in his early period – extremely influential authors as Michael Maier and Michael Sendivogius. Borel had given detailed catalogue descriptions of their work and, in turn, Newton included both names into his authors’ lists of the *Of Chemicall Authors* group.<sup>29</sup> If he did not do so in *De Scriptoribus Chemicis*, we might conclude that Newton merely considered works which had not been accessible to him at that time, that is, which had been desiderata. Thus even the omission of a title or author may give us valuable information concerning books that Newton had known – or even possessed – at the very beginning of his (al)chemical career, i.e. before writing his bibliographical records. Finally, there is a clear indication of the purpose of these records when, in his first list, Newton inserted (and crossed out again) a remark about a work that according to Borel’s misleading entry appeared in three (instead of two) parts or *decades*: ‘Decade tertio careo’.<sup>30</sup>

As stated above, Newton’s earliest excerpts from Borel’s *Bibliotheca (De Scriptoribus Chemicis*, henceforth cited as *Stanford A*) can be dated from the handwriting to the early 1670s or perhaps even to the late 1660s. This hypothesis finds some internal support in that *Stanford A* would well have been written before the acquisition of the *Theatrum chemicum* in 1669. For otherwise the entries with the addition ‘in Th. Ch.’<sup>31</sup> at the beginning of the list

<sup>29</sup> See e.g. Babson [419], f. 2v: ‘Michael Maierus [...] scripsit Symbola Aureæ mensæ duodecim nationum, Hieroglyphica, Emblemata nova (sive Atlantam [*sic*] fugientem) AD 1616.’; *ibid.* f. 3r: ‘Anonymus Sarmata (D.L.G.A. [i.e. ‘Divi Leschi genus amo’ an anagram used by Sendivogius]) [...] anno 1616 vivus tractatus scripsit [...]’; St Andrews Univ. MS 3: under ‘Germani’ and ‘Sarmatæ’ respectively; Keynes MS 13: *passim*. See notes 84 etc.

<sup>30</sup> Borel, *Bibliotheca*, pp. 111–12: ‘Harmonia imperscrutabilis [*sic*] Chimico Philosophica, seu [...] Decades 3. [...]’; *ibid.*, p. 196: ‘Rhenani Decades 2. [...]’; for Newton’s remarks see *DSC* [71].

<sup>31</sup> *DSC* [2] and [3]. First reference to the *Theatrum* seems to have been made by Newton in [3] only, keeping strictly to the original; repeated reference, now in both items, obviously has been added in a second step.

would be unnecessary. Especially striking are those cases in which Newton copied bibliographical details from Borel and, by looking ahead in the *Bibliotheca*, added a remark ‘Extat et in Th[eatr]. Ch.’,<sup>32</sup> when the same title recurs elsewhere and more comprehensively. The sparse references to the *Theatrum* scarcely contradict the early dating, since it is to be assumed that Newton planned to buy this most important of all collections of alchemical texts long before he actually acquired it and therefore disregarded more detailed quotations. Although we dare not decide whether Newton made his first and most extensive excerpts from Borel before or after the *Theatrum* came into his possession, it is reasonable to assume that *Stanford A* was written at a time when Newton was not fully acquainted with the contents of these six bulky volumes.

Some fifteen or twenty years later he made a second extract from Borel (cited here as *Stanford B*).<sup>33</sup> Although only one and a half pages long and much shorter than the earlier *Stanford A*, it contains a large number of common items. The difference lies principally in eliminating the heading, in taking some additional authors into account, in a more precise quotation of titles, and particularly in the omission of all descriptive remarks concerning the contents or composition of individual works. *Stanford B* is now well-nigh unreadable, since the ink has soaked through the paper. It could therefore have been written about 1680–81 (the so-called ‘bad ink period’:<sup>34</sup> when Newton frequently seems to have used ink of poor quality, discolouring the writing paper), although by the handwriting it is more likely from some time in the late 1680s. This manuscript is now with a bundle of notes and extracts enumerating, *inter alia*, printed works of Raymond Lull.<sup>35</sup> Since Newton’s second excerpt from Borel also contains editions of Lull’s works, emphasized by underlining, both series of records seem to be related to one another. The handwriting of the Lull records, however, suggests that they were written in the early or mid-1690s, that is, still later than the excerpts from Borel in *Stanford B*.

The latest document found thus far that is based on Borel’s *Bibliotheca*, is a twelve-line insertion (referred to as *Keynes 13*), beginning ‘Desiderantur Henrici Kunrath [...]', in one of Newton’s above-mentioned drafts for a preliminary chronology of alchemical authors.<sup>36</sup> *Keynes 13* must have been

<sup>32</sup> DSC [18] and [22], especially Newton’s addition of page numbers where Borel first made mention of the *Theatrum* as including these tracts, too.

<sup>33</sup> Stanford M132, container 2, folder 3, f. 1r–1v (our pagination).

<sup>34</sup> See Dobbs, *Foundations*, p. 256, on the dating of ‘bad ink’ manuscripts and its restrictions.

<sup>35</sup> Stanford M132, container 2, folder 3, ff. 2r–2v, 4r–5v, 7v (our pagination; for details cf. note 74).

<sup>36</sup> Keynes MS 13B (early 1690s), f. 3r; the latest internal date within the main (non-bibliographical) body is ‘1689’ (f. 3v).

drawn up about 1690 or in the first half of the 1690s because one of the books cited there appears in Newton's *Lib. Chem.* as having been in his library in 1696–97.<sup>37</sup> This concise listing has the additional peculiarity that it is not in alphabetical order.<sup>38</sup> It is further remarkable that Newton wrote the entire *Keynes 13* note at one time, although it cannot be traced back to Borel exclusively. This time he must have had at least one further source at hand, for the final two entries, both in French, did not originate in the *Bibliotheca*. Newton's last item, however, can be associated with one of the twelve (al)chemical volumes acquired in 1702 with 'Books for M<sup>r</sup> Newton'.<sup>39</sup>

Because of such non-Borel additions, *Keynes 13* belongs to a final group of bibliographical memoranda from Newton's hand, i.e. notes of mixed origin. As stated above, the early *Stanford A* list contains insertions and appended matter added at some later time. One such supplement to the extract from Borel, clearly separated from the foregoing and written at one time, comprises six titles.<sup>40</sup> All of these are in English, published between 1652 and 1675 (except for one different work that appeared only in 1690), and had almost certainly come to Newton's notice from advertisements or publishers' announcements. Five of the additional titles appear in virtually identical words in catalogues ('Books sold by ...') that the bookseller and publisher William Cooper bound in with two of his collected editions, entitled: *Aurifontina chymica* ... (London, 1680) and *Collectanea chymica* ... (London, 1684).<sup>41</sup> The one exception is the last of Newton's six supplementary entries, 'The Chymical weddin [sic] translated by M<sup>r</sup> F.' that first appeared in 1690 as *The Hermetick romance: or The chymical wedding ... translated by E. Foxcroft*. This must have been long extant in manuscript, as the said Ezechiel Foxcroft died in 1674/5.<sup>42</sup> It is

<sup>37</sup> DSC [17]; see note 70.

<sup>38</sup> The concordance of the first six items with the page numbers in Borel's *Bibliotheca* is as follows: p. 130 (DSC [75a]), p. 10 ([13]), p. 50 ([37]), p. 96 ([66]), p. 226 ([83a]), p. 171 ([17]/[81a]).

<sup>39</sup> DSC [Add a]; no source established. 'Le Cabinet Chymiques [sic]' can only be tentatively identified, perhaps as *Bibliothèque des Philosophes (chymiques)* ... (see note 59); 'La Tourbe François [...] is listed in MS New College 361/II as: 'Philosophie naturelle de Trevisan'.<sup>40</sup> DSC [Add 1] to [Add 6].

<sup>41</sup> HL 103, 410 (also in LC); see also Linden, *Cooper's Catalogue*, pp. 119 seq. The titles copied by Newton (DSC [Add 1] to [Add 5]) are specified by Cooper as follows: 'A Catalogue of Chymical Books in Three Parts.', 'Five Treatises of the Philosophers Stone.', 'Starkey's Pyrotechny.', '— his Liquor Alchahest.', '[Boyle] — his Tracts of the Growth of Metals in their Ore.' (see *Aurifontina*, unpag., following p. 272).

<sup>42</sup> DSC [Add 6] (also in LC); translation of J. V. Andreae's *Chymische Hochzeit: Christiani Rosenkreütz*... (Strasburg, 1616). For sources giving the year of Foxcroft's death see K. Figala, 'Newton as alchemist', *History of Science* 15(1977): 102–37, on p. 139 n. 3 (please note that on p. 103 'Old Style' should read 'New Style' in both cases).

possible that this translation of one of the most influential treatises from the borderland of alchemy and Rosicrucianism had been advertised sometime in the 1680s; for when drawing up notes that are certainly to be dated after 1690, Newton used the correct title 'The Hermetic Romance'.<sup>43</sup>

The actual year of publication (1690) of this outstanding book is accordingly of little help in dating the set of non-Borel additions to *Stanford A*, unless we suppose that Newton bought his own copy of the *Aurifontina* as a possible source for his bibliographical completions as long as ten years after its appearance. However, this does not seem plausible, since it is known that he rated Cooper's publications very highly and thus should have acquired the book immediately on publication. And by 1690 Newton's second bibliographical tool, the 1688 issue of William Cooper's *Catalogue*, would have been his preferable source concerning new publications.<sup>44</sup> It is therefore more likely that the six supplementary titles were added to *De Scriptoribus Chemicis* shortly after 1680. Hence it follows that the entirety of the non-Borel items was written in two steps, since *Stanford A* obtained its final form only about ten years later when Newton amended one of his entries from about 1670 by adding bibliographical data of an English translation: he became aware that a short tract by Arisleus had been published as a tailpiece to *Penotus παλιμβιος: or the alchemists engriridion in two parts.... Together with a small treatise...by that very ancient Philosopher, Arislaus, concerning the Philosopher's Stone...* (London, 1692). What is more, Newton seems to have

<sup>43</sup> See Keynes MS 13A (mid- or late 1680s), f. 1v: 'The Chymical Wedding'; but *LC* (Babson [418], 1696–97): '[2.6.] 8 The hermetic Romance'; Keynes MS 13C (after 1700), f. 4r, 'Authores optimi': 'The Hermetic Romance'. On the other hand, in his *Index chemicus* (Keynes MS 30) Newton quoted the 'Chymical Wedding' obviously from the printed book, as it is shown by his page references, e.g. on f. 61r (key word 'Metalla'); on the dating of the 'Index' corpus see Westfall, 'Newton's Index chemicus'. We have not been able to prove any printed advertisement before the publication of the book. In the London term catalogues it was only announced for the Trinity term, 1690, as 'The Horinetcick [sic] Romance, or the Chymical Wedding [...]'; see *The Term Catalogues 1668–1709 A.D.*..., ed. E. Arber, 3 vols. (London: privately printed, 1903–6), vol. 2, p. 325.

<sup>44</sup> Alchemical books in Newton's library, published by Cooper: *DSC* [Add 1] (*Catalogue of chymicall books*; also in *LC*); *DSC* [Add 4] (George Starkey; not in *LC*); *HL* 1478, 1407, 554 (Eirenaeus Philalethes; also in *LC*); *HL* 659 (Geber; also in *LC* but not assignable with certainty); *HL* 103, 410 (cf. note 41); others, e.g. *HL* 513 (Edmund Dickinson, published at Oxford; also in *LC*) had been sold by Cooper *et al.* Just two alchemical titles published (exclusively) by Cooper cannot be proved to be in Newton's library: *The philosophical epitaph of W. C. Esquire....* (London, 1673), and Kenelm Digby's posthumous *A choice collection of rare secrets...* (London, 1983, reissue of a 1682 edition). On Cooper as publisher of the works of Eirenaeus Philalethes see Linden, *Cooper's Catalogue*, pp. 149–56, and B. J. T. Dobbs, 'Newton's copy of "Secrets reveal'd" and the regimen of the work', *Ambix* 26(1979): 145–69.

bought the book – there is evidence that he owned a copy at least about 1696–97.<sup>45</sup> Finally, an interesting sidelight on Newton's continuing concern for alchemy, and on the way he used *De Scriptoribus Chemicis* throughout a long period – from the early 1670s to the early 1690s – may be seen from those later entries. But at about his move to London in 1696 these interdependent bibliographical records seem to have served their purpose for the time, since Newton wrote down the title (and price!) of another alchemical work only elsewhere.<sup>46</sup>

We may now summarize the chronology of *De Scriptoribus Chemicis* and related memoranda. Around 1670, about the time when he purchased the *Theatrum chemicum* or a little later, Newton made his first extractions from Borel's *Bibliotheca chimica*, the result being *Stanford A* in its original form. About 1680 he added six non-Borel titles, all of them in English and published after 1650. In the late 1680s he repeated the first step in a more decisive manner and produced *Stanford B*. About 1690 he once more collected chosen titles from Borel in *Keynes 13*, which he supplemented by two French works published after 1670. Finally, Newton returned to *Stanford A* by adding a last insertion in (or after) 1692.

