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Alchemy in the Cairo Genizah: the *Nachlass* of an Untidy Jewish Alchemist

https://doi.org/10.1515/asia-2021-0007
Received March 22, 2021; accepted June 7, 2021; published online August 24, 2021

Abstract: Among the hundreds of thousands of fragments of mediaeval manuscripts found in the *genizah* of the Ben Ezra Synagogue of al-Fusṭāṭ (Old Cairo), a noteworthy corpus of alchemical material preserves alchemical recipes and theoretical works that have the potential to shed light on the oft-debated question of the involvement of Jews in alchemy during the Middle Ages. After an assessment of the *status quaestionis*, this article offers an introduction to the corpus and to its codicological, palaeographic and linguistic features, and focusses on a discreet number of fragments that were composed by the same alchemist/copyist. The first Judaeo-Arabic edition, Arabic transcription and English translation of a selection of passages from these fragments is presented, together with discussion of their contents. While the first of the fragments is a collection of practical alchemical recipes, the second fragment preserves the Judaeo-Arabic version of a work by the famous alchemist Jābir ibn Ḥayyān that was previously considered lost.

Keywords: Alchemy; Cairo Genizah; Jābir ibn Ḥayyān; Jewish sciences; transmission of knowledge

1 Introduction

For much of the Middle Ages, Jews living in Islamic lands were deeply influenced by and involved in the cultural and philosophical trends running through the wider Islamicate societies of which they were part. A generally shared philosophical and scientific outlook based on the harmonisation of the ideas of a selection of Greek and Hellenistic thinkers with monotheism offered the common elements in which Muslims, Christians and Jews grounded their philosophical and

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scientific worldviews.[1] Logic, mathematics, geometry, astronomy, astrology and medicine were cultivated within circles of Jewish intellectuals, who were in constant dialogue with their Graeco-Arabic sources, on the one hand, and with the contemporary Muslim and Christian interpreters and critics of such sources, on the other.[2] It is therefore not surprising that mediaeval Jews in Islamic lands were fascinated by alchemy, were aware of its Graeco-Arabic sources and possibly practiced this discipline in the context of alchemical workshops. What appears to be surprising is the general scarcity of original alchemical works composed in a Jewish context and for a Jewish audience or, more precisely, the apparent scarcity of the material of this kind that has reached us in manuscript form and is attributed to Jewish authors. Raphael Patai's monograph *The Jewish Alchemists. A History and Source Book* attempted a maximalist reassessment of the importance of alchemy in the history of Jewish thought and presented the first English translation of a number of manuscripts related to alchemy, but fell somewhat short of the scholarly criteria that would have made it more than a stimulus for further work.[3] As Shatzmiller pointed out in her review of Patai's volume: "it may be hoped that the interest in this long-neglected field will be reawakened and that this study will serve as a guide to many who would undertake its further exploration".[4] A more cautious assessment of the *status quaestionis* was drawn by Freudenthal in the chapter on alchemy of his edited volume *Science in Medieval Jewish Societies*, where the "noted absence" of a significant original alchemical production in the mediaeval Jewish context is highlighted and explained as a consequence of the social barriers that prevented interested Jews from accessing the direct teachings of masters and alchemical manuscripts, of the unavailability for mediaeval Hebrew-reading scholars of the Pseudo-Aristotelian meteorological material discussing alchemical theory, and of the widespread association of alchemy with accusations of counterfeiting, which could have endangered the economic role of Jews in mediaeval societies.[5] It should be noted that the latest of the three factors highlighted by Freudenthal could have also determined the transmission of alchemical works composed by Jews under pseudoepigraphic attribution – an extremely frequent phenomenon in the history of alchemical writings, that could

1 Literature on the penetration of Greek philosophy in Islam is vast. For a general overview, see the classic Gutas 1998 together with Mavroudi 2014. On the kind of philosophy that entered the Islamicate world, see Adamson 2014, Adamson 2015, D'Ancona 2005, and D'Ancona 2017.

2 On scientific developments in mediaeval Judaism see Freudenthal 2011. An overview of the topic can be found in Ferrario/Kozodoy 2021.

3 Patai 1994, reviewed in: Freudenthal 1995, Shatzmiller 1995, Langerman 1996.

4 Shatzmiller 1995: 388.

5 Freudenthal 2011: 357–358.

have "protected" the affiliation of their authors and that may now impact our ability to recognise and retrieve these texts.

Shatzmiller's hope for a renewed interest in the study of alchemy in Jewish circles has not yet found much academic resonance, and contributions to the history of alchemy and Judaism are still few and far between.[6] In the current state of research, attempting an assessment of general scope would be premature, since our knowledge of mediaeval alchemy in the Jewish context still needs the basic work of discovery, study, editing and translating of the sources that would allow such an attempt.

Promising results in this direction are surfacing through the ongoing analysis of the alchemical material retrieved from the *genizah* of the Ben Ezra Synagogue of al-Fusṭāṭ (Old Cairo), an unparalleled treasure trove of documents that have revolutionised our knowledge of mediaeval Judaism, of its formative period and developments, of the mediaeval societies in which Jewish communities existed and their relationship with the centres of power, of the philosophical, scientific and medical activities of Jews in the context of mediaeval Islamicate societies and the Mediterranean World.[7] Genizah fragments date from pre-Islamic times up to the 19th century, as material produced even before the construction of the storage room attached to the Ben Ezra Synagogue in the 11th century was deposited there, and the Genizah was to a certain extent active almost until the date of its emptying in 1896. Very early and very late manuscripts are in any case exceptions, since the large majority of Genizah fragments date from the 10th to the 13th century, the so-called "Classical Genizah period." It is therefore scholarly practice to roughly date Genizah fragments to this period, unless the fragment itself presents clear evidence to the contrary in its contents (explicit dating, reference to historically datable events) or in its palaeographic and codicological features (handwriting, writing support, *mise en page*).

While the medical corpus of the Cairo Genizah has been the object of significant cataloguing efforts and of a number of scholarly publications,[8] no significant

6 A classic assessment of the incompatibility of the basic principles of Jewish kabbalah and alchemy is found in Scholem 1925. More recent contributions on the topic are found in Yinon (Fenton) 1993, Mentgen 2009, Freudenthal 2011b, Ferrario 2011 and Ferrario 2021.

7 The still fundamental work on the relevance of Genizah manuscript for the study of mediaeval societies in the Eastern Mediterranean world is Goitein 1967–1993.

8 Gottheil 1930, Gottheil 1931, Goitein 1963, Fenton 1980, Cohen 1993, Isaacs/Baker 1994, Baker 1996, Chipman/Lev 2006, Lev 2007, Lev/Amar 2008, Lev/Niessen 2008, Lev 2011, Lev/Chipman 2012.

study devoted to alchemy in the Genizah has yet appeared, and mentions of alchemical fragments in literature are scarce.[9]

In what follows, I will offer an overview of the preliminary results of my ongoing research on alchemical material from the Cairo Genizah, mainly conducted on the Genizah Collections at Cambridge University Library, and will focus, in particular, on a sub-group of manuscripts within the alchemical corpus that were penned by the same hand.

111 fragments of alchemical content or including alchemical material have been identified to date. The length of these fragments varies from just a few lines surviving from a badly damaged leaf to multiple bifolia that were arguably part of more extensive alchemical booklets, making a total 300 leaves of text.

A survey of the alchemical fragments in the Cambridge Genizah Collections has revealed some overarching features of the corpus:

(a) From a linguistic point of view, Judaeo-Arabic is by far the most represented language: more than half of the alchemical fragments are written in the variant of Middle Arabic used by Jews in the mediaeval Islamicate world for secular writings, including scientific and medical texts.[10] Arabic fragments and fragments that contain a mixture of languages (Arabic and Judaeo-Arabic; Judaeo-Arabic and Hebrew) have an equal share of the remainder of the fragments, while Hebrew alchemical manuscripts are very few and present palaeographic features that indicate a relatively late date of production (possibly the 15th and 16th centuries). The origin of the paper on which these Hebrew fragments are written is European, and in several instances is watermarked, allowing researchers to identify a *terminus post quem* for the production of these works.[11] Whether these fragments were written in Europe or are the result of the local use of European paper that was exported to the Islamicate world at least from the 16th century is still an open question.

9 Patai 1994: 370–371; Golb et al. 1958. A recent assessment of alchemy in the *genizot* and a discussion of three alchemical fragments was presented by Langermann at a conference held at Princeton University in 2017 (Langermann 2017) and shared on digital academic platforms. Studies on alchemy in the Genizah are scarce in comparison to the ones on medicine; this can be partly justified by the available evidence: only 111 Genizah fragments of alchemical content have been identified so far, while there are more than 2000 fragments of medical content.

