

# "Take dragon's blood and crush it to a fine powder" : recipes in the alchemical composite manuscript MS Gotha orient A. 1162

Autor(en): **Braun, Christopher**

Objektyp: **Article**

Zeitschrift: **Asiatische Studien : Zeitschrift der Schweizerischen  
Asiengesellschaft = Études asiatiques : revue de la Société  
Suisse-Asie**

Band (Jahr): **75 (2021)**

Heft 2

PDF erstellt am: **25.07.2024**

Persistenter Link: <https://doi.org/10.5169/seals-956732>

## **Nutzungsbedingungen**

Die ETH-Bibliothek ist Anbieterin der digitalisierten Zeitschriften. Sie besitzt keine Urheberrechte an den Inhalten der Zeitschriften. Die Rechte liegen in der Regel bei den Herausgebern.

Die auf der Plattform e-periodica veröffentlichten Dokumente stehen für nicht-kommerzielle Zwecke in Lehre und Forschung sowie für die private Nutzung frei zur Verfügung. Einzelne Dateien oder Ausdrucke aus diesem Angebot können zusammen mit diesen Nutzungsbedingungen und den korrekten Herkunftsbezeichnungen weitergegeben werden.

Das Veröffentlichen von Bildern in Print- und Online-Publikationen ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. Die systematische Speicherung von Teilen des elektronischen Angebots auf anderen Servern bedarf ebenfalls des schriftlichen Einverständnisses der Rechteinhaber.

## **Haftungsausschluss**

Alle Angaben erfolgen ohne Gewähr für Vollständigkeit oder Richtigkeit. Es wird keine Haftung übernommen für Schäden durch die Verwendung von Informationen aus diesem Online-Angebot oder durch das Fehlen von Informationen. Dies gilt auch für Inhalte Dritter, die über dieses Angebot zugänglich sind.

Christopher Braun\*

# “Take dragon’s blood and crush it to a fine powder”: recipes in the alchemical composite manuscript MS Gotha orient A. 1162

<https://doi.org/10.1515/asia-2020-0021>

Received June 25, 2020; accepted March 1, 2021; published online August 30, 2021

**Abstract:** In the Middle Ages, the recipe was of central importance for the safeguarding and transmission of knowledge. This holds true for the scientific traditions of both the East and the West. Recipes have been transmitted in a multitude of manuscripts, either alone or in combination with other recipes and works. This article presents a collection of recipes for the production of inks that have been handed down in an alchemical collective manuscript. The collection also contains a recipe to ward off the pestilence. This combination of alchemy, healing rituals and ink production is more common than one might think. The question arises whether this is due to pure coincidence or whether such collections reflect a literary tradition?

**Keywords:** alchemy; ink production; magic; pestilence; recipes

## 1 Introduction

Recipes played an important role in the transmission of technical knowledge in the Middle Ages.<sup>1</sup> This applies not only to pre-modern Europe, but also to the Middle East and North Africa. A great number of Islamic manuscripts transmitting single

---

<sup>1</sup> For the role of the recipe in the transmission of knowledge in such diverse fields as textile industry, metallurgy, painting and illumination, see the collection of papers in Córdoba de la Llave 2013.

---

This article was written in the framework of the project “Between Religion and Alchemy. The scholar Ibn Arfa‘ Ra’s (d. 1197) as a model for an integrative Arabic literary and cultural history,” funded by the Swiss National Science Foundation.

---

\*Corresponding author: Christopher Braun, Independent Scholar, Saarbrücken, Germany, E-mail: chrbraun84@gmail.com. <https://orcid.org/0000-0002-3076-8446>

recipes and recipe collections bear testimony to the importance of this literary form in the safeguarding and proliferation of knowledge in this region of the world.<sup>2</sup> These for the most part short texts transmit information pertaining to different arts and crafts. Recipes were especially common in cookery<sup>3</sup> and pharmacy,<sup>4</sup> but also in various other disciplines such as alchemy,<sup>5</sup> gunpowder production,<sup>6</sup> ink making,<sup>7</sup> magic,<sup>8</sup> and medicine.<sup>9</sup>

In general, recipes were either transmitted individually, grouped together in collections or added to treatises and composite manuscripts.<sup>10</sup> It was quite common to write (non-)related recipes on the margins or empty pages of a manuscript at a later stage, thereby making best use of the precious commodity of paper.<sup>11</sup> Recipes were particularly susceptible to alteration and variance.<sup>12</sup> The copyists/composers/authors often changed the recipe's wording, either on purpose or inadvertently, during its often obscure history of transmission. In some cases, such open transmission was the result of on-going experimentation, as Georg Leube points out for the field of alchemy.<sup>13</sup>

The historian of science Matteo Martelli once described alchemical recipes as “shifting atoms of knowledge that could be disseminated in a variety of treatises of different genres or simply piled into collections of variable length.”<sup>14</sup> This ‘volatility’, although a serious challenge to the modern philologist, can be regarded as a fruitful venue to explore the convoluted ways in which technical knowledge was handed down and bequeathed to later generations.<sup>15</sup> Ink recipes represent a

---

**2** When I had the opportunity to take a closer look at the Islamic manuscript collection in Gotha, I discovered, besides the whole collections of recipes listed in the catalog, many single recipes scribbled in the margins of the preserved manuscripts. An unparalleled collection of Arabic medical recipes offers the Wellcome Library in London, see London, Wellcome Library, “Digital Collections: Arabic Manuscripts”: <https://wellcomelibrary.org/collections/digital-collections/arabic-manuscripts/> [consulted on 02.12.2019].

**3** Lewicka 2011: 27–39.

**4** A good introduction to Arabic pharmaceutical literature provides Chipman 2010.

**5** Jüttner 1999.

**6** Zaky 1967: 47–51.

**7** See, in particular, Schopen 2006, and the more recent publication Raggetti 2016.

**8** Dorpmüller 2005; Günther / Pielow 2018: 30.

**9** Isaacs 1990; idem. 1994.

**10** Leube 2013.

**11** Keil 1999.

**12** Variance is a common phenomenon in Arabic manuscripts and can even be observed in works that were handed down in ‘closed transmission’. See the study on Arabic didactic poems by Sobieroj 2016.

**13** Leube 2013: 9.

**14** Martelli 2018.

**15** For the concept of fluid tradition, see Raggetti 2016: 294–338, and idem. 2018.

particularly interesting case in this regard, since they were handed down in a great variety of Arabic, Persian, and Turkish manuscripts.<sup>16</sup> In general, instructions on the production of inks were handed down in handbooks for secretaries or calligraphers or manuals on arts and crafts.<sup>17</sup> Some Persian ink makers and master calligraphers, for example, revealed their trade secrets and handed down numerous recipes on ink making in written form.<sup>18</sup> However, it was not uncommon to include ink recipes in treatises on the occult sciences, such as alchemy, astrology, and the talismanic art.<sup>19</sup> The Jābirian Corpus, for example, comprises treatises that offer alchemical and chemical instructions (e.g. the manufacturing of steel, the colouring of glass, the production of inks) alongside healing, talismanic, and protective rituals.<sup>20</sup> This raises the question of how ink recipes were related to such occult content? Lucia Raggetti argued in her recent article on ink recipes in Ibn al-Jazari’s (d. 833/1429) *Book on the Art of Penmanship* that alchemical practice and alchemical shared notions might have influenced the art of ink making:

Some of the recipes have an alchemical flavour, and it is not far-fetched to propose that some alchemical technical notions emerge here because they were part of a widely shared intellectual and technical background. This shows, moreover, that alchemy scored some major technological successes and that its practices entered and influenced other crafts.<sup>21</sup>

While such links between alchemy and ink production seem convincing, the question remains why recipes on ink production were found in treatises of astrological content or intermingled with recipes on ritual healing? Were such collections of practical value to the composers/scribes? Do they reflect the literary conventions of the day or were they merely grouped together unintentionally?

To date, the transmission of ink recipes and recipe collections in the Islamic world has not been studied sufficiently to provide satisfying answers to such questions.<sup>22</sup> Claudia Colini, a researcher at the University of Hamburg, is currently investigating the relationship between ink recipes and the various Arabic sources

---

**16** Colini 2019.

**17** Gacek 2009: 134.

**18** Seyed Sadra Zekrgoo studied a number of ink recipes written down by Persian master calligraphers in his Ph.D. thesis (Zekrgoo 2017).