This reconstruction is confirmed by a close analysis of the idiosyncrasies in both content and form of the individual manuscripts or fragments. *Stanford A* may be broadly characterized as a first draft, or perhaps a collection of working notes, whereas *Stanford B* and *Keynes 13* may be regarded rather as fair copies or summaries of well-considered items selected for a particular purpose. In *Stanford A* Newton tried to find and collect as detailed bibliographical information as possible, but in drawing up his later lists he knew very precisely what he was looking for. Further distinctive features are revealed by the maintenance or disappearance of single works through the

<sup>45</sup> DSC [24]; not HL; but see LC: '[2.6.] 24 The Alchemists Enchiridion'. Unfortunately we had no opportunity to discuss this point with John Harrison. In his unpublished study of the *Lib. Chem.* list, however, Harrison anticipated the identification of the said book with this item from *Lib. Chem.*

<sup>46</sup> Yale University Library, New Haven: Mellon MS 78.4, f. 4v: 'Centrum naturæ concentratum. Or y<sup>e</sup> salt of Nature regenerated. [...(London, 1696)]'; see *Alchemy and the Occult. A Catalogue ...of the Collection of Paul and Mary Mellon...*, eds. I. MacPhail *et al.*, 4 vols. (New Haven: Yale University Library, 1968–77), vol. 4, pp. 473–6 (including facsimile). Since this book is recorded in LC ('[2.7.] 17 Salt of nature regen'), Newton must have bought his copy (HL 25) immediately after its publication; another fragmentary title that follows the note on *Centrum naturæ* in the Mellon MS can be identified with one of Newton's non-alchemical books (HL 302). This short memorandum is obviously not related to the Borel excerpts, although we are not able to specify Newton's source. Most probably, it had been copied casually from a bookseller's advertisement; the quotation is also different from that given in the *Term Catalogues*, vol. 2, p. 569 (Hilary term, 1695/6).

various stages, i.e. that some were repeated while others were omitted and replaced by new titles. The few additional (non-alphabetical) items in *Keynes 13* seem to have been arranged by Newton according to their importance (or rather in some accidental sequence) and may have functioned as a supplement to the reworked version of *Stanford B*.

To understand Newton's procedure in his first perusal of the *Bibliotheca* and thus the structure of *Stanford A*, we must enter into a short *excursus* on Borel's bibliography. Its title-page, cited in detail above, suggests the enormous number of 4,000 authors. In fact this is approximately the total number of entries, in many of which numerous, though evidently legendary, 'authores chimici' are introduced; furthermore, a large number of manuscripts are cited in addition to printed works; finally, individual items from collected editions are entered separately. The work is made intractable above all by Borel's repetition of numerous treatises, sometimes under different titles, sometimes under the authors' or the editors' names, and sometimes under the title of a collection or compendium. Therefore, the actual number of printed volumes or editions is substantially reduced, and the reader often has enormous difficulties in tracing them (to say nothing of the problems caused by printing errors and contradictory references to the years or places of publication). As a result, Borel's *Bibliotheca* has only limited use as a working basis for bibliographical investigations, or is, in the judgement of the historian of chemistry and bibliographer Bolton, 'unsatisfactory from the standpoint of modern [sic] bibliography'.<sup>47</sup> The only possibility of reliably surveying this extensive compilation seems to be Newton's method: to draw up detailed excerpts instead of marking the corresponding entries in the bibliography itself.

*Stanford A* shows that the choice of information was made from an apparently careful survey of the whole book. Newton worked through the *Bibliotheca* page by page, starting at p. 2 and ending at p. 264: he would copy an entry (often in abbreviated form) at first appearance, then add cross-references to repetitions on following pages or copy additional information found in repeated entries,<sup>48</sup> and later note the number of the page from which

<sup>47</sup> Bolton, *Bibliography*, p. 7.; cf. also his forerunner J. Chr. Wieglob who criticized both reiterations and frequent absence of bibliographical data in his *Geschichte des Wachstums und der Erfindungen in der Chemie, in der neuern Zeit*, 2 vols. (Berlin & Stettin, 1790–91), vol. 1, p. 7: 'Es würde solches noch schätzbarer seyn, wenn bey allen Ort und Jahr der Ausgabe angeführt worden wäre, wie es nur bey wenigen geschehen ist, und nicht so oft ein und dasselbe Buch auch noch unter andern Titeln wieder vorkäme.'

<sup>48</sup> See Newton's cross-references e.g. in *DSC* [16]: Newton copied the title of a collected edition from *Bibliotheca*, p. 14, and added – with his own numbering – the contents listed *ibid.*; he referred to an alternative quotation of the title on p. 19, and to a further tract, contained in this collection, on p. 23 – but without copying the information; he

he had copied an entry.<sup>49</sup> With this procedure Newton was not able to maintain a strict alphabetical order, for Borel initially listed the majority of anonymous treatises and collected editions under 'A' ('anonymi') or under I ('incerti') before repeating them under their titles. Here we have one explanation of disproportionate accumulations among the initial entries in *Stanford A* compared with the total of items in relation to their alphabetical distribution.<sup>50</sup> Independently of such particular characteristics of his source, Newton changed his style in the course of working through the *Bibliotheca*. He copied much more material at the beginning of the task than later, concentrating gradually on essentials, i.e. on single printed works and the relevant bibliographical details: references to the *Theatrum* are dropped (with the exception of indispensable cross-references); less, or no attention, is given to manuscripts,<sup>51</sup> as well as to non-bibliographical quotations.<sup>52</sup> Extraneous information of the latter kind is completely neglected in the later *Stanford B* list, in which Newton confined himself to the 'hard facts' that he copied from his source without remarkable accumulations (as noticed in the first pages of *Stanford A*). Thus *Stanford B*, along with *Keynes 13*, seems to be a condensed version of *Stanford A*, in which all excess cross-references and all data not absolutely essential for bibliographical purposes have been jettisoned. Also, mistakes have been rectified and variant titles reduced to their bibliographically correct form<sup>53</sup> – corrections facilitated by Newton's deepening knowledge of alchemical literature acquired during the 1670s and 1680s.

became aware of the identity of *DSC* [16] with his previous item [12] from p. 8 – and thus inserted there an 'infra'; at last he interlined two other tracts belonging to the same collection, now found on pp. 85 and 107 respectively. Still in *Stanford B* Newton copied the title of this compendium no less than three times in different readings linked up with a common marginal 'A' (see *DSC* [12], [16], [22a]). For other examples of Newton's way of accumulating information by cross-references see *DSC* [9], [18], [22], [26]. Compiling items [41]/[42] and [48]/[51], Newton had changed his style: now he thoroughly compared several pages before he went on with his next item.

<sup>49</sup> In *DSC* [1] to [23] Newton used page numbers exclusively as page references; from [24] to the end (although not constantly) he added page numbers pertinent to his entries.

<sup>50</sup> The first seventy-five items are copied from *Bibliotheca*, pp. 1–129 (or sections 'A' to 'I'), the last nine (!) items only from pp. 129–272 (or sections 'K' to 'Z', including 'Appendix' and 'Corollarium').

<sup>51</sup> *DSC* [1], [7], [13], [15], [36], [48], [50], [55] refer to manuscripts mostly in private possession, [43] to a manuscript tract announced for publication.

<sup>52</sup> *DSC* [29], [46], [52], [57], [72].

<sup>53</sup> E.g. *DSC* [63]; nevertheless Newton did not become aware that *Farrago philosophorum* was identical to one treatise contained in *Theatrum chemicum*. In another puzzling case, *DSC* [18], Newton possibly overlooked his own reference to the *Theatrum* in *Stanford A* when he repeated this item in *Stanford B* – or was in search for a different treatise with the same title.

### The growth of Newton's (al)chemical library: an attempt at chronology

This formal development from *Stanford A* to *Stanford B* and *Keynes 13* supports our initial hypothesis that Newton's excerpts from Borel must be interpreted as desiderata for his own (al)chemical library. More striking evidence, however, can be found by comparing the contents of these documents in their chronological order. A tabular and classified summary of the items selected by Newton (ignoring his non-Borel supplements) may illustrate the displacement of contents (see Table 1). The most obvious discrepancy is the

 abandonment of works on metallurgy<sup>54</sup> in the later lists. But despite such differences one should notice the extensive agreement of the two *Stanford* lists, since the later one contains only four additional authors or titles (there are two more in *Keynes 13*) beyond those in the earliest list.<sup>55</sup> All the others are repetitions of previously copied items; the bulk of those titles taken over from *Stanford A* to *B* (and partly to *Keynes 13*) are from important collected editions, which in *Stanford A* are throughout marked ‘–’ or ‘x’ by Newton.<sup>56</sup>

The correspondence of the different Borel excerpts, as well as Newton's markings and a comparison of transcribed and, particularly, marked titles and editions with his own book inventory (*Lib. Chem.*) of 1696–97, supports an interpretation as outlined previously: When Newton compiled his first excerpts about 1670 he was drawing up a list of desiderata and marked the most essential items. In the late 1680s he made a new survey omitting all titles of works that he had acquired in the interim. Items repeated in *Stanford B* were thus still desiderata at that time. On the other hand, new items or authors may point to a change in Newton's attitude towards the literature of alchemy. The same applies to the items listed in *Keynes 13* about 1690. Apart from all Borel-based material, however, Newton's supplemented items are to be examined carefully. Since his second bibliographical work of reference (the above-mentioned 1688 reissue of Cooper's *Catalogue of chymicall books*) did not have any of the defects of Borel's labyrinthic compilation, Newton did not have to consider contemporary English titles while reworking his early manuscript desiderata list. This may explain the absence of any non-Borel titles in *Stanford*

<sup>54</sup> DSC [5], [8], [38], [54], [56], [60], [61]/[62], [77].

<sup>55</sup> See DSC [9a] (anonymous), [75a] (Heinrich Khunradt), [81a] (Michael Potier), [83a] (Gottfried Smoll[ius], Jean Collesson, and the fictitious Salomon Trissmosin).

<sup>56</sup> For ‘–’-markings see DSC [9], [10], [11], [16], [17], [27], [38], [39]/[40], [42], [51], [75], [76], [83]; ‘x’-markings only in [12] and [14]. For the last-mentioned we have found no conclusive explanation, since one of the marked titles belongs to an important compendium (with reference to its more detailed repetition in [16]), but the second one does not seem to have been of any significance in the development of alchemical literature. In *Stanford B* Newton used similar markings only twice, in both cases accentuating titles he had taken over from *Stanford A* (see DSC [33], [83]).

Table 1.

	<i>Stanford A</i> (c. 1670)	<i>Stanford B</i> (late 1690s)	<i>Keynes 13</i> (c. 1690)
Ancient and medieval authors (incl. MSS/non-bibliographical quotations)	38 (10/5)	8 (2/-)	3 (1/-)
Collected edns and anonymous works	20	13	2
16th/17th-cent. authors	17	11	1
Works on mineralogy, metallurgy, etc.	8	—	—
Summarized entries			
‘De mineralibus’	1	—	—
‘De Quintessentia’	—	1	—

B.<sup>57</sup> Generally, *Lib. Chem.* (1696–97), the bill ‘Books for M<sup>r</sup> Newton’ (c. 1702) and the contents of his final library permit us to judge, whether, and when at the latest, Newton did purchase any of the books he searched for.

For two at least of the most important printed collections or compendiums of alchemical treatises the exact time of acquisition prior to 1696–97 is well documented: Newton recorded the purchase in April 1669 of the six-volume *Theatrum chemicum...* (Strasburg, 1659–61);<sup>58</sup> from his correspondence with Nicolas Fatio de Duillier it is clear that in the spring of 1692/3 Newton bought the two-volume French *Bibliothèque des Philosophes (chimiques)...* (Paris, 1672–78) from his young intimate.<sup>59</sup> As far as it is now possible to verify, there

<sup>57</sup> From comparing the supplements to *Stanford A* (DSC [Add 1] to [Add 6]) with *Lib. Chem.* it becomes evident that both works by George Starkey ([Add 3]/[Add 4]) would have been desiderata until after 1696–97: these are the only additional titles not traceable in Newton’s *Lib. Chem.* inventory.

<sup>58</sup> See Harrison, *Library*, pp. 7–8, on Newton’s early notebooks and recorded purchases of books including the *Theatrum chemicum* (HL 1608).

<sup>59</sup> HL 221 (vol. 1 only); see Isaac Newton, *The Correspondence of Isaac Newton*, ed. H. W. Turnbull *et al.*, 7 vols. (Cambridge University Press, 1959–77), vol. 3, pp. 245, 260–3, nos. 404, 408–11 (February/March 1692/3; 2 vols.). This is the ‘Bibliotheca Gallica’ or ‘y<sup>e</sup> ffrench Bibliothèque’ that Newton referred to in Keynes MSS 45 and 28 respectively. On Keynes MS 28 see recently B. J. T. Dobbs, ‘Newton’s “Commentary” on the “Emerald Tablet” of Hermes Trismegistus: its scientific and theological significance’, in *Hermeticism and the Renaissance: Intellectual History and the Occult in Early Modern Europe*, eds. I. Merkel & A. G. Debus (Washington, DC: Folger Shakespeare Library, 1988), pp. 182–91, who dates the manuscript ‘in the early 1690s’ (p. 183); since Newton’s reference seems to be a later addition to his Hermes

are but few handwritten notes in Newton's surviving books on alchemy and chemistry that give details of purchase. One example, however, is a remark that he inserted in a copy of the anonymous *Sanguis naturæ...* (London, 1696): '[bought] at Sowles a Quaker Widdow'.<sup>60</sup> Considering Newton's desiderata records we may now estimate dates or periods and/or chronological order of further book purchases that attended Newton's (al)chemical studies.

