Medieval Mediterranean Pharmacology

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> [R]ecipe for the small *tryphera*; beneficial for internal haemorrhoids, pain, and weakness of the stomach due to the accumulation of moistness; it also preserves health and is used for a great number of diseases. Take one part each of the bark of Chebulic myrobalan, or, if you want, use the Indian [myrobalan] instead, beleric and emblic [myrobalans]. Chop up, strain, and add rose oil; mix with scummed honey and place [the mixture] in a vessel made of fine pottery; the dosage is two to three *hexagia*[1] of this [mixture] along with tepid water.[2]

Called *tryphera* in Greek, and mostly known as *triphalā* in Sanskrit or *iṭrīfal* in Arabic, it was an extremely popular drug in the Middle Ages, from India to Baghdad and Cairo, and from Constantinople to Salerno and Paris, while various versions of it are still used nowadays in Ayurvedic medicine.[3] The recipe given above provides the short version of this composite drug, including five distinct categories of data: a) title or name of drug – that is, small *tryphera*; b) indications for its use, including for the treatment of various kind of ailments such as haemorrhoids and pain; c) list of

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[1] One *hexagion* is equal to 4.444 grams. See Schilbach (1970: 183, 276).

[2] *Ephodia tou apodēmountos*, 4.19, Vaticanus gr. 300, f. 145v, ll. 4–13: '. . . στήλη τῆς μικρᾶς τρυφερᾶς, ὠφελοῦσα εἰς τὰς ἐσωχάδας καὶ εἰς πόνον στομάχου και ἀδυναμίαν αὐτοῦ, ἀπὸ τοῦ πλήθους τῆς ὑγρότητος, καὶ φυλάττει τὴν ὑγείαν, ἀποπέμπεται δὲ εἰς χρῆσιν πλῆθος ἀρρωστιῶν· λαβὼν τὸν φλοιὸν τοῦ μυροβαλάνου τοῦ κέπουλι· καὶ ἀντὶ τούτου εἰ θέλεις θὲς τὸ ἰνδικόν· καὶ πελίλιζ καὶ ἔμλεζ, ἀνὰ ἑνὸς μέρους· κόψας σήσας (correxi: σείσας cod.) ἀνάμιγε (an ἀνάμισγε?) μετὰ ῥοδελαίου καὶ φύρασον σὺν μέλιτι ἀπαφρισμένῳ· καὶ ἀπόθου εἰς κορούπιν λεῖον· ἡ δὲ πόσις ἐξ αὐτοῦ δύο ἑξάγ., μέχρι τριῶν μετὰ ὕδατος χλιαροῦ'. For the original Arabic version, see Suwaysī et al. (1999) I.376–8. All translations from Greek are mine, unless otherwise stated. All transcriptions from Greek retain the same spelling and punctuation as in the relevant codex, apart from the fact that I have supplied the iota subscript.

[3] On the importance of myrobalans in premodern medical practice across Eurasia, see Yoeli-Tlalim (2021: 63–84).

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ingredients – that is, three kinds of myrobalan fruits, rose oil, and honey, along with posological details; d) method of preparation; and e) information about the administration – that is, it should be consumed with tepid water – and dosage.[4] This example has been taken from a twelfth-century Southern Italian or Sicilian manuscript of the unedited Greek translation of an Arabic medical work by Ibn al-Jazzār (fl. tenth century), *Zād al-musāfir wa-qūt al-ḥāḍir* (*Provisions for the Traveller and Nourishment for the Sedentary*/Gr. *Ephodia tou apodēmountos*), better known by its Latin title, *Viaticum*.[5]

The recipe for this panacea medicine can be discussed in a variety of overlapping contexts. First, the geographical and the transcultural. An originally Indian medicine, it was introduced to the Mediterranean through the Islamicate medical tradition and naturalised in various environments, becoming a common therapeutic agent for people all around the Mediterranean and transcending linguistic, regional, and political boundaries. In this case, it was part of a large manuscript, Vaticanus gr. 300, containing texts connected with the medical practice of Greek-speaking physicians in the multicultural milieu of southern Italy and Sicily. In other words, Mediterranean cultures – whether Byzantine, Islamicate, Jewish, or Latin – shared common elements of *materia medica* that defined pharmacological knowledge and practice. The substances themselves, in this case the myrobalans, originated in Asia (e.g. India and the Indochinese Peninsula) and, apart from being ingredients in compound drugs, they were commodities that travelled long distances before they were mixed with local Mediterranean ingredients, such as honey.[6] The long distances these substances travelled illustrate the global connections between the peoples of the Mediterranean and Eurasia as a whole and shows the interrelation of medicine and pharmacology with other fields, such as trade.[7]

Second, there is the textual and therapeutic context. A recipe is a textual entity which may have undergone several stages of editing, transmission (including translation), and elaboration as a result of scribal activity, often

[4] A long version, the so-called large great *tryphera* ('μεγάλη τρυφερά'), including a large number of additional ingredients, is found just after the recipe for the small one in the Greek translation in Vaticanus gr. 300, f. 146r, l. 10–f. 146v, l. 15.