**19** Colini 2019.

**20** Al-Hassan 2009: 147.

**21** Raggetti 2019: 238–239.

**22** The ERC Project AlchemEast lately promoted a research initiative in this regard. The workshop ‘Traces of Ink. Experiences of Philology and Replication’ in 2018 shed new light on traditions of ink making from Classical Antiquity to the Arabo-Islamic Middle Ages. The proceedings are in course of publication with Brill.

in which these instructions were transmitted.<sup>23</sup> While the reasons might vary and need to be assessed on a case to case basis, I argue in this paper that a local literary tradition might have played a role in the collection and transmission of recipes. Strong evidence for such local ‘tastes’ is provided by ink recipes and recipe collections transmitted in manuscripts from Egypt.

This paper presents two cases for the intermingling of recipes dealing with the production of dyes and inks with different ‘occult’ practices.<sup>24</sup> These two manuscripts are both held at Gotha Research Library. The first manuscript provides instructions on where and how to raise hidden treasure. The second manuscript transmits an alchemical treatise followed by a list of ink recipes and a recipe for warding off the pestilence, recipes that will be published and translated here for the first time. The history of composition of these two manuscripts remain unknown. Could it be that two formerly independent texts were mingled together at a later stage? Does this compilation reflect the interests of a patron/collector/copyist? Such multiple-text manuscripts (MTMs) can allow us to glean information on the close relationship between textual transmission and teaching traditions, the interests of individual readers, and literary tastes and trends.<sup>25</sup> Although MTMs with individual texts on occult topics were at times produced for personal use,<sup>26</sup> recurring patterns in combining texts on occult practices – such as the one presented here – suggest that there is more to this than meets the eye.

## 2 MS Gotha, orient A. 1300: treasures, gold dyes, and healing recipes

The porous disciplinary boundaries in the transmission of recipes reflect an anonymously transmitted collection of treasure indications, currently stored at Gotha Research Library with the shelf mark 1300. The manuscript has no introduction. After the *basma* follow almost one hundred short instructions on how to find treasure at various different locations in Egypt (usually introduced by the word *şifa*, “description”) (see Figure 1).

---

<sup>23</sup> Colini 2019.

<sup>24</sup> On the problematic Western approach towards ‘occult’ and ‘esoteric’ practices in Islamic societies, see Saif 2019. Raggetti convincingly proposes that these recipes are influenced by the concept of the ‘properties’ (*manāfi*’ or *ḥawāşş*) of natural objects. See Raggetti 2018.

<sup>25</sup> Friedrich and Schwarke 2016a.

<sup>26</sup> Friedrich and Schwarke 2016b: 22.



Figure 1: MS Gotha, orient A. 1300, fols 1v–2r.

Treasure hunting was a quite popular activity in medieval Egypt.<sup>27</sup> Since the Nile Valley's history of settlement reaches back millennia and the region experienced the rise and fall of many flourishing civilizations with highly developed burial cultures, discoveries of tombs, artefacts, burial objects, and precious materials must have occurred on a regular basis.<sup>28</sup> The unearthing of such 'hidden' treasures and the subsequent rumors and legends surrounding spectacular treasure troves contributed, finally, to medieval Egypt's fame as the realm of hidden treasures *par excellence*.<sup>29</sup>

<sup>27</sup> On this phenomenon, see Braun 2017.

<sup>28</sup> For the belief in the afterlife and the burial practices in Ancient Egypt, see amongst others Kees 1977 and Ikram 2015. Still today, archaeological projects as well as illegal excavations bring an astonishing number of ancient artefacts to light. Discoveries made during illegal excavations only become publicly known, if the authorities succeed in detecting such activities in time. The surge in illegal excavations in recent years is documented by a number of articles that appeared in *al-Ahrām* and other modern Egyptian media outlets. For an analysis of the phenomenon, see Paul 2016.

<sup>29</sup> Stanislaus Hirschberg, for example, has argued that the unearthing of burial objects in medieval and early modern Europe finally led to the widespread assumption of buried treasure and incited many to search for treasures. See Hirschberg 1934.

Not all of those who headed for Egypt's reputed treasure sites relied solely on traditional treasure hunting tools, such as the pickaxe (*mi'wal*), the iron shovel (*mishā*), and the chisel (*qaṭṭā'*).<sup>30</sup> Some were persuaded that the former owners of these riches had assigned the protection of these sites to supernatural treasure guardians and installed protective talismans as well as lethal contraptions to safeguard them from possible intruders.<sup>31</sup> In order to counteract such defensive means, the treasure hunter had to have recourse to magic.

Surviving Arabic magical compendia offer numerous recipes for the discovery of treasures, the *fath al-kunūz* (literally "the opening of treasures") as it was dubbed in these texts.<sup>32</sup> While some provide lengthy incantations to conjure up treasure, others are aimed at overcoming obstacles barring the way to the treasures, referred to in this kind of literature as *mawāni' wa-dawāfi'* ("impediments and repellents").<sup>33</sup>

Besides these single recipes scattered throughout Arabic treatises on magic, a whole genre of Arabic occult literature emerged that deals exclusively with the hunt for treasures in Egypt and, to a lesser degree, in Greater Syria (*al-Shām*). These texts provide instructions of the way to the treasure sites and reveal, furthermore, the necessary magical rituals such as fumigations of incenses (*bakhūr*), incantations (*'azīma*), invocations (*da'wā*), and spells (*qasam*), as well as sacrificial offerings (*qurbān*) which were necessary to appease the spirits, break the talismans, or render innocuous the lethal contraptions (*mahālik*).<sup>34</sup> These instructions were known in Arabic as "(treasure) indications" (*dalā'il*).<sup>35</sup> Collections of

**30** Abū Ja'far al-Idrīsī outlines the treasure hunters' traditional tools in his treatise on the pyramids. Cf. Haarmann 1991: 36, l. 2; 73, l. 2–3. In early modern Europe, the pick and the axe had become the traditional tools of miners and symbolized their work and ethic. See Dym 2011: 11. Whether treasure hunters in the pre-modern Middle East and North Africa had their own distinct culture and symbolism remains unknown.

**31** Ibn Khaldūn condemns such beliefs among his contemporaries and dismisses them as nonsense, see Slane 1934–38: vol. 2, 281 (Arabic text); Rosenthal 1967: vol. 2, 320 (English trans.).

**32** For the term *fath al-kunūz*, see al-Tilimsānī 2001: 41.

**33** See, for example, the long invocation for conjuring up treasure in al-Tilimsānī 2001: 41. Instructions to overcome *mawāni' wa-dawāfi'* provides, amongst others, a commentary on the 'Greater Invocation of the Deserts' (*Da'wā al-sabāsib al-kubrā*), transmitted in multiple manuscripts. See, for example, Paris, Bibliothèque nationale de France, MS arabe 2767, fol. 74v–104r. URL: <https://gallica.bnf.fr/ark:/12148/btv1b110022457>.

**34** The first and, so far, only edition based on three manuscripts appeared in 1907 in Cairo, see Kamāl 1907.

**35** The heading of Kamāl 1907: §16 reads, for example, 'indications [on the area] near Būsh in Middle Egypt' (*dalā'il qurb Būsh min al-Sa'id al-Adnā*). See also the two indications transmitted in Gotha, Forschungsbibliothek, MS orient. A. 1301, fol. 53v, l. 2: 'Description of the indication in Jerusalem' (*ṣifat dalīla bi-l-Quds*) and Gotha, Forschungsbibliothek, MS orient. A. 1302,1v,1: 'description of the indications on Tīda' (*ṣifat dalā'il Tīda*).

hundreds of such *dalā’il* are transmitted in several extant manuscripts.<sup>36</sup> MS Gotha orient. A. 1300 is one of these manuscripts.

The transmitted *dalā’il* in these manuscripts share a set of characteristics with recipes in general, and Arabic alchemical recipes in particular. They begin with the word *ṣifa* (“description”), a very common term to introduce a recipe; and they partly use an alchemical terminology, often referring to substances common in Arabic alchemy, e.g. mercury, sulfur, and vitriol. Moreover, the promised treasures sometimes consist of fanciful elixirs.<sup>37</sup> Not only are alchemical notions quite present in this genre, the treasure indications showcase some local spiritual healing traditions. The first treasure indication in the first edition of an Arabic treasure book to be published so far guides the reader to the fruit of a ziziphus tree. The fruit can be used as an elixir as well as a medication against leprosy and blindness.