If our interpretation is correct, only two of the volumes assembling basic alchemical texts came into Newton's possession during the 1670s and 80s: *Artis auriferæ, quam chemiam vocant, volumina...* (Basle, 1610 – first published 1572), and *Philosophia chymicæ IV. vetustissima scripta...* (Frankfurt, 1605), both of which are in *Stanford A* alone.<sup>61</sup> Further evidence that Newton acquired *Ars aurifera* in the early 1670s comes from one of his manuscripts from about 1675, which contains reading notes (*inter alia* 'Ex Turba') that are unmistakably copied from this edition.<sup>62</sup> Consequently the writings ascribed to Aristotle, Avicenna and Morienus do not recur in *Stanford B*, for these had entered Newton's library with the *Ars aurifera*.<sup>63</sup> Possibly during this same

text we may place the dating of the part in question of Keynes 28 more precisely to 1691 or 1692, also considering that the *Bibliothèque* must have been at Newton's hand before he bought it definitely.

<sup>60</sup> *HL 1446*; see also J. Neu, 'Isaac Newton's library: ten books at Wisconsin', *U. W. Library News* 14(4)(1970): 1–10, on p. 10; another copy: *HL 1445*. Newton bought neither copy immediately after they had been published, since this title does not appear in *LC* (1696–97).

<sup>61</sup> *DSC* [27], [39]/[40] (also in *LC*); on the latter volume see also Harrison, *Library*, p. 20.

<sup>62</sup> Keynes MS 25, f. 4r–4v: 'Ex Turba [...] (p. 7) Aliter legitur in p. 8 & in Theatr.'; page references agree with the text variant as printed in *Artis auriferæ...*, vol. I; a further quotation from the same paragraph ('Zimon in Turba') can be found in Mellon MS 79, f. 1v. Newton's remark in *Of Chemicall Authors* (Babson [419], early 1670s) on a work by 'Maria the Hebrew' ('is now extant') proves his familiarity with the same volume. There are some uncertainties attached to the purchase of *Ars aurifera*, since Newton owned two copies, both in the same edition of 1610 but one incomplete (only vols. I/II, *HL 91*). This copy bears short MS notes in Newton's hand (on p. 52 of vol. II) added to the same treatise which he also had – beyond his notes out of the 'Turba philosophorum' – extracted in Keynes MS 25, ff. 3v–4r: 'Ex Epistola Com. Trevisani ad Thom. Bonon.'; further notes not in his hand suggest that Newton bought this particular copy along with a copy of *Musæum hermeticum*, i.e. even before writing *Stanford A*, if we suppose an early date of acquisition of the *Musæum* (see notes 80 and 88). Thus Newton should have acquired his two-volume copy first, but replaced it by a complete three-volume edition (*HL 90*) at least during the early 1690s when he was occupied with the works of Raymond Lull (see note 74). This, too, was the copy that Newton entered into his *Lib. Chem. inventory*; see *LC*: '[2.4.] 16 Artis aurif. vol. 3.' On the dating of Keynes MS 25 (1670–75) see Dobbs, *Foundations*, p. 132.

<sup>63</sup> See *DSC* [25], [31], [78]. For a detailed table of contents of the various editions of *Ars aurifera* see Ferguson, *Bibliotheca chemica*, vol. 1, pp. 51–2, and *Alchemy and the Occult*, vol. 1, pp. 133–6. Of course, to most of the ancient (and medieval) authors'

 period Newton purchased a remarkable composite volume made up of *Ars chemica*... (Strasburg, 1566, including the ‘Septem capitula’ by Hermes), John Garland’s *Compendium alchemiæ*... (Basle, 1560), a treatise by the Paracelsian Gerard Dorn and, finally, Bernhardus Trevirensis’ περὶ χημείας... (Strasburg, 1567),<sup>64</sup> since neither Hermes’ nor Garland’s names appear in *Stanford B* again.<sup>65</sup> Additional important works acquired during the 1670s or 1680s include Georg Agricola’s *De re metallica*... (Basle, 1621)<sup>66</sup> and Albertus Magnus’ *De rebus metallicis*... (Strasburg, 1541 – appended to Raymond Lull’s *De secretis naturæ, sive quinta essentia*...).<sup>67</sup> On the other hand, the case of Martin Ruland’s well-known *Lexicon alchemiæ*... ([Frankfurt], 1612) is perplexing: although Newton definitely owned a copy,<sup>68</sup> the book is listed in *Stanford A* alone but was not entered into his *Lib. Chem.* inventory. This particular example may illustrate both the limits of our interpretation and the uncertainty of sources based on manuscript drafts or preliminary notes.

The next stage of Newton’s search for alchemical texts comprises the period between the writing of *Stanford B* (the late 1680s) and Newton’s move to London (1696). In these years he was able to obtain at least one volume of

names a ‘Pseudo-’ should be prefixed, especially to the Lullian corpus treated below; we use the attributed names without regard to modern distinctions.

<sup>64</sup> HL 85, 649, 536, 168, bound in one volume; see LC: ‘[2.7.] 4 Hermetis capitula septem. Tab Smaragd cum commentario Hortulani. Consiliū conjugij [= HL 85]. Iterum Tab. Smaragd. cum commentario Hortulani. Arnoldus in Hortulanū. Garlandus de præp. Elix. Garlandus de mineral [= HL 649]. Lapis metaphys per Gerardum Dorn [= HL 536]. Trevisani Epistolæ et liber [= HL 168].’ Newton’s *Lib. Chem.* entry clearly shows that his copies of these originally individual tracts had been rebound as a single volume (see also note 80).

<sup>65</sup> DSC [73], [69].

<sup>66</sup> DSC [5] (not in LC; probably not classified ‘chemical’ by Newton in the 1690s). Newton’s interest in the work of the famous German metallurgist may explain his following item [6]. But the ascription of an alchemical title to Georg Agricola was based on a misprint in Borel, falsifying both author’s name and year of publication. The actual book by Daniel Agricola ‘does not treat of Alchemy at all’ (Ferguson, *Bibliotheca chemica*, vol. 1, p. 8). On Newton’s study of Georg Agricola see K. Figala, ‘Gedanken zu Isaac Newtons Studium von Agricolas Werken’, in *Arithmos-Arrhythmos: Skizzen aus der Wissenschaftsgeschichte. Festschrift für J. O. Fleckenstein*, eds. K. Figala & E. H. Berninger. Wissenschaftsgeschichte: Beiträge aus dem Forschungsinstitut des Deutschen Museums für die Geschichte der Naturwissenschaften und der Technik (Munich: Minerva, 1979), pp. 73–103.



<sup>67</sup> DSC [8]; see also note 74.

<sup>68</sup> DSC [83]. A second work by Ruland, *Progymnasmata alchemiæ, sive Problemata chymica*... (Frankfurt, 1607; also part of [83], ‘Problemata [...]’), was repeated in *Stanford B* and marked ‘x’. In contrast to the *Lexicon* this book was listed in *Lib. Chem.*; see LC: ‘[2.4.] 18 Rulandi progymnasmata [sic] Alchymiae, Marsilius Ficinus & Cosmopolita.’ According to Harrison (unpublished) Newton’s perplexing entry is based on marginal annotations in his copy (but in an alien hand) quoting Ficino and Cosmopolita (i.e. M. Sendivogius).

*Alchemiæ, quam vocant artisque metallicæ doctrina ...* (Basle, 1572),<sup>69</sup> and – in the early 1690s – the *Opuscula quædam chemica ...* (Frankfurt, 1614) which was the only one of the collected editions to be repeated once again in *Keynes 13*.<sup>70</sup> Roger Bacon's *De arte chymicæ scripta ...* (Frankfurt, 1603) also found its way into Newton's library during these years.<sup>71</sup>

The latter volume is one of the few marked titles in *Stanford B* (unlike *Stanford A*), which suggests that Friar Bacon's significance in Newton's alchemical thought increased in the late 1680s. The same applies to the work ascribed to Raymond Lull. A comparison of *Stanford A* with *B* shows that only in these years did Newton take particular notice of the Lullian *corpus*: while *Stanford A* has a single entry, *Liber, qui codicillus, seu vade mecum inscribitur ...* (Cologne, 1563), *Stanford B* lists no less than ten issues summarized as 'Lullij opera edita quædam'.<sup>72</sup> Underlinings made by Newton probably mean that these editions had been in his possession at the end of the 1680s, i.e. three (or four) titles plus the above-mentioned *Codicillus*.<sup>73</sup> More detailed information can be drawn from another manuscript sheet, now preserved with *Stanford B*. Here Newton tried to compile a detailed inventory of the works of Raymond Lull comprising six volumes in his possession and a summary of seven 'desideranda'.<sup>74</sup> To judge from the handwriting, the Lull

<sup>69</sup> *DSC* [9]; see *LC*: '[2.7.] 5 Alchymiaæ quam vocant &c Continens Tauladan, speculum Alchymiaæ Baconis, Correctorium Richardi, Rosarius minor, Albertus magn. de Alchymia.' Newton's detailed description allows us to conclude that he merely owned vol. I of this two-volume edition; see *Alchemy and the Occult*, vol. 1, pp. 126–8 for more details on the contents. This volume corresponds to the 'not identified' *HL 1624* (identification confirmed by Harrison, private communication, 1989).

<sup>70</sup> *DSC* [17]; see *LC*: '[2.8.] 28 Opuscula Riplei, Canones 10 incerti authoris', followed by '29 Speculum Alchymiaæ [...] & Etschenreuteri Epistola.'; thus Newton's copy obviously was bound in two volumes. <sup>71</sup> *DSC* [33] (also in *LC*).

<sup>72</sup> *DSC* [76], [76a].

<sup>73</sup> *HL 1000* (= 'Basle, 1572' in *DSC* [76a]), *HL 996* or *998* or both (= 'Cologne, 1567' *ibid.*), *HL 995* (= 'Strasburg, 1541' *ibid.*; see also *DSC* [8]), *HL 997* (see *DSC* [76]).

<sup>74</sup> Stanford M132, container 2, folder 3, f. 5r–5v (our pagination, part of a bundle of title listings summarizing the Lullian corpus): Raymundi Lullij opera', followed by tables of contents of altogether nine volumes, 'In Vol. 3 Theat. Chem.', 'In Vol. 4 Theat. Chem.', 'In Vol. 3 Artis Auriferæ', 'Lullij opera quædam Basileæ 1572 [= *HL 1000*]', 'Coloniæ 1563 [= *HL 997*]', 'Coloniæ 1567 [= *HL 996*]', 'Argentorati 1541 [= *HL 995*]', 'Coloniæ 1<6>567 [= *HL 998*]', 'Argentorati 1616 [= *HL 1001*]'; at the bottom of f. 5v: 'Desiderantur opera impressa [...]' (see *DSC* [76a]). Newton assigned his own numbering to every item of the contents obviously corresponding to its importance, thus: '1 Testamentum antiquius continens Theoricam & Practicam' (in *Theatrum*, vol. IV) to '27 De Conservatione vitæ' (in *HL 1001*). Interestingly, one volume (corresponding to *HL 995*) is described as being composed of '6 De secretis naturæ sive Quintessentia lib. 2. Deest tertius. 25 Albertus de mineralibus et rebus metallicis. 26 Encelius de Lapidibus & Gemmis.'; the same sequence was drawn up by Newton in a rough draft (now Babson [416]B:3). Since the original impression, published in



records were written in the early or mid-1690s, and thus may well be compared with the *Lib. Chem.* of 1696–97, which catalogues seven volumes as ‘Lullys works’. None of the ‘desideranda’ found their way into Newton’s library, but in view of the discrepancy in the number of volumes<sup>75</sup> we suspect that Newton integrated his copy of the anonymous *Ars magica...* (Frankfurt, 1631) into his series of Lull editions – the very same that he had marked most peculiarly (‘☞’) in *Stanford A*.<sup>76</sup> In summary, we may conclude that at that stage of his alchemical interests Newton endeavoured to obtain as complete a collection as possible of the published works of Raymond Lull, though his efforts met with only limited success.

 Unattained desiderata, i.e. titles that cannot be proved to have been in Newton’s *Lib. Chem.* inventory or in his final library, include some of the most important publications in the field of alchemy, such as *Veræ alchemiæ artisque metallicæ... doctrina...* (Basle, 1561 – a voluminous former edition of the above-mentioned *Alchemiæ, quam vocant artisque metallicæ doctrina*) that Newton entered in some length both in *Stanford A* and *B*.<sup>77</sup> Nor did he acquire the earliest collected edition of all, entitled *In hoc volumine de alchemia continentur hæc...* (Nuremberg, 1541),<sup>78</sup> as well as the first edition of Petrus Bonus’ *Pretiosa margarita novella...* (Venice, 1546)<sup>79</sup> which still appears in

1541, did not contain the latter work, Newton’s copy may have been a composite volume bound with Christoph Entzelt’s *De re metallica... libri III...* (Frankfurt, 1551, reissued 1557); see *DSC* [56] (not *HL*). There was no opportunity to discuss this particular case with J. Harrison.

<sup>75</sup> See *LC*: ‘[2.6.] 25, 26, 27, 28, 29, 30, 31 Lullys works.’ Harrison (unpublished) refrained from determining which of the total of eight Lull volumes in Newton’s final library may have been included in the *Lib. Chem.* list. Tentatively, we may assume that Newton did not classify volumes as ‘(al)chemical’ that treat with Lull’s ‘Ars magna’ or ‘universalis’ (*HL* 994, and *HL* 999, bound with 32). Thus six alchemical out of Newton’s final Lull volumes contrast with the seven listed in *Lib. Chem.*, i.e. the identity of one volume is questionable.