10 Scholarly literature on Judaeo-Arabic is vast. For an introductory reading, see Blau 1981 and the encyclopaedia entries Halkin 1972 and Cohen 1978.

11 A very useful tool for the identification of watermarked papers is Briquet 1907. Examples of Genizah alchemical fragments produced after the "classical Genizah period" are Cambridge University Library, Or. 1080.14.6, T-S Ar. 44.194, T-S K1.8, T-S K1.38, T-S K14.17, T-S Misc. 10.9 and T-S NS 90.64.

(b) Alchemical fragments are almost exclusively written on paper and predominantly on Eastern rag paper, which is the most common Genizah writing material. The few fragments on Western paper tend to be the aforementioned Hebrew manuscripts: an analysis of these papers together with the palaeographic features of these manuscripts may point to their European origin. In very few cases, alchemical material is found on parchment, which was a very expensive commodity and tended to be used for copying Bibles and for texts perceived as sacred or important in other ways. It seems that alchemy found space on these illustrious manuscripts as a result of the very common activity of recycling used and partially used writing materials: alchemical texts and recipes are found on the *verso* of leaves of religious poetry, biblical commentaries and administrative documents.[12]

(c) The very nature of the Cairo Genizah, a repository for worn out pieces of manuscripts and for written material whose ephemeral usefulness had expired, clearly impacts on the physical shape and conditions of preservation of the material found there. There is no "complete" alchemical manuscript in the corpus, and more than two thirds of the material are represented by single-leaf fragments, often torn, rubbed, holed and/or stained. Multiple-leaf manuscripts and, in particular, groups of bifolia deriving from a single volume are very few, but they represent an important source of insight on more articulate textual efforts than those represented by single recipes or groups of recipes. These longer manuscripts in many cases appear to preserve portions of booklets on alchemy, of both practical – in the case of collections of recipes – and theoretical content. In the case of groups of bifolia, the attempt to establish an orderly sequence of their pages is often marred by physical damage to the writing support that tends to be more frequent and impairing in the corners of the manuscript leaves, preventing the reading of the very phrases that might extend from one leaf to the other and provide a lead for the reconstruction of the text.

In what follows, I will focus on a particular sub-group of alchemical Genizah fragments that share palaeographic, codicological and textual features. On these grounds, I argue that all these fragments were penned by the same Jewish person, who was probably writing for himself out of his own interest in the discipline and who had a wide-ranging interest in alchemy, from practical recipes for metallic transmutation to bibliographical lists of books of authoritative Arabic authors.

12 See, for instance, Cambridge University Library, T-S 20.85, an alchemical fragment on parchment written on the *verso* of a Hebrew bill of gift dated to the 1260s of the Seleucid Era (= 948–958 CE).

To date, I have been able to identify nine fragments (totalling about 50 pages of text) that very clearly show the activity of the same hand.[13] Another seven fragments share only some of the features of the previous group and their inclusion in the *Nachlass* of the copyist/alchemist needs further investigation.[14] The first feature that connects these fragments and hints at the identity of their author is the very peculiar layout and handwriting they display.[15] A first glance at any of the pages produced by the alchemist reveals a rather untidy *mise en page*: margins are not fixed and words are often crammed at the end of lines, lines of text do not run straight but are often arched and slanted downwards. The handwriting shows a similar degree of unevenness: the very size of single letters varies dramatically sometimes even within the same word; in a few instances words or entire sections of text are crossed-out with brutal pen strokes; the use of diacritical dots for differentiating between Arabic letters realised by the same Hebrew consonant is very rare and utterly inconsistent. These features suggest, on one side, that the person who wrote them was not a professional nor a trained scribe: even a quick comparison with a sample of the large number of professionally produced letters and documents from the Cairo Genizah may suffice to highlight the difference between the work of a confident hand and the individual responsible for the manuscripts under examination;[16] on the other side, that these manuscripts were possibly produced for the private use of the person who penned them out of his own intellectual and/or practical interest. The large majority of the texts preserved in what survived of this private *Nachlass* are recipes of an operative nature – and this is in line with the contents of the Genizah alchemical corpus as a whole. It appears clear that the "alchemist" had a keen interest in alchemical recipes and, in particular, in recipes devoid of the lexical and formal intricacies of more encoded alchemical texts.[17] Nevertheless, the extant evidence shows another level of

13 These are: Cambridge University Library, Mosseri I.111, T-S 20.20, T-S 20.85, T-S 24.69, T-S Ar. 35.104, T-S Ar. 48.65, T-S Misc. 8.24, T-S Misc. 8.35, T-S Misc. 8.51.

14 In what follows, I am going to call the person who penned these fragments "alchemist". This does not imply that the "alchemist" was actually involved in the practice of alchemy, although the content of some of the fragments in his production may hint at such activities. The "alchemist" may have only had a bookish interest in the transmission of alchemical doctrines and recipes and be therefore a specialised copyist but not a practitioner.

15 See images below.

16 High-quality digital images of Genizah fragments in the Cambridge Collections are available on the Cambridge University Digital Library website (https://cudl.lib.cam.ac.uk/collections/genizah). Digitized images of fragments from all Genizah Collections are available on the website of the Friedberg Jewish Manuscript Society (https://fjms.genizah.org/). Both websites last accessed on 01/02/2021.

17 The use of the names of planets to indicate the corresponding metal is the only instance of *Decknamen* to be found in these practical texts. For a study on Arabic "cover names", see Siggel

interest of the "alchemist": he copied extensive bibliographical lists by Arabic alchemical authorities and engaged at some level in alchemical theory. The co-existence of operative and theoretical (or simply bookish) texts in the production of a single Jewish alchemist is a significant – although rather isolated – witness to the availability of alchemical sources and knowledge of the mediaeval Jewish communities of the Eastern Mediterranean and to the degree of penetration of alchemy in these societies. Two additional features of these peculiar fragments further complicate the picture: (a) although the *mise en page* is rather inelegant and the pages appear untidy, their writer seems to be aiming for (and failing to accomplish) a rather refined and ornate script, adding a number of serifs to some of the letters (see, e.g., the letters *alef*, *beth* and the *lamed-alef* ligature). It appears that the alchemist was trying to reproduce the elegant and ornate script found in illustrious Hebrew manuscripts, possibly the Bibles and religious works he might have seen in his daily life in the community. This stylistic naivety may appear at odds with the highly bookish context of transmission of theoretical alchemical knowledge and the literary nature of some of its sources; (b) at least two fragments include within the Judaeo-Arabic text words in Arabic script, and one of them is found on the *verso* of an Arabic alchemical fragment of similar (but not identical) content composed, in its turn, in a rather irregular Arabic hand.[18]

To provide a more detailed picture of the variety of material penned by the "alchemist", in what follows I will describe and analyse two representative fragments of his production and present an edition and translation of selected passages. The first fragment exemplifies very well the practical side of the production of the "alchemist", comprising single alchemical recipes and groups of collected recipes and represent the majority of his *Nachlass*. The second fragment is more exceptional: it is an extended list of the alchemical works by Jābir ibn Ḥayyān and provides us with some insight on the penetration of Arabo-Islamic alchemy in the Jewish milieu of mediaeval Egypt.

2 Cambridge University Library, T-S Misc. 8.51

This is a rag paper bifolium measuring 22.2 cm (height) by 31 cm (width; the width of each leaf is 15.5 cm). The classmark under which the fragment is found in the Cambridge Genizah Collections also includes two other bifolia that do not appear

1951. A direct and consistent correspondence between *Decknamen* and substances is often difficult to establish and may vary with different authors and times. See Forster 2016: 16b referencing Ullmann 1972: 268–270.