[...] in the middle of the hall you will find a ziziphus tree bearing fruits. When you open the fruits, one half will be red, the other one yellow. It heals leprosy and blindness. When you apply it on one thousand *mithqāl* of mercury, it will turn into an elixir.<sup>38</sup>

Such miraculous remedies against blindness, leprosy, and elephantiasis are commonly described in the preserved manuscripts. In general, the texts suggest a rather limited understanding of alchemy, magic, and medicine: the authors seem to have had some basic notions but were unfamiliar with more elaborate philosophical concepts and fundamental principles of these occult sciences. However, it might be possible that the authors simply approached the topic in a different way, having a specific target group in mind (the erudite experts vs. the individuals who were less acquainted with alchemy). In any case, the indications do show that there were some points of contact between treasure hunting, alchemy, and healing rituals.

MS Gotha orient. A. 1300 demonstrates, moreover, that recipes on hidden treasure, ink production, and ritual healing were sometimes collected together. It contains numerous treasure indications as well as recipes to produce gold dyes, and various instructions on how to use waste products such as urine and hair from humans and animals for medicinal and magical purposes.<sup>39</sup> Such ingredients are common books on the ‘science of the properties’.<sup>40</sup>

---

<sup>36</sup> I am currently aware of fourteen manuscripts, one letter and one quotation of a treasure indication in Abū Ja‘far al-Idrīsī’s treatise on the pyramids.

<sup>37</sup> See Kamāl 1907.

<sup>38</sup> Kamāl 1907: §1. Trans. by the author.

<sup>39</sup> Pertsch 1878–1892: vol. 2, 477.

<sup>40</sup> Raggetti 2015.



The manuscript was written with a non-professional hand and does not show any sign of thorough consideration of the structure and the organization of the recipes. While it may be that these recipes for treasure hunting and spiritual healing were inadvertently grouped together, the intermingling of recipes pertaining to different occult sciences also resurfaces in other contexts. During the excavation of the Dayr Anbā Hadra, better known as the Monastery of St Simeon, in Aswan, Upper Egypt, the archaeologist Ugo Monneret de Villard (d. 1954) chanced upon some peculiar Arabic documents. He sent them to the Orientalist David Margoliouth (d. 1940). Margoliouth and Eric John Holmyard (d. 1959) published the transcripts and English translations of these fragments in a paper that appeared in 1931.<sup>41</sup> Besides traders' accounts and private letters, the collection contains alchemical and magical recipes. It is impossible to prove whether these recipes were penned by the same author, but they show certain similarities in terms of form and terminology. What is more, their wording resembles that of the Arabic treasure indications, to a degree.

Further evidence for a local tradition, or at least, a tendency to group alchemy, the production of inks and dyes, and ritual healing recipes together, is provided by another manuscript held at Gotha Research Library.

### 3 Allegorical alchemy, dyes and a recipe against the pestilence: MS Gotha orient A. 1162

Part of the Islamic Manuscript Collection at Gotha Research Library is MS Gotha orient A. 1162. The German physician and traveler to the Near East, Ulrich Jasper Seetzen, acquired the manuscript in Cairo at the beginning of the nineteenth century. He indicated the location of purchase (“Kahira”) on the first page of the manuscript. Seetzen's expedition to the Orient was financially supported by Duke August von Sachsen-Gotha-Altenburg (r. 1804–1822). In return, Seetzen promised to buy and send back to Gotha natural curiosities, artisanal products, coins, manuscripts, and various other items of interest. Seetzen stayed in Cairo and in Lower Egypt from May 1807 to March 1809. From Cairo he undertook excursions into the Fayyūm Oasis, Giza, Saqqara, Mītrehene, and al-Lāhūn where he collected a large number of Egyptian antiquities.<sup>42</sup>

The manuscript was copied several centuries earlier by Yūḥannā b. Ghubayr b. Abī l-Faraj al-Manfalūṭī in the Egyptian village Minyat Banī Khaṣīb. He finished the

---

<sup>41</sup> Margoliouth/Holmyard 1931.

<sup>42</sup> Braun 2016: 52.

copying of the manuscript in the year 1000/1592. Either he himself hailed from the Egyptian town of Manfalūṭ near Asyūt, or one of his ancestors did. Unfortunately, nothing is known about the life of this copyist.<sup>43</sup> The first twenty-two folios of the manuscript transmit an alchemical treatise entitled *Kitāb Sidrat al-muntahā* (“The Book of the Ziziphus Tree of the Furthest Boundary”). The Arabic term *sidra* designates the Ziziphus spina-christi, a tree commonly known as the Christ’s thorn jujube. The *Sidrat al-muntahā*, the “Ziziphus Tree of the Furthest Boundary” grows in the seventh sphere near the garden of refuge (*jannat al-ma’wā*), according to Islamic tradition. In this alchemical-allegorical treatise, the tree is at the beginning of a cosmogony.<sup>44</sup>

According to the manuscript’s first page and the colophon, the author of this treatise was Ibn Waḥshiyya the Nabatean, an enigmatic figure in the field of Arabic occult sciences. It is very unlikely, however, that the historical Ibn Waḥshiyya penned this alchemical treatise. Ibn Waḥshiyya gained fame as the transmitter of Nabatean lore and his other works are firmly anchored in an Iraqi context.<sup>45</sup> The alchemical treatise, however, was very likely penned in Egypt. It evokes Hermes Trismegistus and his ability to decipher the hieroglyphs, a popular motif in Egyptian magical and occult texts.<sup>46</sup>

The treatise ends on fol. 22r. On the following four folios, al-Manfalūṭī continued to copy recipes for the production of inks of different colours (twice red, wine-coloured, blue, yellow, pistachio-coloured, rose-coloured, Egyptian black ink, twice black) and a “divine medication” (*al-dawā’ al-ilāhī*) against the pestilence (*ṭā’ūn*).<sup>47</sup> On the last folio, fol. 24r, a different hand scribbled down a recipe for black ink. The recipes describe quite common ink making processes, e.g. the production of iron-gall inks which are produced by mixing gallnuts (*‘afṣ*), pulverized or fermented vitriol (*zāj*), and gum arabic (*ṣamgh*). Some recipes use water from myrtle (*ās*) or pomegranate (*rummān*) rinds instead of gallnuts. This is also a frequently applied method.<sup>48</sup>

The last recipe copied by the scribe recommends the mixing of aloe, myrrh, and saffron, a mixture which the patient needs to drink with an aromatic beverage in order to ward off the pestilence. It is said to have been “tested” (*mujarrab*).<sup>49</sup> Moreover, whoever wrote down the recipe took the trouble to compare the transmitted wording in two different manuscripts (for the added

---

43 Braun 2016: 52.

44 Braun 2016: 20.

45 Ullmann 1972: 209.

46 For an overview of the treatise’s content, see Braun 2016: 28–48.

47 On the rather elusive concept of *ṭā’ūn* in the Arabic sources, see Conrad 1982.

48 Gacek 2009: 133.

49 This label is commonly attached to recipes, see Dorpmüller 2005: 39–40 and Raggetti 2018.

collation remark, see recipe 11 below). Potions, prayers and, amulets were commonly vaunted to keep pestilential diseases at bay and heal those already affected.<sup>50</sup> However, it remains a mystery why this recipe was added to a list of ink recipes. The recipe collection ends with an instruction for the production of black ink written by a different hand.

It remains unknown why these ink recipes were added to the manuscript and why a recipe for warding off the pestilence is found among this collection of ink recipes. Egypt suffered an outbreak of the Black Death in 1347–1350 and experienced cycles of plague in the following decades.<sup>51</sup> Such a recipe could well have been considered of practical use. While texts and recipes on alchemy, magic, medicine, and ink production are quite often transmitted together in multiple-texts manuscripts, it still remains unknown if these cases demonstrate a fully-fledged literary tradition or simply the interest of individual readers. Nevertheless, such conspicuous frequency elicits questions regarding the interrelatedness of these disciplines, crafts and practices and challenge the modern Western conception of clear-cut disciplinary boundaries. A thorough study is needed to shed more light on the intricate web of interdependencies between alchemy, magic, medicine, and the production of dyes and inks and the authors'/composers'/scribes' intentions. The Islamic Manuscript Collection of the Research Library Gotha will offer a unique opportunity in this regard since many of its manuscripts on alchemy and magic have not been closely studied yet.