<sup>76</sup> *DSC* [19]. We have not been able to find any other tolerably conclusive explanation for Newton’s conspicuous marking. But this presumption is further supported by a marginal reference ‘Ars magica [...]’, written by Newton in one of his Lull volumes (*HL* 1000), although the cross-reference otherwise might be aimed to Lull’s ‘Magia naturalis, seu Compendium artis magicæ’, as printed in *HL* 998. The *Ars magica* cannot be identified with any other entry in Newton’s *Lib. Chem.* inventory; on the other hand, this work is closely related to *Trinum magicum...* (Frankfurt, 1609, continued 1611), edited by Caesar Longinus, a later reissue of which (1673) Newton owned (*HL* 981; not in *LC*). <sup>77</sup> *DSC* [12], [16].

<sup>78</sup> *DSC* [11]. For another doubtful compendium allegedly published in the same year see *DSC* [75].

<sup>79</sup> *DSC* [37]. The quotation chosen by Borel corresponds to the last lines of the internal heading of Bonus’ ‘Pretiosa margarita novella’, as printed in Janus Lacinius’ edition of the same title (Venice, 1546, and 1557, on f. 1). Even Ferguson (*Bibliotheca chemica*, vol. 1, pp. 115–6) causes some confusion concerning the differing titles, but in fact the

*Keynes 13.* That Newton failed to acquire these books is by no means surprising, if we note their years of publication. Most of them had been out of print for more than a hundred years when he started his hunt. Success in these cases depended on second-hand copies, for example, his copy of Lull's *Codicillus* and the afore-mentioned composite volume.<sup>80</sup> Perhaps Newton's residence at Cambridge was a handicap to purchasing such old works. In fact, in the late 1690s at London Newton must have been more successful when he found at least an incomplete copy of one of his long-time desiderata, the *De alchimia opuscula complura...* ([Frankfurt], 1550).<sup>81</sup>

This survey, which has been mainly restricted to the most significant classical alchemical texts, clearly shows that Newton regarded these works as extraordinarily important. Indeed, they embrace almost the entire corpus of alchemical literature available until the three-volume first issue of the *Theatrum chemicum* appeared in 1602. Even after its publication, these old compendiums were by no means made obsolete, for the publisher of the *Theatrum*, Lazarus Zetzner, was little concerned to put out a systematic edition of classical texts, but rather he reprinted issues that had appeared up to the dates of publication of the particular *Theatrum* volumes. In this way he composed his first three volumes (1602), and again the fourth (first published 1613, with a reissue of the former volumes). The fifth, published in 1622 by Zetzner's heirs, contains a selection of older texts and the sixth and last, issued with the final edition (1659–61), translations of previous French and German publications. These facts may sufficiently explain Newton's insistence on obtaining the pre-*Theatrum* compendiums, for only after their acquisition would the whole

'Secretum omnium secretorum ac Dei donum' is not a part of but identical with the *Margarita* (1546). On the other hand, Newton, too, seems to have been on a wrong track, for he already had a corrected version of this treatise (published 1572, and reprinted in *Theatrum chemicum*, vol. V) at his disposal. Thus we may conclude that he was – of course in vain – looking for an additional work by Bonus well into the 1690s.

<sup>80</sup> See also Harrison, *Library*, pp. 60, 77–8 (on second-hand purchases), 24–5 (on books annotated in alien hands, i.e. by previous owners). Unfortunately Harrison gives no details of the 'ten alchemical' books bearing notes not in Newton's hand. Some of the more important examples are his copies of Lull's *Codicillus* (*DSC*[76]), and – above all – Newton's two-volume copy of the *Ars aurifera* (cf. note 62) and his *Musaeum hermeticum* of 1625 (cf. note 88). The latter two volumes both bear annotations in the same alien hand and thus may have been acquired by Newton on the same occasion. Another indication of second-hand purchases are composite volumes in his library, exemplified by the sixteenth-century volume mentioned in note 64, since Newton usually desisted from rebinding his alchemical books (see e.g. the split volume mentioned in note 70).

<sup>81</sup> *DSC*[10]; this prominent early impression can not be traced in *Lib. Chem.* (1696–97). For additional supposed late purchases see, e.g., the works of G. Starkey (cf. note 57) and a work by M. Potier (*DSC*[83a], not *LC*).

range of the older alchemy have been available to him.<sup>82</sup> This tendency in Newton's selection of literature is emphasized by his taking into account works that are listed by Borel as being in manuscript only. Most of Newton's items of this group in fact were never – or only much later and in mutilated versions – printed, especially those still noted in *Stanford B* and *Keynes 13*.<sup>83</sup> Thus the presence of this set of manuscripts among the bulk of printed books by no means contradicts the nature of a desiderata list with respect to the establishment of an (al)chemical library; rather we must assess these items as essential supplements to the whole spectrum of printed literature.

As an argument supporting our interpretation of Newton's *De Scriptoribus Chemicis* selections and related documents as his main desiderata inventories, we put forward the neglect of items which actually were essentials for records in alchemical bibliography: e.g. the writings of Michael Maier and Michael Sendivogius. Both feature prominently among Newton's alchemical investigations, and long transcriptions from their works and other notes on them are to be seen among his papers. Furthermore, in his own final library Newton had nine works by Maier and three individual editions of Sendivogius' tracts.<sup>84</sup> His (al)chemical papers, however, reveal that some of the works from these quite 'modern' alchemists must have been in his possession very early, i.e. before the origin of *Stanford A* about 1670. In any case extracts from Maier's *Symbola* in Newton's hand – besides those discussed in the context of *Of Chemicall Authors* – may be dated to the second half of the 1660s.<sup>85</sup> Extensive

<sup>82</sup> A more detailed study on the composition of the *Theatrum* is still wanting, but this is not the place for discussions at length. For some examples of previous editions of tracts that had been reprinted in the *Theatrum* without alterations (i.e. including even original prefaces and dedications) see *DSC* [2], [18], [21], [22], [39]/[40] (tracts I and IV only), [63], [74], and Newton's misleading reference in [9]; *DSC* [41] and [83a] (Collesson) are examples of translations comprised in vol. VI of the final *Theatrum* edition. See also *Alchemy and the Occult*, vol. 2, pp. 358–94, and Ferguson, *Bibliotheca chemica*, vol. 2, pp. 436–40 (who speaks erroneously of its first appearance in four volumes); for a survey of the important early collections see *ibid.*, and, more recently and detailed, R. Halleux, *Les Textes Alchimiques. Typologie des sources du moyen âge occidental*, 32 (Tournhout-Belgium: Brepols, 1979), chap. 5.

<sup>83</sup> See *DSC* [1], [13], [15], [55]. A short tract by Alphidius [13] was only published in German with Benedictus Figulus' *Thesaurinella olympica...* (Frankfurt, 1608), a tract ascribed to St Dunstan [55] in Lancelot Colson's *Philosophia maturata: an exact piece of philosophy...* (London, 1668). The latter one had been in Newton's possession (*HL* 419, also in *LC*: two copies). It may have been purchased before 1680, since this work was named in Cooper's advertisements but not copied by Newton for his supplements to *Stanford A* (see note 41). On Abraham the Jew [1] cf. also note 91.

<sup>84</sup> *HL* 1044–52 (Maier); *HL* 445, 1192, 1485 (Sendivogius; individual editions only).

<sup>85</sup> *HL* 1048 (also in *LC*; early extracts in *Keynes MS 29* (c. 1668–69), in a MS now at St Andrews University (c. 1669), in Babson [419] (early 1670s; cf. note 23); see Dobbs, *Foundations*, p. 131, Westfall, *Never at Rest*, pp. 291–2, and K. Figala, “Die exakte

quotations from the same work, followed by extracts from four more of Maier's books, can be traced without exception to volumes that had been in Newton's possession; the same applies to references (dated to about 1670–72) to another work by the same author. All together, trying to date these important and comprehensive records correctly, would seem to lead to inconsistencies when dating by conventional methods, i.e. those based on handwriting. At present Newton's main Maier manuscript is commonly dated to his late period, but it can be shown that it is definitely quoted in one of his manuscripts from the 'middle early' period. Therefore utmost caution is advised concerning any conclusive statement about the access of Maier's works into Newton's library.<sup>86</sup> As for Sendivogius (or Sędziwój), some of Newton's notes on his writings can be dated to the years 1668 or 1669. Since Newton's early quotations from the anonymously published *Novum lumen chymicum* are joined to those from a tract by Jean d'Espagnet they imply the knowledge – if not the acquisition – of their common publication in *Bibliotheca chemica contracta...* (Geneva, 1653).<sup>87</sup>



Alchemie von Isaac Newton": Seine "gesetzmäßige" Interpretation – dargestellt am Beispiel einiger ihn beeinflussender Autoren', *Verhandlungen der Naturforschenden Gesellschaft in Basel* 94(1984): 157–228, on pp. 190 seq.

<sup>86</sup> Keynes MS 32 (about 1690?): 'Symbola aureæ mensæ duodecim nationum [...]', ff. 1r seq. (= HL 1048, also in LC); 'Lusus serius [...] Dat. 1616. [...]', ff. 11r seq. (not HL?; see LC: '[2.4.] <7>8 Maier lusus serius'; HL 1044 is an English translation only); 'Mich. Majeri Atalanta fugiens, [...] Edit. 1618.', ff. 13r seq. (not HL, but see LC: '2.4.1 Maier Embl.'; a second entry, '[2.4.] 2 Maier Embl.', is HL 1045); 'Michaelis Maieri Viatorium [...]', ff. 25r seq. (= HL 1052, also in LC); 'Septimana Philosophica [...]', ff. 33r–44v (= HL 1046, also in LC). This eighty-eight page manuscript, partly paginated by Newton himself, can be identified by collation with the otherwise unknown 'Extract. Maier.' (or 'Maier. Extract.'), quoted in Newton's 'Notanda chymica' (Smithsonian Institution Libraries, Washington, DC: Dibner MS 77; formerly Burndy # 14), and as well in his *Index chemicus* (see Westfall, 'Newton's Index chemicus', p. 184). However, supported by the handwriting, the 'middle early' Dibner MS 77 has been dated to about 1670 or after, whereas Keynes MS 32 has been dated to the 1690s (we share the assessment of Westfall, *Never at Rest*, p. 292, n. 37). This dating flagrantly contradicts these internal interdependencies. In addition, Dibner MS 77 also bears reference to 'Maier Hier.' (or 'Hieroglyph.'); this may be identified as Maier's *Arcana arcanissima...([London], 1614, reissued 1625 as De hieroglyphicis Ægyptiorum...; not HL, but see LC: '[2.4.] 5 Maier Hieroglyph'). For an extensive bibliography of Maier's works see K. Figala & U. Neumann (forthcoming in *Archives Internationales d'Histoire des Sciences*).*



<sup>87</sup> Babson [925]A (c. 1668): 'Loca difficilia in <N>ovo Lumine Chymico exp<1>icata.', followed by 'Hermetick Secrets'; Keynes MS 19 (c. 1668–69): 'Collectiones ex Novo Lumine Chymico [...]' (with 'Collectionum Explicaciones.'), followed by 'Arcanum Hermetice Philosophiae Opus.' (with 'Explicaciones.'), and 'Dialogus Mercurij Naturæ & Alchymistæ'); Jewish National and University Library, Jerusalem (JNUL): MSS Var. 259–4/5 (early 1670s): 'Novum Lumen chymicum. Sendivogij [...]', followed by 'Enchiridion Physicæ Joh. Spagneti. [...]', and 'Ab eodem Arcanum

In a similar way other prominent titles which are quoted in neither of Newton's desiderata lists can be traced in his alchemical reading notes and transcriptions, and for that reason probably came into his library before 1670. They should include George Ripley's *Opera omnia chemici...* (Kassel, 1649) and the *Tractatus aliquot chemica...* (Geismar, 1647), both edited by Ludwig Combach, as well as the *Musæum hermeticum...* (Frankfurt, 1625) and *Harmonie in perscrutabilis... Decas [I-II]...* (Frankfurt, 1625).<sup>88</sup> Apparently, Basilius Valentinus' *Currus triumphalis antimonii...* (Toulouse, 1646), edited by Pierre Jean Fabre, belongs to this group, too. But we cannot be sure in the latter case, since this edition was the source for a set of Newton's rather early reading notes, though the volume still appears in *Stanford A*. We may thus have to post-date excerpts made by Newton from this book from about 1668 to after 1670, or assume that he made his notes out of a loaned copy and then decided to buy his own.<sup>89</sup>

Among the early subjects of Newton's alchemical studies was the famous work of Nicolas Flamel, which, according to Professor Dobbs, was known to him through its English translation, *Nicholas Flammel, his exposition of the hieroglyphicall figures...* (London, 1624).<sup>90</sup> Moreover, his familiarity with this title is clearly shown by the spelling 'Flammel' (instead of Borel's 'Flamel') throughout his bibliographical records, notwithstanding that he himself did

*Hermetice Philosophiae Opus. [...]*; to this also may belong JNUL MS Var. 259–7 (part A): 'Ex Augurelli Chrysopœa'. The *Bibliotheca chemica contracta* is the only source to present these tracts (Sendivogius/d'Espagnet/Augurello) jointly. For maintaining these early datings we have to suggest that Newton, at least for some time, had a copy of the 1653 edition at hand, although he is only known to have owned a reissue of 1673 (*HL* 220, also in *LC*).