18 See, for instance, Cambridge University Library, T-S 20.20.

to belong to the same manuscript. While these two further bifolia were written by the same "alchemist" as the first and they all are collections of fairly similar alchemical recipes in Judaeo-Arabic, from a codicological point of view the second and third pages of Misc. 8.51 appear to have been composed on a lighter kind of paper with a sharper writing tool. Moreover, the first bifolium preserves the entirety of the leaves, while the others are both similarly badly torn away, and the margins and a portion of text in all leaves are lost. I will therefore focus only on the first bifolium, which is labelled as P1.[19] The leaves of the bifolium contain between 25 and 28 lines of Judaeo-Arabic text. There are tiny holes in the paper and the ink is rubbed off in places: this damage prevents the reading of single letters or groups of letters of text, but, in most cases, the context allows for their plausible reconstruction. The pages also present a few water stains that generally do not hinder the readability of the text. Lines or portions of lines have been struck out by a horizontal line, with the larger portion of crossed out text being on 1 *verso*, where the expunction runs through three lines of text (ll. 10–12). In two cases (1 *verso*, l. 15; 2 *recto*, l. 5), a word is crossed out by multiple horizontal lines and a replacement word is superscript. Marginalia are found on the external and internal margins of 1 *verso*[20] and on the internal margin of 2 *recto*. On this same leaf, an additional line of text has been squeezed in between lines 24 and 25, and the same happens on 2 *verso* (between ll. 18 and 19). All marginalia, additions and replacements are penned by the same hand as the main text. In a few cases, the end of a recipe is marked by a circle (e.g. P1, 1 *verso*, l. 13) or a sequence of three circles (e.g. P1, 1 *verso*, l. 25); a peculiar sign (an oblong circular shape roughly divided in two sections by an horizontal curved line), reminiscent of the alchemical symbol for gold,[21] is found on the internal margin of P1 1 *verso*, corresponding to line 12. The context in which this sign is found suggests that it was not intended as an alchemical symbol, but it is rather a variant of the aforementioned sign marking the separation of sections in the text. Another possible function of these circular

19 Genizah fragments in the Cambridge Genizah Collections are labelled on the bottom right corner of their *recto* with a yellow (or more rarely white) tag showing their classmark. In the case of single-leaf manuscripts, this makes the identification of their *recto* and *verso* straightforward. In the case of bifolia, the label is found on the bottom right corner of the *verso* of the second leaf, so that the *recto* of the first page is the adjacent page on the left in the same opening. In the case of multiple bifolia, the provisional order of pages proposed by the cataloguers is signalled by a page number (e.g., P1, P2, P3) on a smaller white label. In what follows, I am going to refer to pages of fragments according to this system: e.g., P2 2 *recto* indicates the recto of the second page of the second bifolium in a multiple-leaf manuscript: this is the page that is found behind the one labelled with the fragment's classmark.

20 The note on the internal margin is also struck out by a line.

21 The use of signs for representing alchemical ingredients has ancient origins and features extensively in Byzantine alchemical miscellanies. See Martelli 2013: 268–269.

and oblong shapes could be that of collation marks, that would be stroke through at the end of the process of collation of a section of text;[22] the available evidence makes it impossible to verify this hypothesis. Graphically, the "alchemist" uses diacritical dots for distinguishing the Hebrew consonants that represent more than one Arabic letter very rarely and inconsistently: these are almost exclusively found on the Hebrew letter צ when it stands for the Arabic ض rather than ص.

The bifolium preserves a collection of alchemical recipes. In its current state of conservation only two recipes appear to be complete, while two other recipes would have exceeded the space of the extant pages. The presence of the expression *in shāʾa Allāh taʿālā* (if God, may He be exalted, wills) at the end of the two recipes points to a Muslim *Vorlage* for the recipes or, at least, to a very strong influence of Arabo-Islamic alchemy on the text. Any attempt at identification of the sources of these recipes has so far proved unsuccessful, but it is possible to provisionally draw some parallels – at least as far as the ingredients mentioned, the operations described and the formal elements of the recipes themselves – with the material preserved in operative alchemical texts, like the *De aluminibus et salibus* by Pseudo-Razi.[23] In what follows, I will present an edition of the Judaeo-Arabic text of the two complete recipes of this fragment, a transcription in Arabic characters and an English translation.

2.1 P1 1 *recto*, ll. 9-22

Edition (Figure 1)[24]

באב אכר לעקד אלזיבק כד מן
אלנשאדר וזן עשרין דרהמא ומן אלזיבק וזן
סתין דרהמא ומן אלשזרק וזן עשרין דרהמא
ומן מלח אלקלי וזן כמסתעשר דרהמא ומן אלטלק
אלמלוב וזן עשרה אלדראהם אסחק דלך כלה

22 See Gacek 2009: 65–66.

23 On the *De aluminibus et salibus*, see Steele 1929, Ruska 1935 and Ferrario 2007. I am currently preparing an edition and English translation of the Arabic original and the Hebrew version of the *De aluminibus et salibus*.

24 In editing these fragments, I have followed a minimalist approach to editorial intervention. Grammatical and morphological divergences from standard mediaeval Judaeo-Arabic are preserved in the text and the rare emendations are signalled in footnotes. Crossed-out words and phrases are reproduced as such in the edition. Circles used as divisions between sections of the text in the manuscripts are rendered with a circle ●. Square brackets […] signal the beginning of the edited text *in medias res*. Single-angle quotation marks < > enclose portions of text reconstructed by conjecture. Words or groups of words that have fallen or are unreadable because of material damages to the manuscripts are signalled by a double *crux desperationis* ‡.

Figure 1: Cambridge University Library, T-S Misc.8.51 *recto*. Image reproduced with the kind permission of the Syndics of Cambridge University Library.

במא אלנורה אלמצפאה ודלך אן תאכד נצף רטל
נורה כמא תכרג אלתנור פיצב עליה כל כמר אביץ
ותסחקה כלה[25] ותצעדה פי אלקרעה[26] ואלאנביק תם
אסחק בה דואך תלתה איאם פי אלשמס אלחרה תם
אגעלה פי קארורה מטינה ואסתותק מן ראסהא
ותוקד תחתה יום ולילה וקד שדיד תם כד מא
צעד כאנה אלמלח אלביץ לאגרבה באלמטרקה
תם[27] ינכסר פאלקי מנה קירט[28] עלי רטל ארס<כ>‡
נחאס או רצאץ או זיבק יאתי פגה

25 Ms. בלה.

26 I am emending *al-ruqaʿ* (“piece of cloth”) with *al-qarʿa* (“cucurbit”): the error – a simple exchange of the position of the consonants – can be explained as *lectio facilior*. The suggested emendation takes into account the procedural context of the recipe.

27 The stroke written over the letter *tav* appears to be the remnant of an Arabic *ḍamma*.

28 The most common form of this word is *qirāṭ*. I have preserved the defective form in the edition and Arabic transliteration.

Arabic transcription[29]

باب أخر لعقد الزئبق خذ من النشادر وزن عشرين درهما ومن الزئبق وزن ستين درهما ومن الشزرق وزن عشرين درهما ومن ملح القلي وزن خمستعشر[30] درهما ومن الطلق الملوب وزن عشرة الدراهم اسحق ذلك كله بماء النورة المصفاة وذلك أن تأخذ نصف رطل نورة كما تخرج التنور فيصب عليه كل خمر أبيض وتسحقه كله وتصعده في القرعة والأنبيق ثم اسحق به دواك ثلثة أيام في الشمس الحرة ثم اجعله في قارورة مطينة واستوثق من رأسها وتوقد تحته يوم وليلة وقد شديد ثم خذ ما صعد كأنه الملح البيض لاضربه بالمطرقة ثم ينكسر فألقى منه قيرط على رطل ارس<ك>‡ نحاس أو رصاص أو زئبق يأتي فضة.

Translation[31]

Another chapter for the coagulation[32] of mercury. Take twenty[33] *dirham* of sal ammoniac, sixty *dirham* of mercury, twenty *dirham* of guano,[34] fifteen *dirham* of alkali salt and ten *dirham* coloured talc.[35] Grind all of this with purified water of lime – this [requires] that you take half *raṭl* of lime when it comes out of the furnace and that any white wine is poured on it – grind it and sublime it in the cucurbit and the alembic, then grind with it your medicine for three days in the hot sun, then put it in a luted pot and seal its head.[36] Light a strong fire under it for a day and a night. Then take what was sublimed, as if it were the white salt. Beat it with the hammer and then it will break. Throw one *qīrāṭ* of it upon one *raṭl* of ‡ copper or lead or mercury: it will give silver.

29 The transcriptions into Arabic script, while implying necessarily a certain degree of standardisation (and interpretation), aim at being a faithful representation of the Judaeo-Arabic text with minimal normalisation. The same editorial signs used in the editions (see note 24 above) are applied here.

30 Conventionally spelled خمسة عشرة; this is a contracted form of the numeral 15 that is commonly in use in spoken variants of the Arabic language.

31 I am presenting here a very literal translation of the Judaeo-Arabic texts. Editorial additions aimed at enhancing the readability of the English translation are enclosed between squared brackets [ ].