## 4 Notes on editorial interventions and units of measures

To improve the readability of the text without altering the recipes' language, I decided to normalize the orthography such as the substitution of the *alif maqṣūra* for the *yā'* or the writing of the *hamza*. Moreover, I added missing diacritics and thereby determined verbal prefixes that were left for interpretation in the manuscript (opting either for a *tā'* or *yā'*).

Since units of measure hugely varied from time to time and place to place, I refrained from indicating modern equivalents. Walther Hinz offers the following equivalents, but these must be treated with caution:

---

<sup>50</sup> Ullmann 1970: 248–249; Fabbri 2007.

<sup>51</sup> Borsch 2014: 125.

- *dirham*: a weight of around 3 g<sup>52</sup>
- *mithqāl*: a unit of mass that equals 4.68 g in Egypt<sup>53</sup>
- *raṭl*: a unit of mass that equals in Egypt around 500 g<sup>54</sup>

## 5 Facsimiles

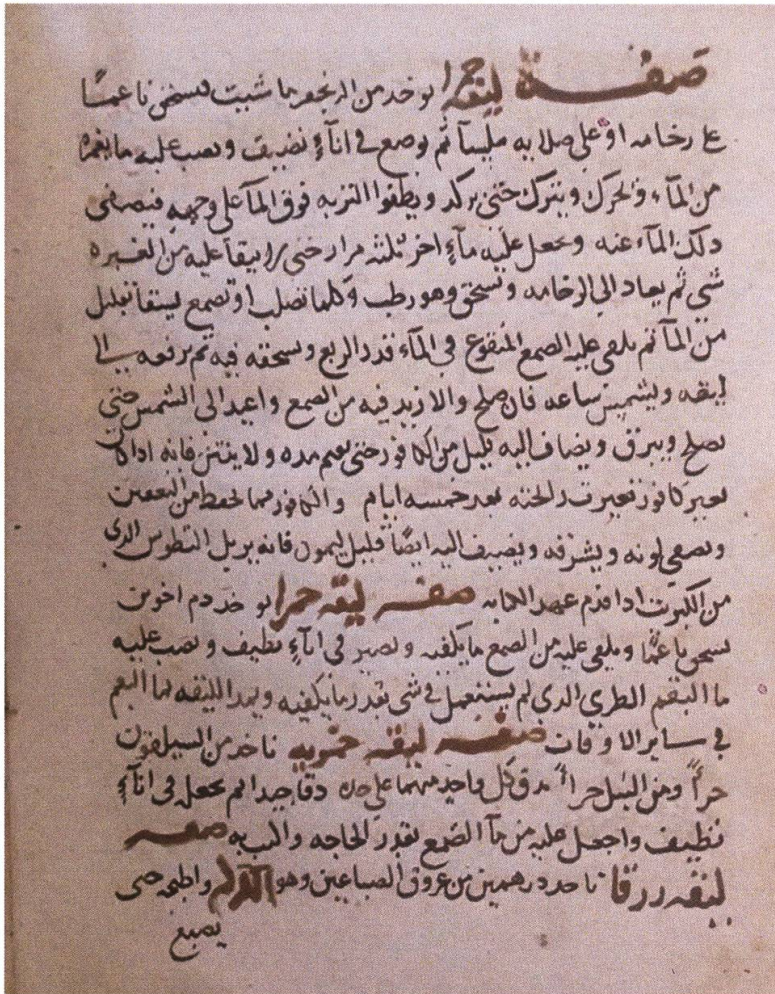


Figure 2: MS Gotha orient A. 1162, fol. 22v.

52 Hinz 1970: 2.

53 Hinz 1970: 4.

54 Hinz 1970: 29.

بصنع الرش ثم اتوا من النار وصفيه بخزفه صيفته والوفيه من الشكر  
 الحال قدر ما يلبيه وقد ما يزيد من ررقه ثم اضربه بما العفص وامر  
 فيه صفا مسحق ثم استعمله **صفه ليفة صفرا**  
 يوضع من الريح الاصغر الصفا لحي حرد ومن الاعفران جرد السجل واحد  
 على جده ثم خلطان بالبخن وخلع عليه من ما الصمغ ما عرهما والسبع  
**صفه ليفة يتي** يوضع عشرون دراهم عروق الصبان  
 وصيف عليه ما يغزوه ويطبخ حتى يصير بصنع الرش ويضع عنها الماء ثم  
 تاخذ درهم رعفران شعرو وتخلط بها من غير بخن ويوضع ما الاكرا وما  
 قشور الرمان ابرها ان تعد الحاجة ولا تكمل لبلاب سود ثم يطرح فيه صفا  
 ولسه **صفه ليفة ورديه** يوضع اسفداج ثلاثة دراهم  
 وسهلون او زعفران او احسن درهم واحد خلطان وينتجان ويصا  
 اليها صمغ ويستعمل **صفه مداد مصري** يوضع من الحما  
 المصعد عن البيرج قدر الحاجة وصنفدان يوضع الشرح في سراج  
 نصيف وخلع فيه دباله او دبالتين قطن لطيف جديد ولسه عليه  
 طرف حتى يجمع قهشي فترفعه ويجمع ما الصق منه الطرف ولحط في اناء  
 لطيف من الرهن فيعطي من الريح والنواب ثم يبعد الطرف على السراج  
 ولا يزال يفعل ذلك حتى يجمع عند هباب قدر ما تريد وتجعله برآك

Figure 3: MS Gotha orient A. 1162, fol. 23r.

العباب عليه فيغير بل حده الاول في الاول ثم اصيف الى ذلك فدر دبعه صمغ  
 مستحق واجعل عليه من ماء ورق الخنا ما يرفقه حتى يصير كالعين وحركه في الماء  
 وصعه في الشمس واصف اليه سير سكر نبات ومثل نصف الكبر صبر ابيض  
 وقرصه اقراصا وخفقه فاد اذ دنت حله مما الصمغ والى الدواء واصيف  
 اليه قليل مسك وما ورد **صفه حراخر** ووضاوقه عققص  
 برض واوقه صمغ عربي فيخلطان ويصن من الماء معدا رها ثمان مرات  
 وتعمل في فاروره وتوضع في الشمس ثلثة ايام ثم تصفى ويطحر منه وزن  
 اربعة درهم راج رومي ويترن في الشمس عشرة ايام ويلب به  
**صفه حراخر** بوخذ العققص يدق ناعما ويخل ويغن بما حار  
 حتى يلوغ في قوام العسل ويترن في الشمس حتى يحن قليلا ويصنى خرقه  
 صغيقه ويرمي القمل ويوخذ الزاج سمي ناعما ويصير في خرقه ويحرك  
 في الماء الذي صفاه من العققص قليلا قليلا وهو خرقه في الورق ثم يروح للترتة  
 والنتبه وانما جعل في خرقه حتى يخذ منه بقدر الحاجة لا يريد فيه  
 حتى لا يطفى زهر الجبر ويرفعه والله اعلم **صفه**  
 نافعه في زمن الطعن والطاعون وهذا الدواء يسمى الدواء  
 الالهى وصفته بوخذ من الصبر السوطى المصري الحار جزو  
 ومن المر الصافي الحماحي جزو وهو مر البطاوح ومن العققص الحار الحار  
 صمغ

Figure 4: MS Gotha orient A. 1162, fol. 23v.