<sup>88</sup> *HL 1405–6, 1623, 1130* (1625 edition; for the enlarged 1677(78) edition see *HL 1131*), 740 (all titles also in *LC*). For extracts from Combach's Ripley edition see Keynes MS 17 (early 1670s); for Combach's *Tractatus aliquot* see Newton's note in his copy (*HL 1623*). A further argument for Newton's early knowledge about this editor's activities may be seen in his explicitly mentioning the name in connection with Christophorus Parisiensis (see *DSC* [42], marked). Early reference to *Musæum hermeticum* of 1625, or rather to a tract contained therein ('Gloria mundi'), is made in JNUL MS Var. 260 (c. 1675), ff. 2r–5v *passim*. On the other hand, but still in agreement with the dating of MS Var. 260, there is some evidence for the acquisition of this volume in the early 1670s, i.e. after Newton had drawn up *Stanford A* (see notes 62 and 80); for *Harmonie ... Decas* see Newton's remark in *DSC* [71].

<sup>89</sup> See *DSC* [59]; not *HL*, but probably in *LC*: '[2.4.] 20 Currus triumph. B. V.' Newton's final library only included editions with the commentary by Theodor Kerckring in Latin and English (*HL* 882, 129). Transcripts in Keynes MS 64 (c. 1668): '[...] Currus triumphalis Antimonij.', followed by 'Roger Baconis Oleum Stibij.' must have been made from Fabre's edition of 1646, because this one also comprises – *inter alia* – Bacon's tract.

<sup>90</sup> See Dobbs, *Foundations*, p. 130, on Newton's source for his Artefius and Pontanus transcripts in Keynes MS 14 (early 1670s). Early extracts from Flamel's treatise itself

not own the book. Newton may have borrowed a copy in the very beginning of his (al)chemical career and subsequently, between about 1670 (as shown in *Stanford A*) and through at least the 1690s, tried to find the whole *corpus* ascribed to (and connected with) this French alchemist.<sup>91</sup> George Starkey's *Pyrotechny asserted...* (London, 1654) is even more illustrative of the significance of Newton's bibliographical lists. A group of his earliest chemical, but not yet alchemical, notes prove that Newton consulted this work as a highly esteemed source-book at the beginning of his research on this subject. Astonishingly, however, Newton added its title as late as the 1680s when he supplemented his *De Scriptoribus Chemicis* with the help of William Cooper's book advertisements. There is every indication that Newton incorporated his own copy into his library only during a later period of his (al)chemical career.<sup>92</sup>

## Conclusion

In a sense we have now come full circle. Detailed studies of the role and development of alchemy in Newton's thought have shown that he started with what may be called 'applied chemistry'.<sup>93</sup> Corresponding to this interest is the series of metallurgical and mineralogical works in his first list of desiderata of books on chemistry and alchemy in about 1670. Alternatively, the inner development of Newton's approach to alchemy is evident even from the same strictly bibliographical records: the book lists and fragments of the late 1680s and early 1690s comprise titles of unambiguously alchemical orientation. Moreover, by comparing his early knowledge and use of the literature of alchemy with his late desiderata, we are able to see a shift from 'modern' to classical authors and texts. It seems likely that the crucial impetus for this change was Maier's 'historical' outline of alchemy, elaborated in his *Symbola*. Accordingly, most of the ancient and medieval authors listed by Newton in *Stanford A* can be traced to that eminent work; though it must be noted that

(including pen drawings by Newton) are in JNUL MS Var. 259–3. This MS seems to have been Newton's main source for later quotations from Flamel's work, since further extracts 'Out of Flammel' in Keynes MS 25 (1670–72) are based on the JNUL MS, as can be verified by collation; cf. Newton's reference in Keynes MS 25, f. 1r: 'Flam. p. 3 c 3.'; also reference in Babson [419] (cf. note 23).

<sup>91</sup> DSC [66], [67]. See also DSC [1], which is closely connected (and was believed as the main key) to the work of Flamel, and – probably – DSC [43] as a supplementary tract on the subject.

<sup>92</sup> DSC [Add 3] (not in LC); on Newton's chemical studies and his experimental notebook see M. Boas & A. R. Hall, 'Newton's chemical experiments', *Archives Internationales d'Histoire des Sciences* 11(1948): 113–58, also Dobbs, *Foundations*, pp. 87–8, and Westfall, *Never at Rest*, pp. 281 seq.

<sup>93</sup> See B. J. T. Dobbs, 'Conceptual problems in Newton's early chemistry: a preliminary study', in *Religion, Science and Worldview. Essays in honor of R. S. Westfall*, eds. M. J. Osler & P. L. Lawrence (Cambridge University Press, 1985), pp. 3–32.

Borel, too, made the widest use of the *Symbola* – and of a similar work by Giovanni Battista Nazari<sup>94</sup> – as sources for his entries on ancient and legendary ‘authores chimici’.

However, beyond such a ‘shift’ one may also state ‘continuity’ by studying these bibliographical records. It seems likely that we have to expand the period of Newton’s essential (al)chemical book purchases – the growth of his (al)chemical library – definitely to his London years. It is true that his move to the capital represents a significant hiatus: thus we may interpret the break of collecting bibliographical data and the cataloguing in about 1696–97. But Newton’s bibliophile activities did not halt: this is the interpretation that we must make of the late acquisition of books which previously emerged within his long-time compilation of desiderata lists.

That Newton wrote, in *Stanford B* and *Keynes 13*, a second and obviously reworked bibliographical memorandum, beginning in the late 1680s (perhaps after having completed and published his *Principia* in 1687) suggests that his interest in alchemy was renewed or became considerably stronger at precisely this period. We may connect this interest with a prolonged search for the whole corpus of the alchemical tradition. From the studies of R. S. Westfall, especially, it is well known that Newton’s enormous knowledge in this field found its most impressive manifestation in his voluminous manuscript *Index chemicus*.<sup>95</sup> Newton’s famous remark to Hooke in 1675 that ‘If I have seen further it is by standing on y<sup>e</sup> sholders of Giants’,<sup>96</sup> is certainly true of his attitude towards the domain of alchemy. The bibliographical records, presented in this paper, namely *Stanford A* (*De Scriptoribus Chemicis*), *Stanford B* and *Keynes 13*, may be considered as important documents illustrating Newton’s path towards this knowledge: his unbroken quest for (al)chemical books and the endeavour to establish an exquisite (al)chemical library, comprising the extant sources to reveal the secrets of the *prisca sapientia* until his own time.

We may conclude our survey with some few words on the possible relevance of such bibliographical material for further studies of Newton’s (al)chemical papers. One of the main difficulties in this field is the lack of reliable methods

<sup>94</sup> See DSC [79]; this, too, was one of Newton’s long-time desiderata.

<sup>95</sup> See Westfall, ‘Newton’s Index chemicus’, *Never at Rest*, ‘Newton and alchemy’, *passim*; see also Dobbs, *Foundations*, p. 88, where she states that ‘Newton went on...to probe the whole vast literature of the older alchemy as it has never been probed before or since.’

<sup>96</sup> Newton, *Correspondence*, vol. 1, pp. 416–17, no. 154; see also R. K. Merton, *On the Shoulders of Giants. A Shandean Postscript* (New York: The Free Press, 1965), whose fascinating *tour de force* through the history of books, tracts, text tradition, misleading quotations, etc. will meet with the widest approval of any historian of alchemy and early chemistry.

for dating the bulk of transcriptions, reading notes, drafts, etc. Certainly, there is an outstanding authority in dating these manuscripts from Newton's handwriting only – D. T. Whiteside. Furthermore, with the research on watermarks now done by A. Shapiro, it is hoped that one can obtain valuable help in determining cases which are undecidable based on handwriting alone, or even cases which are contradicted by internal evidence. On the other hand, the well-known date of acquisition of Newton's own copy of the *Theatrum chemicum* (in 1669) is widely used by almost all scholars on that subject in dating Newton's early (al)chemical manuscripts: the presence or absence of quotations from or references to the *Theatrum* may allow us to decide whether manuscripts had been written before or after April 1669. Thus a more precise knowledge of the dates of acquisition of other books or compendiums may give us a number of further 'key fossils' to date Newton's later (al)chemical papers. A first step, and thus a *terminus post quem*, is made by studying Newton's desiderata lists. Manuscripts, well-dated from handwriting, watermarks or internal evidence, may help us to verify both the dating of the bibliographical records, presented in this paper, as well as a *terminus ante quem* for acquisitions of important alchemical books. If it were possible to fix such dates of acquisition to a well-defined interval of time, these 'key fossils' would become a valuable supplement to other methods of dating manuscripts. But this demands further – intensive – study and identification of the vast number of Newton's textual references in his (al)chemical papers, which fortunately are, mostly, quotations from volumes he once had incorporated into his own library.

#### Appendix: Newton's *De Scriptoribus Chemicis*, an annotated transcription

In advance of their two-day sale of 332 lots of Newton papers and related material on 13 and 14 July 1936, Sotheby & Co. issued a detailed catalogue of the items on offer.<sup>97</sup> The compiler, John Taylor, listed them with the usual care and expertise shown by the London firm. The document being considered in this article, now in Stanford University Libraries, Department of Special Collections, Manuscripts Division, formed Lot 6 of Section I ('Manuscripts on alchemy. Almost all in the handwriting of Sir Isaac Newton') and was described as: 'Alchemical writers. 'De Scriptoribus Chemicis' [a Bibliography containing titles and particulars of over 80 Printed Books and several MSS.] 5 pp. Autograph. sm. 4<sup>to</sup>.' It was acquired by W. Heffer & Sons Ltd of Cambridge with a bid of £11–0–0. The subsequent journey of the manuscript from Heffers to Stanford was completed through the good offices of Frederick Edward Brasch, bibliographer, consultant, and generous benefactor to Stanford. The *De*

<sup>97</sup> Catalogue of the Newton Papers; its title continues:... Sold by order of the Viscount Lymington to whom they have descended from Catherine Conduitt, Viscountess Lymington, Great-niece of Sir Isaac Newton. Which will be sold by auction by Messrs. Sotheby and Co....; see also P. E. Spargo (this volume).

*Scriptoribus Chemicis* was presented by him to the Stanford collection along with other books and manuscripts concerned with the history of science.<sup>98</sup>

When the manuscript was bought by Heffers in 1936 it found itself in Cambridge for a third time. It had been originally compiled there during Newton's time at Trinity College, then about 200 years later it was returned to Newton's university along with a vast quantity of the rest of his papers which were to undergo a thorough examination and classification over the period 1872–88. Two nineteenth-century Cambridge mathematicians had visited Hurstbourne Park, the seat of the fifth Earl of Portsmouth, in order to look through the entire collection of Newton material and report back to the university authorities. When Adams and Stokes quickly realized that their task was likely to be a formidable and lengthy one, Lord Portsmouth gave his permission for the entire corpus to be transferred back to Cambridge for a careful sorting and study.<sup>99</sup> The detailed survey took sixteen years, and its completion was marked in 1888 by the publication of a catalogue<sup>100</sup> in which the papers were divided into fifteen individual categories. Section I (mathematics) was undertaken by Professors Adams and Stokes. For the rest of the material, a vast amount covering chemistry, chronology, history, miscellaneous (mainly theological) papers, letters, etc., assistance was provided by G. D. Liveing, the University Professor of Chemistry, and by H. R. Luard, the University Registry who dealt with the personal and non-scientific papers. The preface to the *Catalogue*, dated 26 May 1888, is signed H. R. Luard, G. G. Stokes, J. C. Adams, G. D. Liveing.



It was therefore quite obviously the last-named who assessed and sorted the chemical and alchemical items, and it is reasonable to assume that it was he who decided which papers were worth including as part of the 'scientific portion' to be presented to the university by Lord Portsmouth, and which should be returned to him at Hurstbourne Park. Though the classification of the chemical papers has been recognized as 'extremely competent',<sup>101</sup> it would seem that Newton's powerful and life-long fascination with alchemy struck no sympathetic chord within Professor Liveing, especially when we attribute to him the verdict given on p. xix of the 1888 *Catalogue* that 'Newton's manuscripts on Alchemy are of very little interest in themselves'. He was more impressed by the notes Newton had made concerning his own chemical experiments over his earlier

<sup>98</sup> A recent study of Brasch is found in H. Lowood, *Frederick E. Brasch and the History of Science* (Stanford University Libraries, 1987).

<sup>99</sup> For a full account of their visit, the subsequent transfer of the collection to Cambridge for sorting and close examination, and the eventual outcome after 'sixteen long years', see D. T. Whiteside, 'General Introduction', in *The Mathematical Papers of Isaac Newton*, ed. D. T. Whiteside, 8 vols. (Cambridge University Press, 1967–81), vol. 1, pp. xxx–xxxiii.

<sup>100</sup> *A Catalogue of the Portsmouth Collection of Books and Papers written by or belonging to Sir Isaac Newton, the Scientific Portion of which has been presented by the Earl of Portsmouth to the University of Cambridge* (Cambridge, 1888).

<sup>101</sup> See Whiteside, 'General Introduction', p. xxxiii.

years, so that these notes and a manuscript notebook were retained in Cambridge, evidently qualifying as 'scientific' and so being placed in a superior category to alchemical writings. Section II of the *Catalogue*, headed chemistry, was set out in six sub-divisions, the first of which was described as 'five parcels containing transcripts from various alchemical authors in Newton's handwriting, with notes and abstracts', with their contents catalogued to show 32, 35, 36, 12 and 31 documents respectively. The Stanford manuscript was item 14, in parcel 3, listed as 'Notes de scriptoribus chemicis' – somewhat briefer than the later *Sotheby Catalogue* entry.