32 Coagulation is a process through which a liquid substance is made solid. The coagulation of mercury is one of processes more frequently described in mediaeval Arabic sources. For al-Rāzī's methods of coagulation, see Stapleton et al. 1927: 35.

33 Lit. "the weight of 20 *dirham*". This applies also to the following occurrences of this phrase.

34 The word *shizraq* (also spelled *shīzraq* as in the recipe edited below) means excrement and, in particular, bat's dung or guano. See Dozy 1881: vol. 1, 810.

35 The word *mulawwab* is very uncommon and rarely found in Arabic dictionaries. The *Lisān al-ʿArab* records it as meaning "stained, soiled" (ed. 1984: vol. 1, 746); Ullmann 2000: vol. 2, part 3, 1654, on which I rely for my translation, connects it with the word *mulawwan*, meaning "coloured".

36 Lit. "strengthen its head".

2.2 P1 1 *verso*, ll. 13-25

Edition (Figure 2)

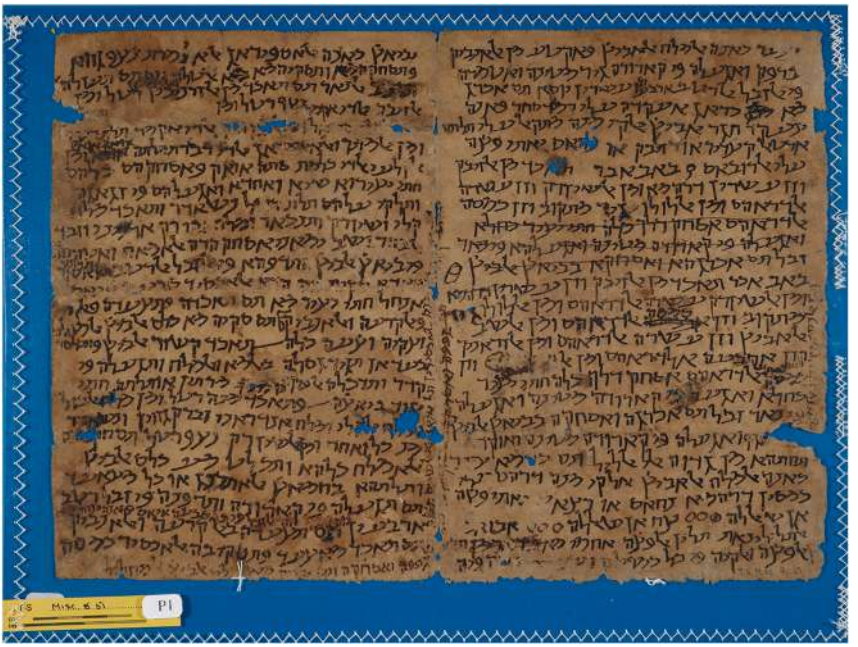

Figure 2: Cambridge University Library, T-S Misc.8.51 *verso*. Image reproduced with the kind permission of the Syndics of Cambridge University Library.

באב אכר תאכד מן אלזיבק וזן עשרין דרהמא
ומן אלשיזרק עשרה אלדראהם ומן אללולו גיר
מתקוב וזן ~~ארבעה~~[37] כמסה אלדראהם ומן אלשב
אלאביקוזן עשרה אלדראהם ומן אלזראניך
וזן ארבעה אלדראהם ומן אל‡ וזן
כמסה אלדראהם אסחק דלך כלה חתי יציר
כחלא ואגעל פי קארורה מטינה ואגעלה
פי נאר זבל תם אכרגה ואסחקה בביאץ אלביקּ
‡וא געלה פי קארורה מטינה ואוקד
תחתהא מן גדוה אלי אלליל תם כ<ד> מא ציר

37 The number four is struck through and replaced with the number five, which is superscript.

כאנה אלמלח אלאביֿ אלקי מנה דרהם עלי
כמסין דרהמא נחאס או רצאץ יאתי פּדֹה
25 אן שאללה[38] ●●● צח אן שאללה

Arabic transcription

باب أخر تأخذ من الزئبق وزن عشرين درهما ومن الشيزرق عشرة الدراهم ومن اللؤلؤ غير مثقوب وزن ~~أربعة~~ خمسة الدراهم ومن الشب الأبيض وزن عشرة الدراهم ومن الزرانيخ وزن أربعة الدراهم ومن ال‡ وزن خمسة الدراهم اسحق ذلك كله حتى يصير كحلا واجعل في قارورة مطينة واجعله في نار زبل ثم اخرجه واسحقه بباض البيض ‡واجعله في قارورة مطينة وأوقد تحتها من جذوة إلى الليل ثم خـذ> ما صير كأنه الملح الأبيض ألقى منه درهم على خمسين درهما نحاس أو رصاص يأتي فضة إن شالله ●●● صح إن شالله

Translation

Another chapter. You should take twenty *dirham* of mercury, ten *dirham* of guano, ~~four~~ five *dirham* of non-pierced pearl, ten *dirham* of white alum, four *dirham* of the arsenics and five *dirham* of ‡. Grind all this until it becomes a powder[39] and put it in a luted pot and place it in a fire of manure. Then take it out and grind it with egg white, ‡ put it in a luted pot and light under it a fire burning until night. Then take what has come out, as if it were the white salt. Throw one *dirham* of it upon fifty *dirham* of copper or lead. It will give silver, if God wills. This is true, if God wills.

2.3 Discussion

The recipes in this fragment share a common final product: artificial silver or, more likely, a stable dyeing of other metals (copper, lead, mercury) that makes them appear like silver. Their ingredients are inorganic as well as organic substances and are very commonly found in Arabo-Islamic alchemical recipes as well as in works on *materia medica*.[40] While most of the ingredients are easy to identify, for some of them a brief note is in place.[41] Sal ammoniac (*nushādir*) derives its Latin

38 The common phrase *in shāʾa Allāh* is here rendered in a contracted form that connects it to spoken/dialectal Arabic. I have preserved this form in the Arabic transcription and in the edition of the following fragments.

39 The word *kuḥl* here indicates simply a black powder with no further chemical specification.

40 For a recent excellent catalogue of and study on inorganic *materia medica* in mediaeval Arabic sources, see Käs 2010. Lev/Amar 2008 offer a study of *materia medica* based on Genizah medical sources.

41 The reader of ancient and mediaeval alchemical sources must be aware of the problems connected with the assimilation of names of alchemical ingredients with their modern chemical counterparts. The aforementioned use of *Decknamen*, the presence of impurities not accounted for but chemically relevant, and the tendency of alchemists themselves to re-interpret names of ingredients according to their own experiences or the contemporary "alchemical" fashions make a direct correspondence often highly risky. On the "practical exegesis" operated by alchemists on their sources, see Rampling 2014.

name from its ancient source, the drying out of water in the oasis of Ammon in Egypt, which left behind a mixture of sodium carbonate and sodium chloride. In the Middle Ages, the name came to indicate mostly ammonium chloride, possibly mixed with ammonium carbonate.[42] Alkali salt (*milḥ al-qalī)* is a kind of salt obtained from burnt plant material and, depending on the kind of plants used and the proximity of the sea, can be generally identified with impure sodium carbonate or potassium carbonate.[43] Talc (*talq*) in the Middle Ages was used to indicate a clay mineral mostly composed of hydrated magnesium silicate and also related minerals, like mica and selenite.[44] White alum (*al-shabb al-abyaḍ*) commonly indicates an aluminum and potassium sulphate of very pure quality, and, during the Middle Ages, was also called Yemenite alum (*al-shabb al-Yamanī*) from its place of origin.[45] The second recipe requires the use of "arsenics": if we assume that the pluralisation of the noun is not an error, this indication points to the three kinds of arsenic that are commonly mentioned in mediaeval alchemical literature: red arsenic, an arsenic sulfide mineral of orange–red colour also known as realgar and sandarac, yellow arsenic, an arsenic sulfide mineral of orange–yellow colour also known as orpiment (cfr. Latin *auripigmentum*), and white arsenic, an arsenic oxide.[46] Among the organic ingredients mentioned, guano or bird droppings (in particular that of seagulls) is particularly rich in chemicals like nitrogen, phosphate and potassium, and this has made it a coveted fertiliser from antiquity until modern times.[47] Guano features in the recipe as an ingredient, while common manure is mentioned as a source of moderate and long-lasting heat.[48] The first recipe includes the use of an ingredient, which is left unidentified and called "your medicine" (*dawāʾuka*): this may be interpreted as a reference to a previously prepared ingredient, whose description may have preceded this passage in the manuscript, or possibly to some kind of preparation acting as an alchemical elixir.[49] The recipes mention different kinds of units of weight, whose equivalence

42 Käs 2010: vol. 2, 1034–1036; 1100–1105; Moureau 2016: vol. 1, 312–313.

43 Käs 2010: vol. 2, 905–908; Moureau 2016: vol. 1, 312.

44 Käs 2010: vol. 2, 769–777.

45 Käs 2010: vol. 2, 726–43; Moureau 2016: vol. 1, 252–253.

46 Käs 2010: vol. 2, 654–664; Moureau 2016: vol. 1, 261–262.

47 Literature on guano, its uses and the geo-political consequences of its mining is vast. For a general overview with references to further literature, see Wills 2016.