[5] On Vaticanus gr. 300, see Lucà (1993: 36–63), who argues that the manuscript was copied, most probably in the area of Messina in Sicily, around 1130/40. On the Greek translation, which remains unedited, see Miguet (2017). On Ibn al-Jazzār and his work, see Bos (1993: 296–7) and Bos, Käs. and McVaugh (2022: 1–29).

[6] On the various kinds of myrobalan, see Amar and Lev (2017: 83–8).

[7] On the medieval spice trade, see Freedman (2012).

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informed by the practical knowledge of experimentation by practitioners. A large number of pharmacological texts remain unedited or are available only in outdated and inadequate editions. Thus, we still know very little about the transmission of these treatises and their audiences. At the same time, a drug could be made up and used as a therapeutic agent in daily practice, thus defining pharmaceutical techniques in a hospital, at an apothecary's shop, in a domestic setting (e.g. a patient's home), or in other contexts.

The third context is non-medical. Studying pharmacological substances in non-medical texts can provide an excellent way to explore how pharmacological knowledge had to be adapted to such contexts. A recipe, for example, might contain methods of preparation that originated in cooking or alchemy or indeed the derivation might be the other way around. Furthermore, drugs, whether simple or composite, were often associated with magic, religion, philosophy, and even diplomacy, thus adding an interdisciplinary aspect to the study of medieval pharmacology.

I.1 Towards a Holistic Study of Pharmacological Knowledge in the Mediterranean

This volume explores medieval Mediterranean pharmacological knowledge or 'drug lore' by focusing on simple and compound drugs (i.e. those consisting of more than one ingredient) and their applications in contemporary societies. It aims to construct a Mediterranean-wide view for understanding more general medieval phenomena, such as the cross-cultural exchange of knowledge in the field of pharmacology from the ninth/tenth century to the fifteenth.[8]

For the purpose of this volume, the term 'Mediterranean' includes evidence from places across the Mediterranean, whether in Europe, the Middle East, or Africa, but it is not a merely geographical designation.[9] It is something broader because, culturally speaking, even places that did not

[8] Cross-cultural exchange often works on many levels and was invariably influenced by the relevant social and cultural milieus. In this I follow the approach of Brentjes, Fidora, and Tischler (2014: 30–3), who considered the 'cross-cultural exchange of knowledge as a way of life, not merely a linear act of translating'. Determining the multifaceted interactions involved and 'their loci of contact, transfer, transport and transformation and their participants either as identifiable individuals or as a representative of a social, professional, cultural, linguistic or other group' is an important element in the process.

[9] The use of 'Mediterranean' as a geographical expression is a modern construction and goes back to the nineteenth century. On this and the study of the 'Mediterranean' as a region, see Horden and Purcell (2000: 530–4).

have access to the Mediterranean were predominantly informed by its cultures. Thus, the volume also includes evidence from people not geographically situated in the Mediterranean, but who had very close links with it. One chapter, for example, concentrates on Abbasid Baghdad (Chapter 1), which is an inland region, but through its political status as the capital of the Abbasid caliphate was nevertheless an important centre for charting and understanding cultural exchange in the Mediterranean.

This book seeks to move away from past prejudices in the study of Mediterranean medical traditions, which often valued one tradition over another. It thus aims to promote the practice of studying the entire region simultaneously by initiating a dialogue between scholars of diverse traditions and disciplines without focusing on or privileging one tradition at the expense of another or highlighting the influence of one tradition on others. The volume is divided into two parts: the first includes studies on the transmission of pharmacological knowledge across cultures and regions and deals with a wide variety of medical texts and contexts; the second concentrates on pharmacology's interaction with other areas, such as alchemy, cooking, magic, and philosophy. The thirteen chapters in this volume include contributions focusing on the Byzantine, the Islamicate, the Jewish, and the Latin traditions. These labels often tend to be reductive. Nevertheless, this book does not set out to solve the complicated issues related to the definition of the various medieval traditions. The use of 'Byzantine' and 'Latin' in this volume mainly relates to the language in which the available sources are written – that is, Greek and Latin – rather than to defined geographical spaces. The term 'Islamicate' medical tradition is employed with reference to authors and practice in regions where Muslims were culturally dominant.[10] Lastly, the term 'Jewish' is used for evidence related to people identified as Jews, but who might often write in languages other than Hebrew, such as Arabic, and who could be situated in any region of the Mediterranean.[11]

It is hard to define a starting point for any study of the transmission, circulation, and adaptation of pharmacological knowledge in the wider medieval Mediterranean. Two significant parameters must be considered: first, the

[10] The term was coined by Hodgson (1974: 59), who states that '"Islamicate" would refer not directly to the religion, Islam, itself, but to the social and cultural complex historically associated with Islam and the Muslims, both among Muslims themselves and even when found among non-Muslims'.