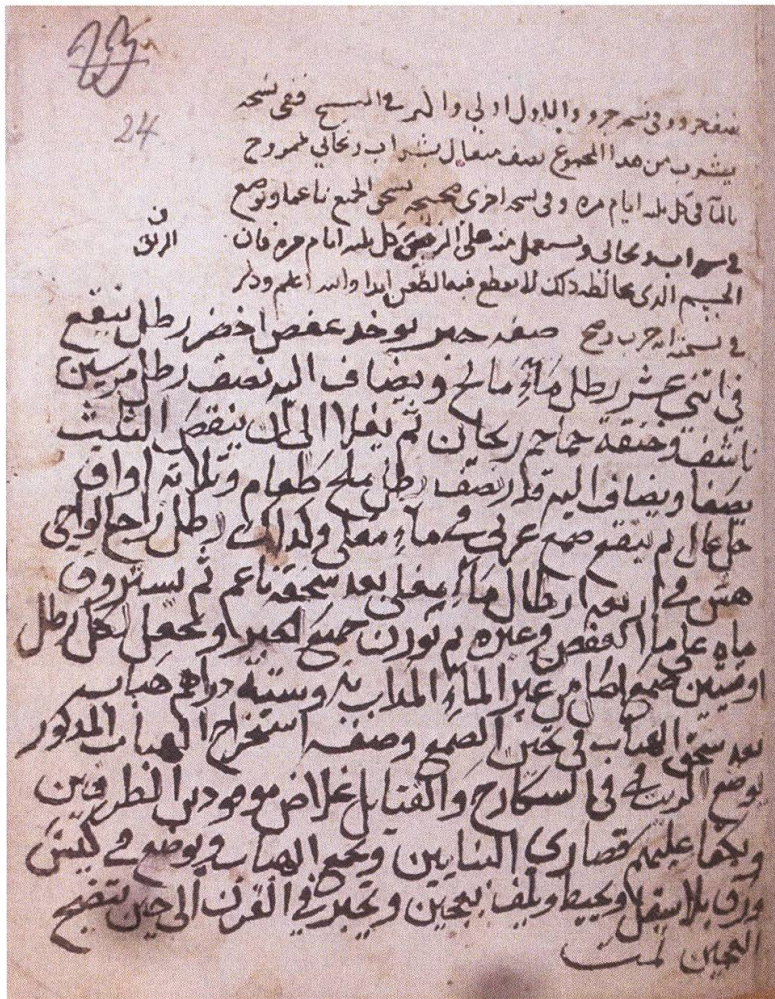


Figure 5: MS Gotha orient A. 1162, fol. 24r.

## 6 Arabic text and translation

### 1. Instruction for a red ink

[22v] صفة ليقة حمراء. يؤخذ من الزنجفر<sup>55</sup> ما شئت. فيسحق ناعماً على رخامة أو على صلابة مليسًا. ثم يُوضع في إناء نظيف ويُصب عليه ما يغمره من الماء. ويحرك ويترك حتى يركد. ويطفو التربة فوق الماء على وجهه. فيصفي ذلك الماء عنه ويجعل

[22v] **Instruction for a red ink.** Cinnabar<sup>57</sup> is taken as much as you want. It is crushed to a fine powder on a slab of marble or in a mortar. Then, it is put into a clean vessel and covered with water. It is stirred and left until the liquid settles down. The powder will float on the water's surface. Decant the water from it and

55 On the etymology and the different spellings, see Käs 2010: vol. 2, 677–683.

عليه ماء آخر ثلاثة مرار حتى لا يبقى عليه من الغبرة شيء. ثم يعاد إلى الرخامة ويسحق وهو رطب. وكلما تصلب أو تصمغ<sup>56</sup> ليسقي بقليل من الماء.

ثم تلقي عليه الصمغ<sup>59</sup> المنقوع في الماء قدر الربع وتسحقه فيه. ثم يرفعه إلى ليقة ويشمس ساعة. فإن صلح وإلا زيد فيه من الصمغ<sup>60</sup> وأعيد إلى الشمس حتى يصلح ويبرق.

ويضاف إليه قليل من الكافور حتى يعتم مدة ولا ينتن. فإنه إذا كان بغير<sup>61</sup> الكافور<sup>62</sup> تغيرت<sup>63</sup> الحنة بعد خمسة أيام. والكافور مما يحفظ من التعفين ويصفى لونه ويشرقه. وتضيف<sup>64</sup> إليه أيضًا قليل ليمون فإنه يزيل<sup>65</sup> التطوس الذي من الكبريت إذا قدم عهد الكتابة.

## 2. Instruction for a red ink

صفة ليقة حمراء. يؤخذ دم أخوين يسحق ناعمًا ويلقى عليه من الصمغ<sup>66</sup>

pour other water on it repeating the operation three times, until no powder remains upon it. Then, it needs to be returned to the slab of marble and crushed as long as it is moist. Each time you solidify it or apply gum arabic<sup>58</sup> to it, you need to pour a bit of water on it.

Then add one quarter of its quantity of gum arabic that has been soaked in water and crush it in. Then preserve it in an ink pad and leave it in the sun for one hour. It will be of good quality, if not, add gum arabic and dry it again in the sun until it has become good and shines.

A bit of camphor is added so that it darkens for a while and does not decay. If it is done without camphor, the piece will change [colour] after five days. The camphor is one of the things that protect from decay, clears its colour and makes it shine. Add a bit of lemon, too, it will remove varnish from the sulphur at the moment of writing.

**Instruction for a red ink.** Dragon’s blood<sup>67</sup> is taken and crushed into a fine powder, to

56 في النسخة: تصمغ

57 Cinnabar is a common raw material for the production of coloured inks. According to Arabic ink recipes, the coloured ink is produced by washing, drying and pulverizing it. See Schopen 2006: 213.

58 On the use of gum arabic for the production of inks, see Schopen 2006: 35–65.

59 في النسخة: تصمغ

60 في النسخة: تصمغ

61 في النسخة: يعير

62 في النسخة: كافور

63 في النسخة: تعيرت

64 في النسخة: يضيف

65 في النسخة: يزيل

66 في النسخة: صمغ

67 Dragon’s blood is a non-specific name for deep red resinous exudations from different trees and was used as a pigment in red inks. See Agbakwuru and Whalley 1976: 1392–1394; Lev and Zohar 2008: 90–92.



ما يكفيه. ويصير في إناء نظيف.  
وتصب عليه ماء البقم الطري الذي لم  
يستعمل في شيء بقدر ما يكفيه. ويمد  
الليقة بماء البقم في سائر الأوقات.

which the sufficient amount of gum arabic is added. It is put into a clean vessel. Pour the necessary amount of fresh brazilwood [or sappanwood?]<sup>68</sup> water on it, which has not yet been used for anything else. Dilute the ink with brazilwood [or sappanwood?] water whenever necessary.

### 3. Instruction for a wine-coloured ink

صفة ليقة خمرية. نأخذ من السيلقون  
جزءًا والنايل<sup>69</sup> جزءًا. يدق كل واحد  
منهما على حدة دقًا جيدًا. ثم يجعله في  
إناء نظيف. واجعل عليه من ماء  
الصمغ<sup>70</sup> بقدر الحاجة واكتب به.

**Instruction for a wine-coloured ink.** We take one part of sericon<sup>71</sup> and one part of wolfsbane.<sup>72</sup> Crush them thoroughly, one by one. Then, put it into a clean vessel. Add the necessary amount of gum arabic water. Write with it.

### 4. Instruction for a blue ink

صفة ليقة زرقاء. نأخذ درهمين من  
عروق الصبّاعين<sup>73</sup> وهو الكركم  
واطبخه حتى [٣ و٢] يصبغ<sup>74</sup>  
الريش. ثم اتركه عن النار وصفيه  
بخرقعة صغيرة. وألقي فيه من السكر  
العال قدر ما يكفيه وقدر ما يزيد من  
زرقية. ثم اضربه بماء العفص  
واضرب فيه صمغًا مسحوقًا<sup>75</sup>. ثم  
استعمله.

**Instruction for a blue ink.** We take two dirhams of 'dyers' roots' which is turmeric. Cook it until [23r] it dyes the feather [that you plunge in it]. Then, remove it from the fire and filter [lit. purify] it with the help of a small rag. Add a sufficient amount of high-quality sugar and a slightly larger amount of blue dye. Then, beat it with gallnut water and adding crushed gum on it. Use it.

68 The Arabic term is ambivalent. It can designate brazilwood from Brazil as well as sappanwood from Asia. A dye known as brazilin can be obtained from the heartwood of both trees. See Dapson and Bain 2015.

69 في النسخة: النيل.

70 في النسخة: صمغ.