48 The use of "dung fire" as a source of moderate heat is very common in Arabic alchemical recipes. Manure and, in particular, horse manure was also used for the heat released by its fermentation which also produced carbonic acid and ammonium carbonate. See Moureau 2016: vol. 1, 321.

49 In the alchemical context, reference to a substance as "our" (e.g., "our mercury", "our sulphur", "our salt") often implies a hidden hint to a different substance produced through alchemical manipulation and lexically concealed to the lay reader.

with modern measures is problematic, given their variations in different times and locations in the Islamic world: the *dirham* derives its name from the Greek δραχμή and was historically defined in relationship with the *mithqāl*, being the rate between the latter and the former 10:7; the standard weight of one *dirham* has been assessed as 3.125 g, but in different areas its value varied sensibly;[50] the *raṭl* derives its name from the Aramaic form of the Greek λίτρον and, depending on place and time, its value oscillated between 400 g and 2.5 kg;[51] the *qirāṭ* derives its name from the Greek κεράτιον and was variably defined as one-twentieth of a *mithqāl* (circa 0.22 g) or as one twenty-fourth of a *mithqāl* (circa 0.20 g).[52]

Few items of alchemical apparatus are mentioned: the cucurbit (*qarʿ*) and the alembic (*anbīq*) are parts of the distilling apparatus, the former being the vessel in which the material to be distilled (or sublimed) is placed and heated, and the latter the cap which is fitted on the cucurbit and receives the vapours.[53] Lute (*ṭīn*) is commonly used in mediaeval alchemy as an insulating material for pots that are exposed to prolonged cooking. A kind of clay specifically prepared for insulation, the so-called *ṭīn al-ḥikma* ("clay of wisdom", Lat. *lutum sapientiae*), is frequently mentioned in Arabo-Islamic alchemy: it was a mixture of clay, egg, vinegar or urine, horse manure and hair, which resulted in a particularly strong insulating material that could bear extensive exposure to fire.[54] The first recipe requires several steps before the white salt, which functions here as an elixir for the transmutation of metals into silver, can be obtained: preparation of water of lime, grinding of the ingredients, sublimation in the alembic, mixing with the "medicine", cooking and grinding again. The second recipe appears more straightforward, requiring only grinding, cooking and cooking again after mixing the ingredients with a binding agent (egg white). According to the metric conversion of the units of measures proposed above, the white salt produced with the first procedure would be more effective than that of the second, since one of its parts could transmute 80 parts of metal, while a part of the second white salt could only transmute 50 parts of metal.

All considered, these two recipes and the operative context in which they are found are typical examples of the procedural alchemical texts that were widely circulating in the mediaeval Islamicate world and that, as this evidence makes undoubtedly clear, were also read and possibly practiced by Egyptian Jews.

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50 In Egypt, it can indicate a weight of up to 4.68 g. See Hinz 1970: 2–4; Miles 1992b.

51 Hinz 1970: 27–33; Ashtor/Burton-Page 1991.

52 Hinz 1970: 27. Miles 1992a.

53 For a description of these instruments in al-Rāzī, see Stapleton et al. 1905: 324–325, 355–356, 380–381 and Ruska 1937: 54, 62, 95.

54 Käs 2010: vol. 2, 796–797; Thomas 2013; Moureau 2016: vol. 1, 324–325.

3 Cambridge University Library, T-S Ar.35.104

The second manuscript presented here is made up of three paper bifolia, the remnants of a booklet which might have extended over several more pages now lost. Each bifolium measures 15.5 cm (height) × 19.2 (width; the width of each leaf is 9.6 cm) and contains between 19 and 21 lines of Judaeo-Arabic text. There are tiny holes on the second leaf of the first bifolium, on the first leaf of the second and on both leaves of the third. The second leaf of the third bifolium (P3 2 *recto* & *verso*) is also torn in two places with the loss of portions of text. The readability of the text is hindered further by the presence of large water stains on the three bifolia: in most cases, these stains, even when extensive, have only managed to lower the contrast of the ink on the page without preventing its readability. In few places – e.g., the bottom left corner of the *recto* of the first page of the first bifolium (P1 1 *recto*) and the bottom left corner of the *recto* and *verso* of the second page of the third bifolium (P3 2 *recto* & *verso*) – water damage caused a severe smudging of the ink and the consequent deletion of significant portions of the text, which is therefore unfortunately lost for good. Similar to what was noted of the previous fragment, the "alchemist" made mistakes and corrected them by expunging groups of letters or entire words, as can be seen on P2 1 *verso* (ll. 6 and 11), P2 2 *recto* (ll. 13, 14, 16 and 20), P3 1 *verso* (ll. 11 and 12) and 2 *verso*, (l. 9). The "alchemist" makes very sparse use of diacritical dots and exclusively on the letter ע when it stands for the Arabic ض rather than ص. The end of sections of text are marked by single circles that differ from the ones seen in the previous fragments with the presence of a dot at their centre (e.g. P1 1 *recto*, ll. 5 and 10; P1 2 *verso*, ll. 1, 7, 8, 9, 17); these circles, that may as well have the function of collation marks, are not used consistently, since portions of text similar to the ones demarked by this sign end without any demarcation. Another feature of this fragment is the frequent division of words between two lines: the alchemist begins to write the first letters of a word at the end of one line of text and completes it in the new line, a phenomenon that is found in early Islamic manuscripts, but becomes rarer in later times.[55] See, for example: *al-thā/lith* (P1 1 *recto*, ll. 5–6), *maʿā/nīhā* (P2 1 *recto*, ll. 5–6), *taḥt/āj* (P2, 1 *recto* ll. 12–13) and other places in the edition. One of the most interesting graphical features of this manuscript is the presence of two words in Arabic script in the context of the Judaeo-Arabic text (P1 1 *recto*, l. 7 and P2 2 *verso*, l. 6); in both cases, there are no Arabic diacritical dots to distinguish similarly shaped consonants, making the reading of these words problematic. In both cases, the context allows us to hypothesise that, in the process of transferring the contents of the Arabic *Vorlage* into Judaeo-Arabic, the

55 Gacek 1989 and Gacek 2009: 146.

"alchemist" could not make sense of the Arabic source and reproduced what he could read. The same phenomenon is also attested in other fragments attributed to the "alchemist" and appears to be a feature of his *modus operandi*.[56]

The three bifolia were part of a larger booklet, the extent of which it is now impossible to reconstruct. The surviving fragments contain neither *incipit* nor *explicit:* we must therefore consider these pages as a section of a longer text that extended before and after the content preserved. Even the reconstruction of the order of the leaves of the three bifolia and their reciprocal relationship within the booklet is not easy to determine with any degree of certainty. Three factors complicate this task: (a) adjacent leaves in a bifolium may not be consecutive, since further bifolia may have been inserted between them in the original quire; (b) any attempt at reconstructing the order of the leaves on the basis of their content is a ventured enterprise, since the content of the booklet consists mostly of titles of treatises, and, therefore, provides neither a continuous narrative that could be followed over few pages, nor syntactic clues that may help connecting different leaves; c) the leaves of the manuscript present the highest degree of damage in the lower and upper external margins, where most of the tearing and staining is concentrated: words and entire phrases that could connect with what follows or precedes are rendered unreadable. For these reasons, I am going to present the edition, Arabic transcription and English translation of a selection of discreet passages in the provisional order of pages indicated by the labels on the bifolia.[57] I believe that the selected passages well represent the contents of this manuscript and provide an adequate insight on its importance.[58]

3.1 P1, 1 *recto*, ll. 4–14

Edition (Figure 3)

פאול מצחחאת בותאגורס אל
תאני מצחחאת סקראט • ואלתא
לת מצחחאת אפלאטון ואלראבע
מסחחאת רסטאטאליס ואלכמס
מצחחאת ارستجالس ואלסאדס מצ

56 See, for instance, Cambridge University Library, T-S Ar.48.65.

57 The current page numbering of the bifolia of T-S Ar.35.104 appears to be incorrect and, in particular, the contents of P3 – or, at least of the *verso* of its second leaf – should precede the material of P1. Being currently unable to establish on solid grounds the complete sequence of the three bifolia, I have preferred to edit them in their current cataloguing order.