The transcription of the Stanford manuscript (= *Stanford A*; Stanford University Libraries – Department of Special Collections, Manuscripts Division: Newton Collection (M132), Container 2, Folder 4; published by permission) reproduces Newton's original version as closely as possible, but a number of editorial insertions have been made in order to refer directly to each item and to page numbers in Borel's *Bibliotheca chimica*. All extra material of this nature is given in square brackets [], including capital letters to show the alphabetical division within Borel and (//) indicating change of pages within *Stanford A*. Except for the enclitic *que*, Newton's contractions have not been expanded. Subdivision into items was established according to Newton's indentation of lines. All variant sections are given in angle brackets <>, i.e. Newton's deletions, slips of the pen and corrections; interlineations are marked ↑↓. Newton's own 'editorial' additions, i.e. page references and material copied from following and/or repeated entries in Borel, are indicated by <italic sections>, and his later supplements, not based on Borel by <italic sections>.

Further information is given in the notes in part B at the end of the transcription referring to item numbers: notations of Newton's alternative spelling (restricted to major deviations or faults); corrections to Borel's entries and comments on actual editions or reprints in *Theatrum chemicum*, vol. I–VI (= *TC*); reference to John Harrison's *Library of Isaac Newton* (= *HL*) for volumes in Newton's possession. Newton's later excerpts from Borel (Stanford M132, container 2, folder 3, ff. 1r–1v = *Stanford B*; Keynes MS 13, f. 3r = *Keynes 13*) are incorporated into our annotations by reference only (for items repeated from *Stanford A*, without considering variants of quotation) or by detailed citation (for items occurring in the later excerpts only or repeated out of the original order; in these cases a cross-reference indicates the location within the actual order of quotation). Our numbering of Newton's items is as follows: [1] to [84] = set of excerpts copied from Borel; [Add 1] to [Add 6] = set of supplements added to Borel excerpts; item numbers indicated 'a' = additional items in *Stanford B/Keynes 13*, incorporated into the annotations following the transcript item numbers respectively. Reference to 'Borel' is made to his *Bibliotheca* edition of 1654 exclusively.

(A) Transcription of Stanford M132: Container 2, Folder 4: *De Scriptoribus  
Chemicis*

[Item:]	De Scriptoribus Chemicis.	[Borel:]
[f. 1r]	⟨Borellus vidit A⟩	[p. 2]
[1]	Abrahamum Judæum 'MS, <i>Borellus vidit</i> cum fig. et explicatione quadam idque Lutetiæ in 4.	[A]
[2]	Ægidius y <sup>e</sup> [sic] ⟨ꝝ⟩Vadis. Dialog. int. naturam & fil. artis ⟨in Th. Ch.⟩	[p. 3]
[3]	Ejusdem tab. diversorum metallorum in Th. Ch. ⟨in Th. Ch.⟩ [sic]	[p. 3]
[4]	Idem reperitur cum tractatu Penoti abditarum rerum Chemicarum Francofurti edit. 1595. 8.	[p. 3]
[5]	Georgius Agricola de re metallica lib. 12 Basil. fol. 16<2>1	[p. 4]
[6]	Georgius Agricola Philopistius Germanus, Lapid Philosoph. Coloniæ 1521 [sic]	[p. 4]
[7]	Alanus de Insulis MS in Angl.	[p. 5]
[8]	Albertus M. de rebus metallicis & minera <li>ibus 1. 5 1568 in 1 [sic] Colo. &amp; 1541 a Gualt. Riff, Argentorati</li>	[p. 5]
[9]	– Alchimiæ quam vocant Artisque metallicæ quam vocant doctrina certusque modus scriptis tum novis tum veteribus tum veteribus [sic], duobus vol. comprehensus Basil. per Pet. Pernam 1572 in primo sunt 8 ⟨in⟩tractatus in alio 13. ⟨in quibus Margarita pretiosa (p. 50, 140)⟩	[p. 7]
[10]	– De Alchimia opuscula quam plura veterum Philosophorum. In hoc libro sunt 9 tractatus Francofurti 1550. 4.	[p. 7]
[11]	– De Alchimia volumen Norimbergæ 1541. 4.	[p. 8]
[12]	× Alchemiæ veræ scriptores veteres Basil. 1561. fol. ⟨infra⟩	[p. 8]
[13]	Alphidij Secreta artis Chem. Lutetiæ apud D. de Lob <b>b</b> erie.	[p. 10]
[14]	× Gaspar Amthor Chrysoscopion seu Aurilogium, Jenæ 1632. 4	[p. 11]
[15]	Anaxagoræ conversiones MS in Angl.	[p. 11]

- [16] – Elixiriorum varia compositio & modus cum [p. 14]  
 veteribus Alchemiae Scriptoribus in fol. Basil. 1561.  
*viz' in eo sunt 1 Epist vetus de Metallorum materia*  
*& artis imitatione. 2. De Lapidis Philosophici*  
*formatione Epilogus. <ib. ><3> Arcanum ut ex*  
*Saturno facias aurum perfectum <4> Caput de sale*  
*Alcali ib & in Theat. Ch. 5 An lapis valeat contra*  
*pestem. 6 Hist de argento in aurum verso. 7*  
*Tractatus de Marchasita <-[?]> ex qua fit*  
*Elixir. & <8> Emanuelis liber 12 aquarum. Gratoroldi*  
*[sic] Defensio Alchemiae.*  
*Vide etiam p. 19. 1. 19 & 23 1. 9. & p. 8 & p. 85.*  
*1. 20. p 107. >*
- [17] – Canones decem. Francof. 1614. 8 cum quibusdam [p. 17]  
 alijs opusculis Chemicis <, viz Heliæ speculo Alchemiae>  
*<p. 113, 17, 171. >*
- [18] Tractatus de secretissimo antiquorum Philosoph. [p. 17]  
 arcano L<-[?]>ipsiæ 1610↑11↓12↑. 8.  
*pag 12, 17, 26, 221. Extat et in Th. Ch. [/]*
- [f. Iv]
- [19] ▷Ars magica seu naturalis et artificiosa stupendos [p. 17]  
 effectus & secreta detegens. Francof. 1631 in 12.
- [20] Introductio in vitalem Philosoph. Francof. [p. 17]  
 1623↑7↓. 4  
*p. 1<7>, 1<8>, 125.*
- [21] Epistola cujusdam patris ad filium Lugd. [p. 18]  
 Bat 1601. 8
- [22] Tractatus 7 a Justo a Balbian correcti et emendati, [p. 18]  
 ubi de Lap. Philos. 2 De minera Philosophi<c>a. 3.  
 Compendium utile. 4 Tractatus parvus de mercurio  
 Philos.  
*p. 18, 40. Extat in Theatr Ch.*
- [23] Aqua aurea, Balsamum & Oleum nigrum cum [p. 19]  
 Alkemiæ [sic] scriptoribus 2 vol. 8.
- [24] Arislai de lap. philos. in formam Dialogi opus cum [p. 27]  
 Denario Med. Penoti, Bernæ 1608. 8.  
*p. 27. <Et Lond. 1692. 8. >*
- [25] Aristotelis liber de practica lapidis in 4. [p. 28]  
*p 28.*
- [26] Arnaldi opera in fol. Lu<d>gd. 1520 & 1585 & [p. 29]  
 Francof. 1603 in 8.  
*p. 31. 229.*

- [27] – Ars Aurifera vol. 3 authores 48 antiquissimos [p. 32]  
 continens Basiliæ [sic] 1572 & in 8 & Franof. [sic]  
 apud Aubrios.
- [28] ⟨A[?]⟩ [p. 32]  
 Artefius et Flammel [sic]. Paris in 8 1609 & 4
- [29] Artefius de vita proroganda, qui se anno ætatis [p. 33]  
 1025 hunc librum scripsisse ait. Ex Naudæo.
- [30] A⟨f⟩vicennæ porta elementorum Basil. 8. 1572. [p. 35]
- [31] Avicenna de tincturis metallorum Francof. 1530. 4. [p. 35]
- [32] Augurellus carmine ⟨G⟩allico cum Hermetis 7 cap. [p. 36]  
 8 Pari⟨s⟩. 1626.
- [33] Rogerij Baconis ⟨scripta⟩ opuscula Francof. 1603 [p. 39]  
 in 12 [B]
- [34] Rog. Bacon De l' admirable p⟨ui⟩ssance de l' Art [p. 39]  
 et de la Nature, [?] ou est traité de la pierre  
 philosophale. a Lyon 1557. 8.
- [35] Jani Bacceri Thesaurus Chemicus experimentorum [p. 40]  
 certissimorum fide Justi Reinecceri Lipsiæ in 8 1609  
 & Francofurti 1620 in 12.
- [36] Blemidas περὶ χρυσοποίας antiquu⟨s⟩ liber Græcus [p. 48]  
 M.S. in Regia Bibl. Paris.
- [37] Petri ⟨b⟩Boni [fferariensis] de secreto omnium [p. 50]  
 secretorum, [?] Dei dono, lib. in 8. Venetijs 1546.
- [38] – Cesalpinus de metallicis lib. 3 Norimberg. 1602 in 4. [p. 58]  
 Idem de lapidibus. [C]  
*p. 58. [//]*
- [f. 2r]
- [39] <->Chymicæ Philosophiæ sex vetustissima scripta [p. 60]  
 Fran⟨c⟩of. in 8. 1605 apud Jo. Berne⟨t[?]⟩ [sic].  
*p. 60.*
- [40] – Philosophiæ Chemicæ ↑(sex)↓ vetustissima scripta [p. 60]  
 ex Arabico ser⟨m⟩one Latine facta Francof. 1605.  
 in 8.
- [41] Christoph. Parisiensis<-[?]> Elucidarium, &  
 cuius pars 2<sup>da</sup> est Arbor philosophalis. *La Medicine*  
 [sic] de troisieme ordre. *Alfabet Apertorie* [sic] de la  
 pratique envoy⟨e⟩ a s⟨on⟩ fils. *La Somme. La*  
*Sommiete en 4 parties (forte Summa minor) La*  
*Harpe. La Viole⟨t⟩e (alias Cithara sive*  
*Viole⟨t⟩ta⟨.⟩) Medulla artis. Particularia quædam.*  
*De Lapide Vegetabili*  
*pag. 61 et 182. Ab Italico Idiomate Gallica dat.*  
*15⟨84⟩*

- [42] – *Christophori Parisiensis libellus Chemicus a Quercetano memoratus & a Combachio publicatus.*  
pag. 181.
- [43] Jacques Cœur. ejus <M. S. de> Hieroglyphicorum explicationem <brevi p̄omi> & practicam quandam brevi in lucem mittendam *promittebat Borellus A.C.* 1654.  
p. 63.
- [44] Oswaldi Crollij Basilica Chemica Francof. 1608<&>1609 <et> in 8 & 1647 in 4 & Genevæ in 8. Jdē Gallice. Idem cum comment Jo Hartmann<i>. [p. 68]
- [45] Crollius redivivus ab Anonymo de lap. philos. 1635 in 4 Francof. <G>ermanicè. [p. 68]
- [46] Dardanus vel Dardanis, Antiquissimus philosophus<sup>^</sup>Chemicus<sub>↓</sub> seu Græcus seu Persa cuius opera Democritus a sepulchro ejus excepit & in Græciam transtulit et in ea commentaria scripsit.  
p. 72. [p. 72]  
[D]
- [47] Democritus Abderita, Philosophus Græcus de arte sacra seu Chemica cum Synesij et Pelagij comment. Interprete Dominico Piz<i>mentio Coloniæ apud Birkmannum 1574 in 16. [p. 75]
- [48] Democritus græce scripsit de Chemia ex Gesnero qui in Bibliotheca sua ait, extare adhuc illius scripta Chemica apud Joh. Deé [sic] M.S. græce, sub hoc titulo *περὶ χημείας* id est y<sup>e</sup> [sic] arte sacra cum commentarijs Synesij et Stephani.  
p. 75. [p. 75]
- [49] Arthur<i> Dee ffasciculus Chemicus Paris 1631 in 12 [p. 74]
- [50] *Prædictus* [sic] Democriti Physicorum et mysticorum liber cum comment Synesij et Stephan<i> MS apud D. Elichmannum Med. Lugd. Bat. [p. 75]
- [51] – *Democriti liber de arte sacra seu de rebus naturalibus et mysticis cum comment. Synesij et Pelagij extant latine cum Ant. Misaldi centu<-rijs> [/]rijs 9 memorabilium Coloniæ, 1574 in 16 ap. Birkma<nn>.*  
p. 75, 183, 217 [sic].
- [f. 2v] [52] Sanctus Dominicus Alberti Magni magister [p. 79]  
p. 79.