[11] On Jewish medical authors and practice, see Caballero-Navas (2011). On Jewish authors who specifically wrote in Arabic, see Chipman (2013). For a recent critical survey of views about 'Jewish medicine' in general and about 'Jewish medicine' in the medieval era, see Lehmhaus (2021a: 9–20) and (2021b: 39–49), respectively.

reception of the classical medical knowledge, and, second, the introduction of new knowledge from the Islamicate world, especially from the eleventh century onwards. By the ninth century, as part of the large corpus of Greek medical texts that were translated into Arabic, Greek pharmacological knowledge had been combined in a unique way with Indian pharmacological lore in Abbasid Baghdad. Classical pharmacological knowledge, based on work by authors such as Dioscorides (fl. first century CE)[12] and Galen (129–216/17 CE),[13] was elaborated with the addition of new vegetal and animal substances from Asia, such as myrobalans, sandalwood, musk, and ambergris.[14] Also, some medical authors in the Islamicate world introduced their own pharmacological theories often based on experimentation – for example, al-Kindī (d. 873), who instigated a new theory of calculating the degrees of primary qualities of composite drugs (hot, cold, dry, moist) and modified earlier corresponding Galenic concepts.[15] Pharmacological knowledge from the Islamicate world reached other Mediterranean traditions by the eleventh century, initiating a period of assimilation and adaptation that lasted for many decades, even centuries in some cases.

The introduction of Islamicate pharmacological lore in the Byzantine, Jewish, and Latin medical traditions and their interaction with one another was neither a unified nor a simultaneous phenomenon, but rather showed a variety of patterns of adaptation and reception. First, it is evident that there was piecemeal introduction of oriental *materia medica* even before the tenth century.[16] For example, in the Byzantine and Latin traditions, one can see the steady introduction of ingredients such as musk, ambergris, galangal, camphor, and sugar, including new forms of sugar-based recipes/ingredients from the ninth century onwards in medical and non-medical

[12] On Dioscorides, see Riddle (1985).

[13] For an overview of Galenic pharmacology, see Vogt (2008). On Galenic pharmacological theories, see the comprehensive study by Harig (1974).

[14] Kahl (2019). See, for example, the cases of Al-Ṭabarī's (fl. *c.*830–50), *Firdaws al-ḥikma* (*Paradise of Wisdom*), and the *Kitāb al-ḥāwī* (*Comprehensive Book*) by Al-Rāzī (d. *c.*925), who wrote medical works attesting to the merging of Greek and Indian medicine. Greek texts were translated either directly into Arabic or via Syriac, while Sanskrit texts were translated either directly into Arabic or via Persian. On al-Ṭabarī, see Meyerhof (1931) and Kahl (2020); on al-Rāzī, see Kahl (2015). See also Amar, Lev, and Serri (2014), who discuss the case of Ibn Juljul (d. after 994).

[15] Pormann (2011); Chipman (2019).

[16] The term 'oriental' is used to refer to ingredients originating from India and the Far East. The term has been used with reference to the importation of spices from Asia to the Mediterranean by Jacoby (2016: 196).

works.[17] The most significant medium for the introduction of Arabic medical knowledge into the wider Mediterranean world was translation. The huge and systematic job of translating Arabic medical works into Latin by Constantine the African (d. before 1098/9) in the late eleventh century led to the creation of new medical compendia in Latin, such as the *Articella*, which remained the main textbook for Latin medical teaching in Europe until the sixteenth century.[18] The period was marked by the rediscovery of classical and late antique works,[19] which were combined with new knowledge from the Islamicate tradition. To give a few characteristic examples from the area of pharmacology, two important Latin *antidotaria* had appeared by the end of the eleventh century. The so-called *Antidotarium magnum*, which is a large collection of composite drugs that can number up to 1,300 recipes in some manuscripts, shows a unique elaboration of earlier pharmacological lore with newly introduced oriental substances. A certain Nicolaus created a much smaller and more user-friendly work, the *Antidotarium Nicolai*, by excerpting the most commonly used recipes from the *Antidotarium magnum*.[20] By the twelfth century an influential and very well-circulated Latin work on simple drugs, the *Circa instans*, had been put together in Salerno, which became the centre of medical activity in the western Mediterranean from then