58 The complete edition, translation and commentary of this fragment will be the object of a future publication.

חחאת ארכאגאליס ואלסאבע
מצחחאת אמורס • ואלתאמן
מצחחאת דמקראטיס • ואלתאסע
מצחחאת חרבי ואלעאשר
מצחחאת נא نحن פאערף דלך אן
שאללה עז וגל [...]

Arabic transcription

فأول مصححات بوتاغورس الثاني مصححات سقراط • والثالث مصححات أفلاطون والرابع مصححات رسطاطاليس الخمس مصححات ارستجالس والسادس مصححات اركاجاليس والسابع مصححات امورس • والثامن مصححات دمقراطيس • التاسع مصححات حربي والعاشر مصحاتنا نحن فاعرف ذلك إن شاالله عز وجل

Figure 3: Cambridge University Library, T-S Ar.35.104, P1 1 *recto* and 2 *verso*. Image reproduced with the kind permission of the Syndics of Cambridge University Library.

Translation

The first is *The Rectifications of Pythagoras*,[59] the second is *The Rectifications of Socrates*,[60] the third is *The Rectifications of Plato*,[61] the fourth is *The Rectifications of Aristotle*, the fifth is *The Rectifications of Aristotle*,[62] the sixth is *The Rectifications of Arkājālīs*,[63] the seventh is *The Rectifications of Homer*,[64] the eight is *The Rectifications of Democritus*,[65] the ninth is *The Rectifications of Ḥarbī*,[66] the tenth is *Our Rectifications by us*.[67] Know this, if God – glorified and exalted be He – wills.

3.2 P1, 2 *verso*, ll. 1–21

Edition (Figure 3)

1 […] כתאב אלתצר
יף עשרה אגזא הדא כתאב שריף
< ע>סִּים אלמקדאר גדא פיה עלום לא
תפנ‡ כתירה אבדא בה תבלג
5 יבלג אלאנסאן אלנהאיה פי הדה אל
צנאעה ופי גמיע אלאמור ואלעלום
ואלפלספה כלהא אן שאללה עז וגל •
כתאב אלהדי גזוא ואחדא • וינבגי
יקרי בעד אן שאללה עז וגל • רסאלתי
10 מנצור בן אחמד בן ברמך גזוא
ואחדא[68] ינבגי אן תקרי בעד דלך אן
שאללה עז וגל ובה אלתופיק ורסאלתי

59 Kraus 1943: 64 (no. 203). The number between brackets is the progressive number attributed to each Jābirian work in Kraus' catalogue.

60 Kraus 1943: 64 (no. 204).

61 Kraus 1943: 64 (no. 205).

62 This name is written in Arabic script and could be read as "Aristajālis" or, rather less likely, as "Aristaḥalis" or "Aristakhalis". This appears as a duplication of the mention of Aristotle in two different spellings, and the "alchemist" may have preferred to reproduce the Arabic letters of the second occurrence in case it stood for the name of an authority unknown to him.

63 Kraus 1943: 66 (nos. 207–208). Kraus lists two titles, *Kitāb Muṣaḥḥaḥāt Arshījānas* and *Kitāb Muṣaḥḥaḥāt Arkāghānīs*, as the *Rectifications of Archigenes*. The Arabic manuscripts consulted by Flügel for his edition of al-Nadīm's *Fihrist* show a similar multiplication of names and spellings. See Flügel 1871–1872: vol. 2, 194, note 1.

64 Kraus 1943: 66 (no. 209). See also Kraus 1942: 117, note 10.

65 Kraus 1943: 66 (no. 210). See also Kraus 1942: 43, note 2.

66 Kraus 1943: 67 (no. 211). See also Kraus 1942: 261, note 2.

67 Kraus 1943: 67 (no. 216).

68 Ms ואחד.

אלי געפר בן כאלד בן יחי בן ברמך
גזואן ינבגי אן יקריאן בעד אן שאללה
‡<כת>אב אלבאהת עטּים מן אלכתב
< בע>למה פינבגי אן יגוד דראסתה
אן שאללה עז וגל • כתאב אלאגראץ
פהדא אלכתאב הו בדו הדה אלכתב
אלמאיה ואחד עשר כתאבא לאן
פיה פתוך רמוז הדה אלכתב משרוחא
אערף דלך אן שאללה עז וגל • •

Arabic transcription

[...] كتاب التصريف عشرة أجزاء هذا كتاب شريف <ع>ظيم المقدار جدا فيه علوم لا تفن‡ كثيرة أبدا به تبلغ يبلغ الإنسان النهاية في هذه الصناعة وفي جميع الأمور والعلوم والفلسفة كلها إن شاالله عز وجل • كتاب الهدى جزءا واحدا • وينبغي يقرأ بعد إن شاالله عز وجل • رسالتي منصور بن أحمد بن برمك جزءا واحدا[69] ينبغي أن تقرأ بعد ذلك إن شاالله عز وجل وبه التوفيق ورسالتي إلى جعفر بن خالد بن يحيى بن برمك جزآن وينبغي أن يقرآن بعد إن شاالله ‡ <كتـ>اب الباهت عظيم من الكتب بعلمه فينبغي أن يجود دراسته إن شاالله عز وجل • كتاب الأغراض فهذا الكتاب هو بدء هذه الكتب المائة وأحد عشرة كتابا لأن فيه فتوح رموز هذه الكتب مشروحا. اعرف ذلك إن شاالله عز وجل ••

Translation

[...] The *Book of the Transmutation*[70] is in 10 parts; this is a noble and very extensive book, in which sciences that I have never <explained> thoroughly before are presented and through which man reaches the goal in this art as well as in all the things, the sciences and philosophy, if God – glorified and exalted be He – wills. The *Book of the Guidance*[71] is in one part and it must be read afterwards, if God – glorified and exalted be He – wills. My *Epistle to Manṣūr b. Aḥmad b. Barmak*,[72] is in one part and must be read after that, if God – glorified and exalted be He – wills, and He grants success. My *Epistle to Jaʿfar b. Khālid b. Yaḥyā b. Barmak*[73] is in two parts and they must be read afterwards, if God wills. ‡ the *Book of the Surprising* [*Stone*][74] is the most important among the books for the

69 Ms.واحد

70 Kraus 1943: 38 (no. 114) and 98 (no. 404).

71 Kraus 1943: 38 (no. 115). There are two possible readings of this title: *Kitāb al-Hudā* ("The Book of the Guidance") or *Kitāb al-Hadī* ("The Book of the Offering"); the two readings are mentioned by Kraus, who also notes that the fifth book of the Jābirian *Seventy Books* bears the same title.

72 Kraus 1943: 39 (no. 116) mentions a *Kitāb Talyīn al-ḥijāra ilā Manṣūr b. Aḥmad al-Barmakī* ("The Book on the Softening of Stones for Manṣūr b. Aḥmad al-Barmakī"), which is likely to be the same work as the one in this list.

73 Kraus 1943: 39 (no. 117) mentions a *Kitāb Aghrād al-ṣanʿa ilā Jaʿfar b. Yaḥyā al-Barmakī* ("The Book on the Aims of the Art for Jaʿfar b. Yaḥyā al-Barmakī"), which is likely to be the same work as the one in this list.

74 Kraus 1943: 39 (no. 118) explains that, according to the Jābirian *Kitāb al-Khawāṣṣ al-kabīr* ("The Great Book of the Properties") the "surprising stone" is a peculiar stone that provokes laughter in whomever looks at it.

knowledge it contains, and its teachings must be mastered, if God – glorified and exalted be He – wills. The *Book of the Aims*,[75] and this book is the beginning of these *Books of the Hundred and Eleven Books*[76] because it contains the explanation of the symbols of these books by way of commentary. Know this, if God – glorified and exalted be He – wills.

3.3 P2, 1 *recto*, ll. 1–14

Edition (Figure 4)

כתאב מאיה ואחד עשר פיהא
עלם אלצנעה וכתאב הו אלפהרסת
להדה אלכתב ודלך לתערף אסמאהא
פאערף דלך אן שאללה עז וגל ‡ והדה
אלמאיה ואתני עשר כתאבא פי מעא
ניהא ליס יחתאג אלי גירהא מעהא
פי פנהא ואעלם אן מא נדכרה
מן אלכתב פפי כל פצל מנהא מעני
וכל פצל קאים בנפסה מתאל דלך
מתאל הדה אלכתב אלמאיה ואחדא
עשר כתאבא לא יחתאג אלי גירה
א ומתאל אלעשרה אלאול לא תחת
אג פי מענאהא אלי גירהא פאערף
דלך אן שאללה עז וגל • [...]