71 The precise etymology of the word sericon remains unknown. In alchemy, it often referred to a red pigment, probably minimum (or red lead). See Rampling 2014: 26. For minimum, see Lev and Zohar 2008: 451.

72 Wolfsbane or aconite is a poisonous plant. Its toxicity was known to the authors of medieval Arabic toxicological treatises, see Johnstone 1977.

73 في النسخة: صبّاعين.

74 في النسخة: يصبغ.

75 في النسخة: مسحوق.

## 5. Instruction for a yellow ink

صفة ليقة صفراء. تأخذ<sup>76</sup> من  
الزرنينج<sup>77</sup> الأصفر الصفائحي [؟]  
جزءاً<sup>78</sup> ومن الزعفران جزءاً<sup>79</sup>.  
اسحق كل واحد على حدة. ثم يخلطان  
بالسحق. وتجعل عليهما من ماء  
الصمغ<sup>80</sup> ما يغمرهما واكتب به.

**Instruction for a yellow ink.** Take one part of scissile orpiment<sup>81</sup> and one part of saffron. Crush them separately and thoroughly. Pulverize them thoroughly. Then, mix them while crushing. Cover them with gallnut water and write with it.

## 6. Instruction for a pistachio-coloured ink

صفة ليقة فستقي. تؤخذ عشرة دراهم  
عروق الصبّاعين<sup>82</sup> وتضيف عليهم  
ما يغمره. وتطبخه حتى يصير  
بصبغ<sup>83</sup> الريش. ويصفي عنها الماء.  
ثم تأخذ درهم زعفران شعر وتجعله  
صحيحاً من غير<sup>84</sup> سحق. وتأخذ<sup>85</sup>  
ماء الأس أو ماء قشور الرمان. إنهما  
كان بقدر الحاجة ولا تكبر لنلا يسود.  
ثم تطرح فيه صمغاً وتكتب به.

**Instruction for a pistachio-coloured ink.** Ten dirhams of the roots of the dyers [i.e. turmeric] are taken. Cover it [with water]. Cook it until it turns into the colour of the feather. Remove [excess] water from it, then take one dirham of saffron threads. Add them whole without crushing them. Take myrtle water or the juice of pomegranate peels, a sufficient quantity of them. Do not exceed it, so that it does not blacken. Add gum arabic to it and write with it.

## 7. Instruction for a rose-coloured ink

صفة ليقة وردية. يؤخذ اسفيداج ثلاثة  
دراهم وسيلقون وزنجفر وهو أحسن  
درهم واحد يخلطان يسحقان ويضاف  
إليهما صمغ<sup>86</sup> وتستعمل.

**Instruction for a rose-coloured ink.** Take three dirhams of white lead,<sup>87</sup> sericon, and cinnabar, and of the latter it is better [to only take] one dirham. They are mixed and crushed. Gum arabic is added to them. Use it.

76 في النسخة: تؤخذ

77 في النسخة: الررنج

78 في النسخة: جزء

79 في النسخة: جزء

80 في النسخة: صمغ

81 For the term “foliated orpiment” (*al-zarnīkh al-aṣfar al-ṣafā’ihī*), see Schopen 2006: 165.

82 في النسخة: صبّاعين

83 في النسخة: صبغ

84 في النسخة: عير

85 في النسخة: تؤخذ

86 في النسخة: صمغ

87 For white lead and its use as pigment, see Lev and Zohar 2008: 198; Gettens and Stout 1947: 174.

## 8. Instruction for an Egyptian ink

صفة مداد مصري. يؤخذ من الهباب  
المصعد عن الشيرج قدر الحاجة.  
وصفيه. إن توضع الشيرج في سراج  
نظيف<sup>88</sup> وتجعل فيه ذبالة أو ذبالتين  
قطن نظيف جديد، ويلب عليه طرف  
حتى يجمع فيه شيء فيرفعه ويجمع ما  
لصق منه الطرف.

وتحفظ في إناء نظيف من الدهن  
وتغطيه من الريح والتراب. ثم تعيد  
الطرف على السراج ولا تزال تفعل  
كذلك حتى تجمع عنده هباب قدر ما  
تريد.

وتجلي مراكم [٢٣ظ] الهباب عليه  
فيغير بل خذه الأول في الأول. ثم  
أضيف إلى ذلك قدر ربعه صمغ  
مسحوق واجعل عليه من ماء ورق  
الحناء مما يرقه حين يصير كالعجين  
وحرکه في الهاون وضعه في الشمس.  
وأضيف إليه يسير سكر نبات ومثل  
نصف السكر حبر<sup>90</sup> أسود. وقرصه  
أفراصاً وخففه. فإذا أردت حله بماء  
الصمغ<sup>91</sup> وألقي الذوابة<sup>92</sup> وأضيف  
إليه قليل مسك وماء ورد.

**Instruction for an Egyptian ink.** One takes  
the necessary amount of soot sublimated from  
sesame oil.<sup>89</sup> Purify it. If you put the sesame oil  
in a clean lamp and insert into it a wick or two  
made of clean, new cotton, cover one end until  
a little bit of [soot] accumulates on it, then lift  
it up and collect what has stuck to the  
extremity.

Store it in a vessel which is free of oil and cover  
it [in order to protect it] from scent and dust.  
Return the extremity to the lamp and do not  
stop this procedure until the quantity of soot  
you desire accumulates on it.

Clear the deposits of soot on it. It will change [its  
colour?]. However, take it, the top layer at first.  
Then, add one quarter of its quantity of crushed  
gum arabic and add the water of henna leaves  
that makes it thinner. When it turns into  
something like dough, stir it in the mortar and  
place it in the sun. Add a bit of sugar obtained  
from plants and black ink, around half the  
quantity of the sugar. Make pastilles out of it and  
dilute it. If you want to dissolve it with gum  
arabic water, throw a soluble substance into it  
and add a bit of musk and rose water.<sup>93</sup>

88 في النسخة: تضيف

89 Soot is the main ingredients of carbon-based inks. It was produced by combusting a variety of vegetal substances, amongst others sesame oil. See Gacek 2009: 133.

90 في النسخة: صبر

91 في النسخة: صمغ

92 في النسخة: ذوابه

93 Musk, camphor and rose water were added to provide the ink with a pleasant smell, see Gacek 2009: 133.

## 9. Instruction for another ink

صفة حبر آخر. يؤخذ أوقية عصف  
يرضّ وأوقية صمغ<sup>94</sup> عربي.  
فيخلطان. وتصب من الماء بمقدارهما  
ثمان مرات وتجعل في قارورة.  
ويوضع في الشمس ثلاثة أيام. ثم  
تصفي وتطرح فيه وزن أربعة درهم  
راح رومي ويترك في الشمس عشرة  
أيام وتكتب به.

**Instruction for another ink.** An ounce of crushed gallnuts and an ounce of gum arabic are taken. These are mixed together. Add eight times their quantity of water to it and pour it into a vial. It must be left in the sun for three days. Then, purify it and add four dirhams of Byzantine wine. It is left in the sun for ten days. Write with it.

## 10. Instruction for another ink

صفة حبر آخر. يؤخذ العفص يدق  
ناعماً ويحل ويعجن بماء حارّ حتى  
يكون في قوام العسل. ويترك في  
الشمس حتى يحن قليلاً ويصفي  
بخرقاة صفيقة. ويرمي التفل ويؤخذ  
الزاج يسحق ناعماً ويصير في  
خرقة.

**Instruction for another ink.** Gallnuts must be taken and crushed into a fine powder, dissolved and kneaded with hot water until they obtain the texture of honey. Then, it is left in the sun until some short while passes and filtered it with a thick rag. One removes the foam, takes the vitriol and crushes it to a fine powder, passes it into the rag.

ويحرك في الماء الذي صفاه من  
العفص قليلاً قليلاً. وهو يحر به في  
الورق. ثم ترفع الخرقاة وتكتب به.  
وإنما جعله في خرقة حتى يأخذ منه  
بقدر الحاجة لا يريد فيه حتى لا  
يطفئ زهر الحبر ويرفعه. والله  
أعلم.

And little by little agitates the water that has been separated from the gall nuts. This is released with it on the paper. Then, remove the rag and write with it. It must be stored only in the rag, until someone takes from it, since one does not wish that the best part of the ink fades away and. This will improve its quality. God knows best.