- [53] Cornelius Dre<sup>p</sup>belius seu Dreppels Belga de natura Elementorum liber cum Epist de mobilis perpetu*æ*i inventione e Belgico idiom. in Lat. versa a Petro Laurembergio Hamburg. 1621 in 8. & Francof. 1628. Reperiū*ntur* et ejus opera in 12 cum Cosmopolita et *aa*Augurello. Genevæ impressa.  
*p. 82.*
- [54] Lud. Dolce de Gemmis. Italice 1566 in 8  
*<vv>Venetijs.* [p. 82]
- [55] Dun*s*tani Arch. Cant. Liber secretus de lapide majori M.S. in Anglia apud D. Mayernum Turquetum Medicum.  
*p. 83.* [p. 83]
- [56] Christophorus Encel*iu*s de re metallica<-[?]>  
1557 in 8 Francof. [p. 85]  
[E]
- [57] Ephrem [sic] Syrus *scripsit* cont Alchemiam vulgarem.  
*p. 86.* [p. 86]
- [58] Epistolarum Philosophicarum Medicarum & Chemicarum volumen Francofurti. 1598 in fol. [p. 87]
- [59] *<P.J.> Fabri annot in 13 lib. chem* Tolosæ 1646 in 8. [p. 91]  
[F]
- [60] G. Fabritius [sic] de *<m>etallicis Tigu<r>i.* 1565. in 8. [p. 92]
- [61] G. Fallopij lib. 3 de secretis in 4. [p. 92]
- [62] Idem de mineralibus et metallis &c. [p. 92]
- [63] Joh. Chrysippi Faniani farrago Philosophorum, hoc est varij processus et sententiæ *hor* pervenienti ad lap. phil. Amberg. 1611 in 8.  
[sic] [p. 93]
- [64] Fernelius lib. de abditis rerum *↑causis↓* cap. 18 1. 2 de lap. philos. optime disserit & se caluisse eum testatur processumque ejus docet.  
*(p. 93)* [p. 93]
- [65] Flamelli Hierogl. *cum Artephio <e>t Synesio in [sic]*  
*Lat. per P. Arnaud. 1612 in 4.* [p. 95]  
*p. 95.* [p. 95]

- [66] Le Desir desire *or [sic]* Tresor de Philosophie de N. [p. 96]  
 Flammel *[sic]* dit autremnt, Le liure des 6  
 paroles in 8. avec divers autres Traitez 'Propria  
 Flamelli manu. exaratus *putatur et*, *<E>*xtat apud  
 D. Franciscum de Geran, dominum de  
 Sou qui etiam aliam Flamelli Scheat *[sic]* habet  
 Paris.  
*p. 96.*
- [67] Le grand Esclairisment *[sic]* de Nich. Flammel *[sic]* [p. 96]  
 in 8. Portio est libri, Christophori Parisiensis sub  
 hoc titulo editi.
- [68] Joh. Nicholaus *[sic]* Furichius de lap. philos. seu [p. 100]  
 Chyseidos *[sic]* lib. 4 cum ejusdem annot. 1622 in 8  
 et 1631 in 4 Argentorati.
- [69] Garlandi *opera* cum Ventura extant in 8. Basil. [p. 101]  
 1<5>60. *viz'* Dictionarium Chem. Compendium  
 Alchymiae. De tincturis. In Arnaldum. De salibus.  
*[G]*
- [70] Tractatus absolutissimus ubi agitur de Gemmis, [p. 109]  
 de Alchimisticis [//] de Thesauris &c Francof. 1627  
 in 4 apud Emmelium.
- <Harmonia-Deeas-tertia-F>*
- [71] Harmoniæ Chem. *<Deeas-tertia>* Decades [p. 111]  
 ↑2~~rēl~~↓ 3 Francofurt. in 8. 162<5>  
*<Decade-tertia-eJaree:>*  
*p. 112, 196*
- [72] <H>eliодорus↑Græcus↓ libum *[sic]* composuit [p. 113]  
 metro Jambico de auri factura quem Theodosio  
 Imperatori dicavit, ex Nicephoro Callisto, Georgio  
 Cedreno & Gratarolo.  
*p. 113.*
- [73] Hermetis cap. 7 Lipsiæ 1600 in 8 & in Th. Ch. cum [p. 115]  
 Scholijs & Gallicè per Gabr. Joly 1626 a Paris *cum*  
*Au<g>u<r>ello et Epistola Trevisani ad Tho.*  
*Boloniensem [sic].*
- [74] Philosophi cujusdam antiquissimi libellus de [p. 123]  
 Alchimia Argentorati 1566 in 8.  
*[I]*
- [75] – Authores variij Chemici Venetijs 1541 in 4 et in 8. [p. 124]
- [76] – Lullij Codicillus seu *C*antilena ad Regem Angl. [p. 142]  
 Colon. 1576 in 16. et 1563 in 8.  
*[L]*

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- |      |   |                                |
|------|---|--------------------------------|
| [77] | De mineralibus scripser <e>?</e> Albertus. Agricola,<br>Cæsalpinus, Aldrovandus, Cæsius, <i>Guil. Fabritius</i><br><i>[sic]. Aubertus, Quercetanus, Encelius</i> <&e. p. 159.><br>Gesnerus, Vincentius, Isaacus Hollandus, Guidius,<br>Mylius.<br><i>p 159, 161.</i>                | [p. 161]<br>[M]                |
| [78] | Morienus Hanoviæ <1565> in 4 & 1593 in 8. &<br>Parisijs 1559, 1<564> & 1574 in 4 & MS in Bibl.<br>Bo <e>d</e> leiana. < <i>Castrensis Præfat in Morien.</i> >   | [p. 163]                       |
| [79] | Nazari concordanza di Philosoph <i>i</i> 1599. in 4 in<br>Brescia Item della transmutatione metallica.  | [p. 166]<br>[N]                |
| [80] | Nollij [sic] <i>opera</i> . [?]<br><i>p 167</i>   | [p. 167]                       |
| [81] | Samuelis Nortonii Angli <i>opera varia</i><br><i>p 168.</i>   | [p. 168]                       |
| [82] | Joh. Rhenani aureus tractatus <F> libris tribus &c<br>Francofurt 1623 in 4  | [p. 196]<br>[R]                |
| [83] | – Mart. Rullandi Lexicon Chemicæ, et Problemata<br>Chemica cum tractatu de L. P. Francofurti in 8.<br>1607  | [p. 203]                       |
| [84] | Interpretation des secrets Hebrieus [sic] Chaldees &<br>Rabi <e>n</e> s du Prince Dorcas Philosophe Ethiopien<br>pour augmente<[?]r> <-[?]> l' or & <-[?]> l'argent<br>a dix p <e>er</e> our cent profit [sic] chaque semaine a<br>Paris chez Pierre Ramier 1622 in 8 Par de Merac. | [p. 264]<br>[Corol-<br>larium] |

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- |         |   |                |
|---------|---|----------------|
| [Add 1] | « <i>Catalogue of Chem. Books in 3 parts</i> »                                    | [not in Borel] |
| [Add 2] | « <i>Five Treatises</i> »   |                |
| [Add 3] | « <i>Starkey's Pyrotechny.</i> »  |                |
| [Add 4] | « <i>--- his liquor Alkahest</i> »  |                |
| [Add 5] | « <i>The[?] Boyle's Tracts↓ of the growth of</i><br><i>Metals in their ore</i> »  |                |
| [Add 6] | « <i>The Chemical weddin</i> [sic] <i>transla<e>d</e>ted by M'</i><br><i>F.</i> » |                |

(B) Annotations to *De Scriptoribus Chemicis*

- [1] Also *Stanford B.*  
[2] *y<sup>e</sup> J* de (Borel); *in Th. Ch.*] (not in Borel; see annot. to [3]/[4]).

- [3] *in Th. Ch. in Th. Ch.* in Th. Ch. (Borel; applying to [2]/[3]); see annot. to [4].
- [4] Repr. in *TC II*; containing [2]/[3].
- [5] = *HL 20*.
- [6] *Georgius*] G. (Borel; *recte*: D[aniel].); *1521*] 1531 (Borel: *recte*: 1631); also *Stanford B* ('1531').
- [7] Not identified; a short alchemical tract, 'Dicta Alani' (originally in German, Latin transl. publ. 1599 [*HL 717*], repr. in *TC III*) has been falsely ascribed to Alanus de Insulis (Alain de Lille).
- [8] *1568*] (Borel; *recte*: 1569); *in 1*] (illegibly printed in Borel; *recte*: in 12). W. H. Ryff's edn of 1541 was publ. along with *Raimundi Lullii de secretis naturae ... libri II*; = *HL 995* (see also [76a] and text, note 74).
- [9] *tum veteribus tum veteribus*] tum veteribus (Borel); = *HL 1624* (vol 1 only; see text, note 69); also *Stanford B*. This is an abridged and altered edn of G. Gratarolo's collection [12]/[16], also containing [23]. Newton's ref. to 'Margarita pretiosa' is misleading as this treatise (first publ. 1546; see [37]) was ed. in 1572 separately by M. Toxites and repr. in *TC V*.
- [9a] Add. item in *Stanford B*:

'A Revelation of y<sup>e</sup> most secret spirit declaring the most secrets of Alchymy Lond. 1532. 8.' (Borel, p. 7; *recte*: 1623).

- [10] = *HL 493* (Cambridge University Library, Keynes Collection; vol. 1 only); also *Stanford B*. See [25]/[31].
- [11] Also *Stanford B*. See [75].
- [12] Also *Stanford B* (marked 'A'). Identical with [16].
- [13] Also *Keynes 13*.
- [15] Also *Stanford B*.
- [16] *Gratoroldi*] Grataroli (Borel, p. 107); also *Stanford B* (marked 'A') as: 'Veræ Alchemiæ artisque metallicæ, citra ænigmata doctrina certusque modus scriptis tum novis tum veteribus nunc primum & fideliter majori ex parte editis comprehensus fol. Basil. 1561.' (Borel, p. 19; this is the correct title of [12]/[16]; cf. [22a]). See also [9] and, on the composition of this item, text, note 48.
- [17] = *HL 1208*; also *Stanford B* as: 'Opuscula diversorum autorum Chemica partim e veteribus MSS eruta partim restituta Francofurti 1614 in 8.'; also *Keynes 13* (Borel, p. 171; correct title of [17]; cf. [81a]). See also [28].
- [18] *1610/1611/1612*] (Borel, pp. 17/12/26, 221; *recte*: [1611]); also *Stanford B* ('1612', without ref. to *Theatrum chemicum*). The year of publ. was originally enciphered by a chronogram; repr. in *TC V*.
- [19] = *HL 86*.
- [20] *1623/1627*] (Borel, pp. 17, 25/18; *recte*: 1623); also *Stanford B* ('1623'; see [75a]). Ed. by – and usually ascribed to – J. E. Burggrav.

- [21] Ed. by N. Barnaud; repr. in *TC* III.
- [22] Publ. Leyden, 1599; repr. in *TC* III.
- [22a] Add. item in *Stanford B*:
- ‘Veræ Alchimiæ [...]’ (Borel, p. 19; see [16]).
- [23] *Alkemiæ / Alchemiæ* (Borel). Anonymous tract contained in [9].
- [24] English transl. (‘Lond. 1692.’) not *HL*, but in Newton’s possession; see text, note 45.
- [25] Publ. with [10], repr. in [27].
- [26] Also *Stanford B*. The edns. ‘1520’ and ‘[Basileæ] 1585’ both are Arnald’s *Opera omnia*; the edn of 1603 is entitled: *Omnia, quæ extant, opera chymica*, ed. by H. Megiser. Its second part, *Speculum alchymiae*, was repr. in *TC* IV, the tracts composing its first part had been published with [27], and also in Philip Ulstad’s *Cælum philosophorum ...*, Lyon, 1572 (also [Strasburg], 1630; *HL* 1651, 1652).
- [27] *Basilæ / Basileæ* (Borel); *Franof. / Francof.* (Borel); = *HL* 90, 91: Trinity College, Cambridge (third edn, Basel, 1610, vols. 1–3), and Royal Society Library (*ibid.*, vols. 1–2 only). The edns mentioned by Borel (‘1572’ and ‘Frankofurti [*recte*: Basileæ, 1593, printed for De Marne & Aubry, Frankfurt]’) had been publ. in two vols. only, the 1572 edn with a slightly differing title: *Auriferæ artis ... antiquissimi authores, sive Turba philosophorum*, instead of: *Artis auriferæ ... volumina duo, quæ continent ...* See also [25], [26], [31], [34], [78].
- [28] *Artefius / Artephius* (Borel); *Flammel / Flamel* (Borel). For the edn in ‘4<sup>to</sup>’ see [65]; the ‘1609’ edn is the Latin *Artefii Clavis ...* only, repr. in [17] and in *TC* IV.
- [30] Publ. as: *Artis chemicæ, principes, Avicenna atque Geber ...* (1572); correct title likewise in Borel, p. 35. Only edn!
- [31] *1530 /* (Borel; *recte*: 1550 probably). Publ. with [10], repr. in [27].
- [32] Identical with ‘1626’ edn in [73].
- [33] = *HL* 110: Trinity College, Cambridge; also *Stanford B* (marked ‘\*’).
- [34] Latin versions repr. in [27] and, with annotations by J. Dee, in *TC* V.
- [35] *fide Justi /* (Borel; *recte*: Fidejusti). Ed. by Baccerus, but comp. by F. Reinneccerus. A ‘1620’ edn cannot be proved but in the same year a reimpr. in 24<sup>mo</sup> of Roger Bacon’s *De arte chymiae scripta* was publ. at Frankfurt, entitled: *Thesaurus chemicus ...*
- [37] , *Dei dono /* Dei, Dono (Borel); also *Stanford B*; also *Keynes* 13. This is identical with *Pretiosa margarita novella ...*, ed. by J. Lacinus (1546); see text, note 79, and [9]. Newton copied the surname, further emphasized by use of his significant [ ] brackets, from Borel’s first entry on P. Bonus.
- [39] *sex /* (Borel, *recte*: IV); *Bernet /* Berner (Borel). Identical with [40].