Arabic transcription

كتاب مائة وأحد عشر فيها علم الصنعة وكتاب هو الفهرست لهذه الكتب وذلك لتعرف أسماءها فاعرف ذلك إن شاالله عز وجل ‡ وهذه المائة وأثنى عشر كتابا في معانيها ليس يحتاج إلى غيرها معها في فنها واعلم أن ما نذكره من الكتب ففي كل فصل منها معنى وكل فصل قائم بنفسه مثال ذلك مثال هذه الكتب المائة وأحدا عشر كتابا لا يحتاج إلى غيرها ومثال العشرة الأول لا تحتاج في معناها إلى غيرها فاعرف ذلك إن شاالله عز وجل [...]

75 Several books of the Jābirian corpus may be identified with this title. Given its position at the end of a list of works belonging to the collection of the *CXII Books*, I am inclined to identify it with the *Kitāb Gharaḍ al-aghrāḍ* ("The Book of the Final Aim", see Kraus 1943: 39, no. 122). The work is mentioned in the Jābirian *LXX Books* as the concluding treatise of the *CXII Books*, in agreement with the order of works presented in the Judaeo-Arabic fragment. Nevertheless, this treatise is here described as the beginning of a differently titled collection, the mysterious *CXI Book*, which I shall discuss below.

76 This title is problematic: it may be caused by an error of the copyist or it may be an alternative name of the famous collection of the Jābirian *CXII Books*. The presence of a discussion of a collection of *CXI Books* together with the mention of the *CXII Books* in the following section (P2, 1 *recto*, ll. 1, 10–11) further complicates its identification.

Figure 4: Cambridge University Library, T-S Ar.35.104, P2 1 *recto* and 3 *verso*. Image reproduced with the kind permission of the Syndics of Cambridge University Library.

Translation

The *Book of the One Hundred and Eleven* [*Books*][77] in which there is the knowledge of the art. And a book that is the index for these books, so that you know their names. Know this, if God – glorified and exalted be He – wills […]. And in the meanings of these *One Hundred and Twelve Books*[78] there is no need for anything else with them in their discipline. Know that in every chapter of the books that we mention there is a meaning and that every chapter is independent, and this, similarly to these *One Hundred and Eleven Books*, does not need anything else and the first 10 do not need in their meaning anything else. Then know this, if God – glorified and exalted be He – wills […]

77 See discussion below.

78 Kraus 1943: 10–40 (nos. 6–122).

3.4 P3, 2 *verso*, ll. 1–20

Edition (Figure 5)

1 [...] והמא אלגזו אלאול
כלאם אלתאני פיה אשכאל עלי
מא ‡ם שרחה כתאב אלאפר
נד ‡ בעדה אן שאללה עז
5 וגל ובה אלתופיק כתאב אלצאדק
והו גזוא יקרי בעדה אן שאללה
עז וגל כתאב אלרוצה גזוא
ואחדא יקרא בעד אן שאללה עז
וגל כתאב ~~אלשהאד~~ אלזאהר
10 גזוא ואחד יקרא בעדה אן
שללה עז וגל כתאב אלתאג
גזוא ואחדא[79] יקרא בעדה אן שאלה
עז וגל כתאב אלגבאל גזוא
יקרי בעדה אן שאללה
15 <כתא>ב תקדמה אלמערפה ה
‡ כבאר ינבגי אן יקרי
‡ יפהם ויתופא[80] אן שאללה עז
וגל • כתאב אלזרניך יקרא ויפהם
‡ע מ‡ תקד<מה>‡ רסאלתי אלי כאטף
20 ‡ [גזוא] ואחדא וינבגי אן <יקרא> •

Arabic transcription

[...] وهما الجزء الأول كلام الثاني فيه أشكال على ما ‡ شرحه كتاب الإفرند ‡ بعده إن شاالله عز وجل وبه التوفيق كتاب الصادق وهو جزءا يقرأ بعده إن شاالله عز وجل كتاب الروضة جزءا واحدا يقرأ بعد إن شاالله عز وجل كتاب ~~الشهاد~~[81] الزاهر جزءا واحد[ا] يقرأ بعده إن شاالله عز وجل كتاب التاج جزءا و<ا>حدا يقرأ بعده إن شاالله عز وجل كتاب الجبال جزءا يقرأ بعده إن شاالله <كتا>ب تقدمة المعرفة هـ‡ كبار ينبغي أن يقرأ ‡يفهم ويتوفا إن شاالله عز وجل • كتاب الزرنيخ يقرأ ويفهم ‡مـ عـ‡ تقد<ة> ‡ رسالتي إلى خاطف ‡ <جزءا> واحدا وينبغي أن <يقرأ>

Translation

And these two are the first part and the second discourse in which there are similarities regarding what ‡ he explained. The *Book of the Shininess of the Sword*[82] ‡ after it, if God – glorified and exalted be He – wills, and He grants success. The

79 Ms. וחדא.

80 Ms. ויתתופא. The duplicated ת of this problematic verbal form, which I read as a fifth form of the verb وفى , has been emended.

81 This word is struck through in the manuscript.

82 Kraus 1943: 37 (no. 100).

Figure 5: Cambridge University Library, T-S Ar.35.104, P3 1 *recto* and 2 *verso*. Image reproduced with the kind permission of the Syndics of Cambridge University Library.

Book of the Truthful[83] which is in one part and is read after it, if God – glorified and exalted be He – wills. The *Book of the Garden*[84] which is in one part and is read afterwards, if God – glorified and exalted be He – wills. The *Book of the Shining*,[85] which is in one part and is read after it, if God – glorified and exalted be He – wills. The *Book of the Crown*,[86] which is in one part and is read after it, if God – glorified and exalted be He – wills. The *Book of the Mountains*,[87] which is in one part and is read after it, if God wills. <The *Book of the*> *Preliminary Knowledge*[88] ‡

83 Kraus 1943: 37 (no. 101) notes that the title of this work possibly refers to sixth Imām Jaʿfar al-Ṣādiq (d. 148/ 765–766), who was one of the purported teachers of Jābir.
84 Kraus 1943: 37 (no. 102).
85 Kraus 1943: 37 (no. 103).
86 Kraus 1943: 37 (no. 104).
87 Kraus 1943: 37 (no. 105) gives this title as a variant of the title *Kitāb al-Khayāl* (“The Book of the Imagination”).
88 Kraus 1943: 37 (no. 106) notes that this title corresponds to the Arabic translation of the title of the Hippocratic treatise Περὶ Προγνώσεως (“The Book of Prognostics”).

voluminous[89] and it must be read ‡ understood and completely received, if God – glorified and exalted be He – wills • The *Book of the Arsenic*[90] is read and understood ‡ precedes it ‡. My *Epistle to Khāṭif*[91] ‡ is [composed of] one part and it needs to be <read> […]

3.5 Discussion

While the first fragment presented above is clearly a portion of a practical alchemical booklet, the second booklet is of a completely different nature: it is a long bibliographical work devoted to the vast alchemical production of one of the most important Arabo-Islamic alchemists, Jābir ibn Ḥayyān.[92] The presence of this kind of material among the writings of the "alchemist" suggests that he was not only interested in the operational aspects of the alchemical work, but also in its theory and in the written production of one of its champions. The content of the sections edited above consists without much variation of a list of titles of Jābirian books and epistles and includes very brief notes on their contents and usefulness or, more frequently, on the order in which they should be read. The Jābirian works mentioned in the Judaeo-Arabic fragment are: a) the ten *Books of the Rectifications*[93] by ancient philosophers, by one of Jābir's alleged masters, Ḥarbī, and by Jābir himself (P1, 1 *recto*); b) the treatises 90 to 99 (P3, 2 *verso*), 104 to 108 and 112 (P1, 2 *verso*) of the famous collection of the *One Hundred and Twelve Books*; c) two collections of Jābirian works, the aforementioned *One Hundred and Twelve Books* and a similarly titled collection of *One Hundred and Eleven Books*. At first glance,

89 The corrupted context of this word prevents its full understanding. It may also refer to persons and translate as "olds", "ancients".