## 11. Useful instruction for the time of pestilence and pestilential disease

صفة نافعة في زمن الطعن  
والطاعون وهذا الدواء يسمى الدواء  
الإلهي وصنّعه. يؤخذ من الصبر  
السقطري الحضرمي<sup>95</sup> العال جزء  
ومن المر الصافي الحماحمي جزء  
وهو مر البطارخ ومن الزعفران  
الخالص العال [٢٤] نصف جزء

**Useful instruction for the time of pestilence and pestilential disease. This is a medication called the divine medication and its production.** One takes one part of high quality aloe from Socotra in Ḥaḍramawt and one part of pure *ḥamāḥamī* [?] myrrh which is the common myrrh, and [24r] half a

94 في النسخة: صمغ

95 في النسخة: الحضرمي

وفي نسخة جزء والأول الأولي  
وأكبر في النسخ.

piece of pure and high-quality saffron.  
Another copy says one piece. The first copy is  
the primary and most reliable copy.

ففي نسخة يشرب من هذا المجموع  
نصف مثقال بشراب ريحاني  
مسموح [؟] بالماء في كل ثلاثة أيام  
مرة.

According to one manuscript, one drinks half  
a *mithqāl* of this mixture with a permissible  
aromatic beverage once every three days.

وفي نسخة أخرى صحيحة يسحق  
الجمع ناعمًا ويوضع في شراب  
ريحاني ويستعمل منه على الريق كل  
ثلاثة أيام مرة. فإن الجسم الذي  
يخالطه ذلك لا يقطع فيه الطعن أبدًا  
والله أعلم. وذكر في نسخة إنه  
جرب<sup>96</sup> وصح.

In another reliable copy, one crushes the  
mixture to fine powder and pours it into an  
aromatic beverage. One uses it on an empty  
stomach once every three days. [The mixture of]  
the body which reacts with this [beverage] will  
never be affected with the pestilence, but God  
knows best. It is mentioned in a manuscript  
copy, that was tested and true.

## 12. Instruction for an ink (added by a different hand)

صفة حبر. يؤخذ عصف أخضر  
رطل ينقع في إثني عشر رطل ماء  
مالح ويضاف إليه نصف رطل  
مرسين ناشف وخنقة حمام ريحان.

**Instruction for an ink.** One *raṭl* of green  
gallnuts is taken, soaked in twelve *raṭls*. Of  
salty water, and added to half a *raṭl* of dry  
myrtle and a hand full of fragrant sweet basil.

ثم يغلي إلى أن ينقص الثلث. يصفى  
ويضاف إليه قدر نصف رطل ملح  
طعام وثلاثة أواق خلّ عال. ثم ينقع  
صمغ عربي في ماء مغلي وكذلك  
رطل زاحم الواحي هس في أربعة  
أرطال ماء مغلي بعد سحقه ناعم.

Then, it is boiled until a third of it evaporates. It is  
purified and half a *raṭl* of table salt and three  
ounces of high-quality vinegar are added. Arabic  
gum is soaked in boiling water as well as one *raṭl*  
of *wāḥī* [?] wine in four *raṭls* of boiling water, after  
having crushed [the gum] into fine powder.

ثم يستروك مياه على ماء العفص  
وغيره. ثم توزن<sup>97</sup> جميع الحبر  
وتجعل لكل رطل أوقيتين صمغ  
أصل من غير الماء المذاب به ستة  
دراهم هباب بعد سحق الهباب في  
غير الصمغ.

Then, the liquid is poured on the gallnut water  
and the other substances. Weigh all the ink,  
add for each *raṭl* two ounces of original gum,  
not dissolved in water, and six dirhams of  
soot, after having crushed the soot without  
gum.

96 في النسخة: حرب

97 في النسخة: تورن

## 13. Instruction for the production of the aforementioned soot

وصفة استخراج الهباب المذكور  
يوضع الزيت في السكاريج<sup>98</sup>  
والفتائل غلاص مودوذين الطرفيين  
وبكفا عليهم قصارى البنائين. ويجمع  
الهباب ويوضع في كيس. ورق بلا  
سفل ويحيط ويلف بعجين ويحتر في  
القرن إلى حين يتضح العجين. تم.

**Instruction for the production of the aforementioned soot.** The oil is poured in bowls – the wicks must be thick with elongated extremities – with both palms of the hands, the outer parts of the fingertips touching them. The soot is collected and put in a bag of paper without bottom. It will be surrounded and enveloped with a dough. One can write with it by the time the dough has become clear. This is the end.

**Acknowledgement:** I am extremely grateful to Regula Forster and her students who supported me in establishing the Arabic text. I also extend my gratitude to the anonymous reviewers for their detailed and illuminating comments.

## References

### Manuscripts

- Gotha, Forschungsbibliothek, MS orient. A. 1162.  
Gotha, Forschungsbibliothek, MS orient. A. 1300.  
Gotha, Forschungsbibliothek, MS orient. A. 1301.  
Paris, Bibliothèque nationale de France, MS arabe 2767.

### Printed publications

- Agbakwuru, Evans O. P. / Whalley, William B. (1976): “The pigments of ‘dragon’s blood’ resin”. *Journal of the Chemical Society* 1: 1392–1394.  
Al-Hassan, Ahmad Y. (2009): *Studies in al-Kimya’. Critical Issues in Latin and Arabic Alchemy and Chemistry*. Hildesheim et al.: Olms.  
Borsch, Stuart (2014): “Plague Depopulation and Irrigation Decay in Medieval Egypt”. *The Medieval Globe* 1: 125–156.

---

98 في النسخة: سكارح

- Braun, Christopher (2016): *Das Kitāb Sidrat al-muntahā des Pseudo-Ibn Waḥṣīya. Einleitung, Edition und Übersetzung eines hermetisch-allegorischen Traktats zur Alchemie.* (Islamkundliche Untersuchungen; 327). Berlin: Klaus Schwarz.
- Braun, Christopher (2017): *Treasure Hunting and Grave Robbery in Islamic Egypt Textual Evidence and Social Context.* Ph.D. Thesis. London.
- Chipman, Leigh (2010): *The World of Pharmacy and Pharmacists in Mamlūk Cairo.* (Sir Henry Wellcome Asian series; 8). Leiden: Brill.
- Conrad, Lawrence I. (1982): "Tā'ūn and Wabā' Conceptions of Plague and Pestilence in Early Islam". *Journal of the Economic and Social History of the Orient* 25.3: 268–307.
- Córdoba de la Llave, Ricardo (ed.) (2013): *Craft Treatises and Handbooks: The Dissemination of Technical Knowledge in the Middle Ages.* Turnhout: Brepols.
- Dapson, Richard and Carol Bain (2015): "Brazilwood, sappanwood, brazilin and the red dye brazilein: from textile dyeing and folk medicine to biological staining and musical instruments". *Biotech Histochem* 90.6: 1–23.
- Dorpmüller, Sabine (2005): *"Religiöse Magie im Buch der probaten Mittel": Analyse, kritische Edition und Übersetzung des Kitāb al-muḡarrabāt von Muḥammad ibn Yūsufas-Sanūsī (gest. um 895/1490).* Wiesbaden: Harrassowitz.
- Dym, Warren Alexander (2011): *Divining Science. Treasure Hunting and Earth Science in Early Modern Germany.* Leiden et al.: Brill.
- Fabbri, Christiane Nockels (2007): "Treating Medieval Plague: The Wonderful Virtues of Theriac". *Early Science and Medicine* 12.3: 247–283.
- Gacek, Adam (2009): *Arabic manuscripts. A vademecum for readers.* Leiden et al.: Brill.
- Gettens, Rutherford J. / Stout, George L. (1947): *Painting Materials: A Short Encyclopaedia.* New York: van Nostrand.
- Günther, Sebastian / Pielow, Dorothee (2018): "Magie im Islam". In: *Die Geheimnisse der oberen und der unteren Welt: Magie im Islam zwischen Glaube und Wissenschaft.* Edited by Sebastian Günther and Dorothee Pielow. (Islamic history and civilization; 158). Leiden: Brill, 3–115.
- Haarmann, Ulrich (ed.) (1991): *Das Pyramidenbuch des Abū-Ḡa'far al-Idrīsī : (st. 649/1251).* Stuttgart: Steiner.
- Hinz, Walther (1970): *Islamische Masse und Gewichte. Umgerechnet ins metrische System.* Leiden: Brill.
- Hirschberg, Stanislaus (1934): *Schatzglaube und Totenglaube.* Breslau: Priebatsch.
- Ikram, Salima (2015): *Death and Burial in Ancient Egypt.* Cairo: American University in Cairo Press.
- Isaacs, Haskell D. (1990): "Arabic Medical Literature". In: *Religion, Learning and Science in the 'Abbasid Period.* Edited by M.J.L. Young, J.D. Latham and R.B. Serejant. Cambridge: Cambridge University Press, 342–63.
- Isaacs, Haskell D. (1994): *Medical and para-medical manuscripts in the Cambridge Genizah Collections.* Cambridge et al.: Cambridge Univ. Press.
- Johnstone, Penelope (1977): "Aconite and its antidote in Arabic writings". *Journal for the History of Arabic Science* 1: 65–71.
- Jüttner, Guido (1999): "Alchemie. II. Schrifttum". In: *Lexikon des Mittelalters.* Edited by Robert-Henri Bautier. Munich et al.: Artemis-Verlag, vol. 1, cols. 331–333.
- Kamāl, Ahmad (ed. and trans.) (1907): *Kitāb al-Durr al-maknūz wa-l-sirr al-ma'zūz fi l-dalā'il wa-l-khabāyā wa-l-dafā'in wa-l-kunūz = Livre des Perles enfouies et du mystère précieux au sujet des indications des cachettes, des trouvailles et des trésors.* Cairo: Imprimerie de l'Institut Français d'Archéologie Orientale.