- [40] *sex*] (see [39]); = *HL 1301*: Trinity College, Cambridge. Identical with [39], but likewise listed twice by Borel; tracts I & IV repr. in *TC V*.
- [41] *Medicine*] *Medecine* (Borel); *Apertorie*] *Apertoire* (Borel); *1584*] 584 (Borel, p. 181, misprinted). Contraction (and translation) by Newton of Borel's extensive entries in Latin and French, omitting the following indications: the French versions were known in MSS only, the 'Elucidarius' [*sic*] was publ. in German (identical with [42]).
- [42] Also *Stanford B*; cf. [81a]. Ref. to the German 'Elucidarius Christophori Parisiensis', as publ. in *Vier auserlesene Teutsche chemische Büchlein ...*, Kassel, 1649, which must not be confused with L. Combach's *Tractatus aliquot ...* (see text, note 12). A Latin transl. of this tract was publ. in *TC VI*.
- [43] No impr. identified.
- [44] = *HL 462 + 743*: Trinity College, Cambridge (edn Frankfurt, 1647, with J. Hartmann's *Praxis chymiatrica*).
- [47] Also *Stanford B*; cf. [81a]; also in Keynes MS 13, f. 3v (see text, note 27). Identical with [51].
- [48] *Deé*] *Dée* (Borel); *y<sup>e</sup>*] *de* (Borel).
- [49] = *HL 497*. Out of turn and obviously inserted by Newton while copying the entries on Democritus (see also his ref. 'prædictus' in [50]).
- [51] *217*] *recte*: 215. More detailed repetition of [47], entered by Borel under 'Pelagius' and 'Synesius' respectively.
- [53] Also *Stanford B*. The Geneva edn 'cum Cosmopolita et Augurello' is that of Sendivogius' *Novum lumen chymicum ...* (1628); a reissue in 1639 (*HL 1192*: British Library) had been publ. without Drebbel's tracts. A French transl. of these was publ. with *Divers traitez ...* (1672; see [Add a]).
- [54] Ref. to C. Leonardi's *Speculum lapidum ...* transl. by Dolce.
- [55] Also *Stanford B*; see also text, note 83.
- [56] Also publ. 'Francoſ[urti]', 1551. Not *HL*, but probably bound with *HL 995*; see [8], [76a], and text, note 74.
- [57] *Ephrem*] *Ephraen* (Borel).
- [58] Ed. by L. Scholtz.
- [59] Latin version of Basilius Valentinus' *Currus triumphalis antimonii ...* (explicitly mentioned by Borel but abbreviated by Newton), augmented by several other tracts, ed. by P. J. Fabre. Not *HL*, but probably in Newton's possession; see text, note 89.
- [60] *Fabritius*] *Fabricius* (Borel). Publ. with C. Gesner's *De omnium rerum fossilium genere ... libri aliquot ...* (1565).
- [61] Numerous edns, but almost all in 8vo.
- [62] Ref. to Falloppio's *De medicatis aquis atque fossilibus tractatus ...*, Venice, 1564 (also 1569), in 4to probably.

- [63] Also *Stanford B* (without Faniani's name). Misleading ascription by Newton: in Borel the *Farrago* (ed. by A. Brentz) follows directly upon the Faniani entries: repr. in *TC IV*, as: 'Variae philosophorum sententiæ...'.  
[64] Also *Stanford B*. First publ. in 1548 at Paris; went through numerous edns, also with Fernel's *Universa medicina*.  
[65] *in Lat. per*] traduit de Latin de (Borel; misleading transl. by Newton); = *HL 1309, 1310*: Trinity College, Cambridge (both copies third enlarged edn, Paris, 1682). Identical with edn in '4<sup>[o]</sup>' in [28], although this is not a French transl. of Arcephius' *Clavis* (1609, see [28]) but of his 'Liber secretus': Flamel's and Arcephius' tracts repr. in *Bibliothèque des philosophes chymiques* .... Paris, 1672–78 (*HL 221*: Trinity College, Cambridge [vol. 1 only, but originally both vols. in Newton's possession]; see text, note 59); an English transl. was publ. in W. Salmon's *Medicina practica* ..., London, 1692 (*HL 1439* [edn 1707]).  
[66] *or*] ou (Borel); *Flammel*] Flamel (Borel); *Scheat*] Schead (Borel); also *Keynes 13*. Publ. with the French transl. of Sendivogius' works: *Cosmopolite, ou Nouvelle lumière de la phisique naturelle* ... (edns Paris, 1618 and 1628/29), but not included in the edn in Newton's possession (*HL 445* [dern. éd., Paris, 1691]).  
[67] *Esclairismen*] Esclaircissement (Borel); *Flammel*] Flamel (Borel); also *Keynes 13*. Publ. Paris, 1628.  
[68] *Nicholaus*] Nicolaus (Borel); *Chyseidos*] Chryseidos (Borel).  
[69] = *HL 649*: Trinity College, Cambridge. This '1560' edn is Garland's *Compendium alchimiæ* only, including his named tracts; it was reissued with L. Ventura's *De ratione conficiendi lapidis philosophici* ..., Basel, 1571.  
[70] Also *Stanford B*. Misprinted in Borel; *recte*: to be read as continuation of previous line, 'Ioh. Guidius de Mineralibus [Tracatatus absolutissimus ...]'. On Newton's cancellation see [71].  
[71] *Decades 2/3*] 3 (Borel, pp. 112/196; *recte*: 2); = *HL 740*: Trinity College, Cambridge (2 parts).  
[72] *libum*] librum (Borel).  
[73] *1600*] (Borel; *recte*: 1610); *Boloniensem*] de Bologne (Borel; also 'de Bononia', p. 49). Joly's edn was publ. as: *Trois anciens Traictez de la Philosophie naturelle* ...; see [32]. The 'Septem tractatus seu capitula' had been publ. previously in *Ars chemica* ..., Strasburg, 1566 (*HL 84, 85*: Trinity

College, Cambridge), a French transl. was extant in *Bibliothèque ...* (see annot. to [65]), and an English version in *Medicina practica* (see annot. to [65]); Augurello's poem in Latin was repr. in [12]/[16], and in *TC III*, a slightly different version publ. with Sendivogius' *Norum lumen chymicum ...* (edns Geneva, 1628, 1639; see annot. to [53]), and in *Bibliotheca chemica contracta ...*, Geneva, 1653 (*HL 220*: Trinity College, Cambridge [edn Geneva, 1673]); the Latin text of the 'Epistola' by Bernhardus Trevisanus (i.e. Trevirensis) was repr. in [27], an English transl. publ. in *Aurifontina chymica ...*, London, 1680 (*HL 103*: Trinity College, Cambridge).

- [74] Also *Stanford B*. This is the treatise ascribed to Zadith (Senior), publ. Strasburg, s.d. (probably simultaneously with *Ars chemica*; see annot. to [73]), repr. in [39]/[40], and in *TC V*.
- [75] Also *Stanford B*. Not identified, but probably misleading ref. to [11]: = Nuremberg, 1541, 4to (or to [8]: = Strasburg, 1541, 8vo), or, more probably, to an edn of the works of Geber, augmented by other tracts of several authors: = Venice, 1542 [*sic*], 8vo.
- [75a] Add. item in *Stanford B*: see [20] (Borel, p. 125).  
Add. item in *Keynes 13* (from Borel's division 'K'; no items copied in the *Stanford* lists):  
  
'Desiderantur Henrici Kunrath Amphitheatum æternæ sapientiæ Hamburgi 1611 in fol. Item Magnesia Catholica Philosophorum. Item de Athanore, igne Sophorum, Apocalypsi &c vel Ignis Magorum' (Borel, p. 130; *recte*: Hanoviæ [Hanau], 1609 [1602]).
- [76] 1576] (Borel; *recte*: 1572, or misprint of 1567; but in that year only other works by Lull had been publ. at Cologne); = *HL 997*: Trinity College, Cambridge (edn 1563; see Borel p. 267: 'Corollarium').
- [76a] Add. item in *Stanford B*:  
  
'Lullij opera quædam edita Norimberg. 1546↑& 1625↓, Basileæ↑1561 &↓1572 [= *HL 1000*: Trinity College Cambridge], Coloniæ↑1567↓ [= *HL 996, 998*] & 1592. Argentinæ, 1597 [Borel; *recte*: 1598 probably], Argentorati 1541 [= *HL 995*], Parisijs 1627. Lugd. Bat. 1502 [Borel; *recte*: 1602].' (Borel, pp. 141–7; underlining by Newton).

A similar listing was set up by Newton at the end of an inventory of Lull's works extant in his library (see text, note 74): 'Desiderantur opera impressa Norimbergæ 1546, 1625 Argentorati 1541 Basileæ 1561, 1600 Coloniæ 1592, 1576 Parisijs 1627'. – From these the '1502' (i.e. 1602) edn may ref. to *Secreta alchimiæ magnalia D. Thomæ Aquinatis ...*, ed. by D. Brouchuisius (incl. Lull's 'Clavicula & Apertorium'), repr. in *TC III*; for the cancelled '1541' edn see [8]. All other issues (not in Newton's library) are described in detail by Borel (pp. 141ff, 267).

- [77] *Fabritius*] Fabricius (Borel). Contraction/selection of two entries in Borel, pp. 159, 161, beginning ‘De Metallis scripserunt [...]’, and ‘De Mineralibus, innumeri scripserunt, quorum præcipui sunt [...]’ respectively; see also [8] (‘Albertus’), [5] (‘Agricola’), [38] (C[a]jesalpinus’), [60] (‘Fabritius’), [56] (‘Encelius’), [70] (i.e. ‘Guidius’). See also *HL 331* (‘Cæsius’), 539 (‘Quercetanus’), 787 (‘Hollandus’), 1136 (‘Mylius’).
- [78] The tract by Morienus was also publ. in [27], a French transl. in *Bibliothèque...* (see annot. to [65]).
- [79] Also *Stanford B.* ‘Della transmutatione metallica’ is the main title; ‘Concordanza’ is an appendix, comprising four works by Arnald of Villanova.
- [80] *Nollij*] Nolij (Borel). Contraction of a detailed listing of titles in Borel.
- [81] = *HL 1180–87*: Trinity College, Cambridge (eight tracts bound in 1 vol.; publ. Frankfurt, 1630).
- [81a] Add. items in *Stanford B.*:

‘Opuscula [...]’ (Borel, p. 171; see [17] also *Keynes 13*); – ‘Christophori Parisiensis [...]’ (Borel, p. 181; see [42]) – ‘Democritus [...]’ (Borel, p. 183; see [47]/[51]) – ‘Poterij Veredarius Hermeticus secreta secretissima detegens Francof. in 8 1622 [= *HL 1341*]. Ejusdem Philosophia pura materiam et processum ↑totum↓ apertissime detegens Francof. in 8 [publ. 1619]. Ejusdem Compendium Philosophicum in Trevisanū, Basil Valentīnū &c materiam & processum demonstrans. in 12 1610.’ (Borel, p. 189) – ‘De Quintessentia [Quinta essentia (Borel)] scripserunt Vittestein, Lullius, Arnaldus, Drebcl, Ripleus, Ulstadius, Rupessisa [Rupescissa (Borel)], Savonarola, Carerius, Guntherius [Guntherus (Borel)], Gerhardus &c’ (Borel, p. 193; copied in full).

- The ‘Compendium’ of M. Potier was listed on the title-page of *Elucidatio secretorum...* [Frankfurt, 1610, second edn; in German], but obviously not publ. For works on the ‘Quinta essentia’ see also [76]/[76a] (‘Lullius’); spurious version of the work of ‘Rupescissa’), [26] (‘Arnaldus’), [53] (‘Drebcl’), [9] (vol. II incl. a tract by ‘Savonarola’); see also *HL 1405–1406* (‘Ripleus’), 1651–1652 (‘Ulstadius’; see annot. to [26]), 667 (‘Gerhardus’).
- [82] Also *Stanford B.* Repr. in his *Opera chymiatrica* (*HL 1397*: Trinity College, Cambridge [edn Frankfurt, 1668]).
- [83] = *HL 1426; 1427*: Trinity College, Cambridge; Stanford University Library; also *Stanford B.* (‘Problemata’ only, marked ‘x’).
- [83a] Add. item in *Stanford B.*:

‘Smolij [Smollij (Borel)] Manuale venerandæ antiquitatis mysterium in 4 & in 24’ (Borel, p. 212; publ. Hamburg, 1609, 1610).

Add. item in *Keynes 13* (from Borel’s division ‘V’; no items copied in the *Stanford* lists):

'Vellus aureum Trismosini.' (Borel, p. 226; publ. Rorschach, 1598(-99), add. vols. Basle, 1604; in German).

Add. item in *Stanford B*:

'L'Idee parfaite de la Philosophie Hermetique ou l' abrige [sic: abregé (Borel)] de la Theorie & Practique [sic: pratique (Borel)] de la Pierre des Philosophes. Par M. I. Colesson [Collesson (Borel)] a Paris 1631 in 8.' (Borel, p. 240: 'Appendix'; Latin transl. publ. in *TC VI*).

[84] *Hebrieus* / Hebrieux (Borel); *profit* / de profit (Borel).

[Additional] (Late entries not based on Borel, completing *Stanford A*)

[Add 1] Publ. London, 1675; = *HL 442*: Babson College, Mass. (edn [1688]; reissue of 1675 edn with continuation; see text, notes 16 and 17).

[Add 2] Publ. London, 1652; = *HL 621*.

[Add 3] Publ. London, 1658; = *HL 1553*.

[Add 4] Publ. London, 1675; = *HL 961* (edn 1684).

[Add 5] Publ. London, 1674; = *HL 274*

[Add 6] Publ. London, 1690 as: *The hermetick romance, or...*; = *HL 1422*; see text, note 42).

[Add a] Add. items in *Keynes 13*, not based on Borel:

'Le Cabinet Chimiques [sic]' (not identified; probably identical with *Bibliothèque...* [publ. 1672-78]; see annot. to [65]) - 'La Tourbe Françoise la Parolle delasseé, Drebellius, L'ancienne Guerre des Chevaliers, composent ensemble une volume imprimé à Paris chez d'Houry' (publ. as: *Divers traitez de la philosophie naturelle...*, Paris, 1672; = *HCL 531*: Trinity College, Cambridge; see [53]).