90 Kraus 1943: 37 (no. 107) records for this treatise the variant title *Kitāb al-Zarānīkh* ("The Book of the Arsenics").

91 Kraus 1943: 38 (no. 109) notes that a Khāṭif al-Hindī al-Ifranjī is mentioned in al-Nadīm's *Fihrist* (1871–1872: vol. 1, 353) among the philosophers who wrote about alchemy.

92 The identity, dating and the very existence of the alchemist Jābir ibn Ḥayyān has been at the centre of a lively scholarly debate. Kraus maintains that "Jābir" should be considered as a collective name for a group of scholars of Shīʿī persuasion active around the ninth century. Although Kraus' hypothesis has been variously criticised (e.g., by Nomanul Haq 1994: 3–32, who maintains the existence of a single alchemist called Jābir, who flourished in the eighth century and composed all the books that bear his name), it still remains the most plausible. Delva 2017 presents important new findings that further problematise the question of Jābir's biography and historicity. The most recent and complete discussion of Jābir, his works and the status of the Jābirian question is Forster 2019.

93 "Rectification" here means the improvement of previous alchemical recipes of ancient authors by Jābir and by his master. Cf. Kraus 1943: 64.

the Judaeo-Arabic list may appear similar to the one transmitted in the 10th chapter of the famous *Kitāb al-Fihrist* ("Book of the Index"), an extensive reckoning of every book written in Arabic compiled by the famous 10th century Baghdadi bio-bibliographer and bookseller Abū l-Faraj Muḥammad b. Isḥāq al-Nadīm.[94] Although the similarities are many, there are significant differences that clearly prove that the Judaeo-Arabic fragment is not a copy of al-Nadīm's list: a) the list in al-Nadīm refers generally to Jābir in the third person (e.g., "Jābir said", "he had four books") and only switches to the first person when al-Nadīm is quoting directly from Jābir's own catalogue of books, while the Judaeo-Arabic text is consistently in the first person (e.g., "I have never explained") and refers to Jābir's *Epistles* to the notables of the Barmakid family as *risālatī* ("my epistle"); b) the list by al-Nadīm is devoid of the frequent supererogatory formulas that are frequently found in our manuscript (*in shāʾa Allāh ʿazza wa-jalla*); c) the Judaeo-Arabic text (P1, 2 *verso*; P2, 1 *recto*) mentions an unknown collection of Jābirian works, the *One Hundred and Eleven Books*, which is nowhere to be found in al-Nadīm's account. It would be easy to interpret this title as a gross mistake on the side of the copyist, were it not for the fact that it is mentioned in the very same passage that contains mention of the known collection of Jābirian alchemical works *One Hundred and Twelve Books*; d) the *Kitāb al-Aghrāḍ* (P1, 2 *verso*) is mentioned by al-Nadīm as the last work of the *One Hundred and Twelve Books*[95] and the same positioning is confirmed by Kraus, who relies on a direct mention of the *Kitāb al-Aghrāḍ* as the last of the *One Hundred and Twelve Books* in the Jābirian *Seventy Books*; e) the Judaeo-Arabic text – in particular P1, 2 *verso* and P3, 2 *verso* – appears concerned with the establishment of an order in which the books by Jābir should be read for their correct understanding. Very frequent is the use of the phrase *wa-yanbaghī an yuqraʾ baʿdahu* ("and it needs to be read after it") and of similar phrases that aim at guiding the reader through the puzzlingly extensive number of Jābirian alchemical treatises. The indications appear particularly useful as a remedy for one of Jābir's notorious strategies for preserving the secrecy of his writings from the curiosity of the laymen, the *tabdīd al-ʿilm* ("scattering of knowledge").[96]

This evidence should suffice to prove that we are in the presence of a Judaeo-Arabic list that is independent from but related to al-Nadīm's list. At the beginning of the section devoted to Jābir, al-Nadīm mentions the existence of two catalogues of

94 The Arabic edition of the section of the *Fihrist* on Jābir is in al-Nadīm 1871–1872: vol. 1, 354–358; the same section is translated in al-Nadīm 1970: 853–862. Another English translation of the chapter on alchemy of the *Fihrist* is found in Fück 1951.

95 Al-Nadīm 1871–1872: vol. 1, 356; al-Nadīm 1970: 858.

96 See Kraus 1943: XXVII–XXX and Lory 1983: 21–26, 78, which contains a translation of Jābir's *Kitāb al-Bayān*. See also Moureau 2016: vol. 1, 76, note 263.

Jābirian works compiled by Jābir himself: one, *al-Fihrist al-kabīr* ("The Great Index") would include all of the works of the alchemist, while the other, the *Fihrist al-ṣaghīr* ("The Small Index") would only be devoted to his works on the alchemical art.[97] These two catalogues are considered lost by Kraus, who provides as evidence for their historical existence their frequent mention in other Jābirian works.[98] Kraus adds an important detail that appears useful for attempting an identification of our Judaeo-Arabic fragments: these indexes were not only lists of titles, but also determined the relationships that existed between the different parts of the corpus, as clearly stated in the *Kitāb al-Mājid* ("The Book of the Glorious").[99] Moreover, Kraus mentions a further book that may be identified with the Judaeo-Arabic fragments presented here: the *Kitāb Tartīb qirāʾat kutubinā* ("The Book on the Order of Reading of our Books"), which is mentioned in the second book of the *Seventy Books* and may either be one of the aforementioned catalogues or a different work.

In sum, it is possible to consider the Judaeo-Arabic fragment T-S Ar.35.104 as an important witness of the transmission of one of these Jābirian catalogues, a work that was possibly still extant at the time of al-Nadīm and that, to the best of my knowledge, is not transmitted in any Arabic manuscript. This makes this fragment a fundamental source for our understanding of Jābir's production and how to approach it in the most fruitful way.

4 Conclusions

The alchemical *corpus* of the Cairo Genizah is a unique and mostly unexplored source for our understanding of the involvement of mediaeval Jews in the study and, possibly, in the practice of alchemy. Although few in number, Genizah alchemical fragments represent a large part of what has reached us regarding alchemy in the Jewish milieu during the Middle Ages and have the potential to provide evidence on a chapter in the history of the transmission of alchemical and, in general, natural philosophical ideas that is yet to be written. My research on the alchemical fragments preserved in the Cambridge Genizah collection has highlighted the existence of both theoretical/doctrinal fragments and of alchemical recipes in the *corpus*, showing that the whole spectrum of alchemical ideas and practices that circulated in the Islamicate world also penetrated and influenced its

97 Al-Nadīm 1871–1872: vol. 1, 355; al-Nadīm 1970: 855.

98 Kraus 1943: 3–4 notes that Jābir mentions the existence of these catalogues in his *Kitāb Usṭuqus al-Uss* (no. 6), in the *Kitāb al-Kabīr* (no. 46), in the *LXX Books* (nos. 123–192), in the *Kitāb al-ʿAwālim* (no. 1056), in the *Kitāb al-Mizān al-ṣaghīr* (no. 369) and in the *Kitāb al-Naqd* (no. 378).

99 Kraus 1935: 115–125.

Jewish component. Palaeographical and codicological observations have allowed me to identify a subset of fragments that were penned by the same hand, the *Nachlass* (or a portion of it) of a Jewish copyist/alchemist, who collected recipes and bibliographical information on Arabic alchemical authorities. This allows us further insight into the penetration of alchemical doctrines in mediaeval Egypt. The study of this group of fragments has unearthed the existence of the unique known witness to the tradition of a list of Jābirian works that it is possible to identify with one of Jābir ibn Ḥayyan's own lists of treatises. This discovery shows that the Genizah alchemical corpus has not only the potential to partly remedy the lamented lack of sources for the study of mediaeval alchemy in the Jewish milieu, but also of preserving important works of Arabic alchemy that were thought lost for good. The alchemical fragments retrieved from the *genizah* of the Ben Ezra Synagogue of Old Cairo should be considered a fundamental source in our attempt to understand how natural philosophical ideas moved between different cultures and languages in the mediaeval world.

Acknowledgments: I am deeply indebted to the Regula Forster and the anonymous peer-reviewers for their insightful comments, valuable corrections and bibliographic advice, and to Melonie Schmierer-Lee, who kindly polished my English. Images in this article are reproduced with the kind permission of the Syndics of Cambridge University Library.
Research funding: This publication is part of the research project *Alchemy in the Making: From Ancient Babylonia via Graeco-Roman Egypt into the Byzantine, Syriac, and Arabic Traditions*, acronym *AlchemEast*. The *AlchemEast* project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (Grant Agreement No. 724914).

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