- Käs, Fabian (2010): *Die Mineralien in der arabischen Pharmakognosie: eine Konkordanz zur mineralischen Materia medica der klassischen arabischen Heilmittelkunde nebst überlieferungsgeschichtlichen Studien*. 2 vols. Wiesbaden: Harrassowitz.
- Kees, Hermann (1977): *Totenglauben und Jenseitsvorstellungen der alten Ägypter*. Berlin: Hinrichs.
- Keil, Gundolf (1999): “Rezept, Rezeptliteratur”. In: *Lexikon des Mittelalters*. Edited by Robert-Henri Bautier. München et al.: Artemis-Verlag, vol. 7, cols. 778–779.
- Leube, Georg (2013): *Die Rezepte der Freiburger alchemistischen Handschrift des ‘Abd al-Ġabbār al-Hamaḍānī. Edition, Übersetzung und Kommentar*. Berlin: Klaus Schwarz.
- Lev, Efraim / Amar, Zohar (2008): *Practical materia medica of the medieval eastern Mediterranean according to the Cairo Genizah*. Leiden and Boston: Brill.
- Lewicka, Paulina B. (2011): *Food and Foodways of Medieval Cairenes : Aspects of Life in an Islamic Metropolis of the Eastern Mediterranean*. Leiden et al.: Brill.
- Margoliouth, David Samuel / Holmyard, Eric John (1931): “Arabic documents from the Monneret Collection”. *Islamica* 3.5: 249–271.
- Pertsch, Wilhelm (1878–1892): *Die arabischen Handschriften der Herzoglichen Bibliothek zu Gotha*. 5 vols. Gotha: Perthes.
- Raggetti, Lucia (2015): “The ‘Science of Properties’ and its Transmission”. In: *In the Wake of the Compendia Infrastructural Contexts and the Licensing of Empiricism in Ancient and Medieval Mesopotamia*. Edited by J. Cale Johnson. Berlin/Boston: De Gruyter, 159–176.
- Raggetti, Lucia (2016): “Cum grano salis. Some Arabic Ink Recipes in Their Historical and Literary Context”. *Journal of Islamic Manuscripts* 7.3: 294–338.
- Raggetti, Lucia (2018): *‘Isā ibn ‘Alī’s Book on the Useful Properties of Animal Parts: Edition, translation and study of a fluid tradition*. Berlin/Boston: De Gruyter.
- Raggetti, Lucia (2019): “Inks as Instruments of Writing Ibn al-Ġazarī’s Book on the Art of Penmanship”. *Journal of Islamic Manuscripts* 10.2: 201–239.
- Rampling, Jennifer M.: “Transmuting Sericon: Alchemy as “Practical Exegesis” in Early Modern England”. *Osiris* 29.1: 19–34.
- Rosenthal, Franz (trans.) (1967): *The Muqaddimah. An Introduction to History*. 3 vols. Princeton, NJ: Princeton University Press.
- Saif, Liana (2019): “What is Islamic Esotericism?”. *Correspondences* 7.1: 1–59.
- Schopen, Armin (2006): *Tinten und Tuschen des arabisch-islamischen Mittelalters: Dokumentation – Analyse – Rekonstruktion. Ein Beitrag zur materiellen Kultur des Vorderen Orients*. Göttingen: Vandenhoeck & Ruprecht.
- Slane, William MacGuckin de (ed.) (1934–1938): *Les prolégomènes d’Ibn Khaldoun*. 3 vols. Paris: Imprimerie Impériale.
- Sobieroj, Florian (2016): *Variance in Arabic Manuscripts: Arabic Didactic Poems from the Eleventh to the Seventeenth Centuries – Analysis of Textual Variance and Its Control in the Manuscripts*. Berlin et al.: De Gruyter.
- Al-Tilimsānī (2001): *Kitāb Shumūs al-anwār wa-kunūz al-asrār*. Cairo: n. p.
- Ullmann, Manfred (1970): *Die Medizin im Islam*. Leiden et al.: Brill.
- Ullmann, Manfred (1972): *Die Natur- und Geheimwissenschaften im Islam*. Leiden et al.: Brill.
- Zaky, A. Rahman (1967): “Gunpowder and Arab Firearms in the Middle Ages”. *Gladius* 6: 45–58.
- Zekrgoo, Seyed Sadra (2017): “Persian Inks: a study on traditional writing matters used in Persia (15th – 18th CE) through collection of recipes, historical reconstruction and non-invasive analysis of University of Melbourne’s Middle-Eastern manuscript collection”. Ph.D. Thesis, The University of Melbourne.



## Online resources

- London, Wellcome Library, “Digital Collections: Arabic Manuscripts”: <https://wellcomelibrary.org/collections/digital-collections/arabic-manuscripts/> [consulted on 08.05.2020].
- Martelli, Matteo: “Selecting and Organizing Recipes in Late Antique and Early Byzantine Compendia of Medicine and Alchemy”, published: 17 May 2018: <https://recipes.hypotheses.org/category/matteo-martelli> [consulted on 08.05.2020].
- Paul, Katie A. (2016): “Cultural Racketeering in Egypt—Predicting Patterns in Illicit Activity: Quantitative Tools of the 21st-Century Archaeologist.” In: *The Future of the Past: From Amphipolis to Mosul, New Approaches to Cultural Heritage Preservation in the Eastern Mediterranean*. Edited by Konstantinos Chalikias, Maggie Beeler, Ariel Pearce, and Steve Renette, published: July 2016: [https://store.archaeological.org/sites/default/files/files/HCA\\_FutureofthePast-AIAJuly2016.pdf](https://store.archaeological.org/sites/default/files/files/HCA_FutureofthePast-AIAJuly2016.pdf), 21–30 [consulted on 08.05.2020].
- Friedrich, Michael and Schwarke, Cosima (2016a): *Composite and Multiple-Text Manuscripts*. Berlin and Boston: De Gruyter, published: November 2016: <https://www.degruyter.com/view/title/523246> [consulted on 01.11.2020].
- Friedrich and Schwarke (2016b): “Introduction – Manuscripts as Evolving Entities”. In: Michael Friedrich and Cosima Schwarke (2016a): *Composite and Multiple-Text Manuscripts*. Berlin and Boston: De Gruyter, published: November 2016: <https://www.degruyter.com/view/title/523246>, 1–26 [consulted on 01.11.2020].

## Conference talks

- Colini, Claudia: “Ink Recipes from the Islamic Era: Texts, Manuscripts, Ink Reproductions and Scientific Analyses”, paper given at Freie Universität Berlin in 2019 at the “Broadening Horizons 6” conference. Conference proceedings forthcoming.