[17] On the Byzantine and Latin traditions, see Bouras-Vallianatos (2021) and Burridge (2020: 235–7), respectively. The issue of theoretical versus actual *materia medica* is relevant here, or, in other words, whether the ingredients mentioned in medical works were actually in circulation before the tenth/eleventh centuries. In fact, there are non-medical sources that confirm the presence of oriental ingredients in the wider Mediterranean world in this period. For example, that galangal was supplied every year as far afield as the Abbey of St. Bertin in north-west France is confirmed in a charter of 867 (see Gysseling and Koch (1950) I.68.11–12). In the Byzantine world, the appendix to the *Book of Ceremonies*, ascribed to Emperor Constantine VII Porphyrogennetos (sole r. 945–59), includes, for example, musk, ambergris, and sugar, among the spices that the emperor would have with him when he went on campaign. See Constantine VII Porphyrogennetos, *What Should Be Observed When the Great and High Emperor of the Romans Goes on Campaign*, ed. Haldon (1990) 108.219–22. Another important work which makes early references to oriental *materia medica* is *Hippiatrica*, a Byzantine horse medicine manual, emphasising the importance of a more holistic assessment of medieval medical literature, including veterinary works. Its tenth-century recension (in Berolinensis Phillippicus 1538) includes notable mentions of ingredients such as ambergris and galangal. On this, see McCabe (2009: 288–90).

[18] We know very little about the life of Constantine the African. There is no doubt that he made his translations in Montecassino, where he lived as a monk. On Constantine the African and the transformation of Latin medicine in the late eleventh century, see Green (forthcoming) with further recent bibliography.

[19] For example, late antique Latin translations of Dioscorides' and Alexander of Tralles' (*c.*525–*c.*605) works or Theodore Priscianus' (fl. later fourth/early fifth century) Latin handbook, as well as new translations from Greek, such as Paul of Aegina's (fl. first half of the seventh century) *Epitome*. See Green (2008).

[20] On the *Antidotarium magnum*, which remains unedited, see Green (2019). Francesco Roberg is preparing a new edition of the *Antidotarium Nicolai*. See Roberg (2007).

onwards; this treatise shows significant influence from the Islamicate pharmacological tradition.[21] An abundance of evidence from Hebrew commercial documents (dated to the eleventh and twelfth centuries) in the so-called Genizah collection in Cairo shows the intense links between India and Egypt, including references to the importation of thirty-six spices, aromatics, varnishing plants, and medicinal plants to the Mediterranean.[22] This is particularly important since it confirms that the transfer of knowledge through translation was not just theoretical, but that oriental ingredients were simultaneously spreading across the Mediterranean.[23]

By the third quarter of the eleventh century, Symeon Seth, a Greek scholar active in Constantinople, who knew Arabic and most probably came from Antioch, had composed his *Treatise on the Capacities of Foodstuffs*, addressed to the Byzantine emperor Michael VII Doukas (r. 1071–8), which provides details on a large number of aliments and their properties. In this work, Symeon made a systematic attempt to introduce new data and codify Islamicate medical knowledge, which had been slowly infiltrating Byzantine medical circles in Greek since the tenth century.[24] It is worth noting that Symeon was an exact contemporary of Constantine the African, although his work is not comparable with the latter's grand-scale translation project. Southern Italy and Sicily played a significant role in introducing Islamicate pharmacological lore to the wider Byzantine world as well, which inevitably leads us to reconsider the role of Greek-speaking communities outside Byzantium proper. The *Ephodia tou apodēmountos* had been translated in the same area by the early twelfth century, along with other Arabic medical works, such as *On Purgative Drugs*, most probably from an Arabic treatise by Pseudo-Yūḥannā ibn Māsawayh (d. 857).[25] These treatises were abundantly copied and used by Byzantine medical authors in later centuries, thus enhancing

[21] The work survives in 138 manuscripts. See Ventura's (2016) comprehensive study of the text.

[22] Goitein and Friedman (2008: 16). See also Yoeli-Tlalim (2021: 71–3). Commodities from India reached Egypt (Alexandria) via the Gulf of Aden. Of course, there were other trade routes between India and the Mediterranean – for example, the overland routes from Baghdad (via Siraf on the Persian Gulf) to Trebizond and Constantinople. See Durak (2021).

[23] Cf. Ventura (2016: 379–81). On the debate about theoretical versus actual/practical *materia medica*, see note 17, and Lev and Amar (2007).

[24] Harig (1967); Bouras-Vallianatos (2021: 979–82).

[25] The earliest surviving manuscript of this translation is Vaticanus gr. 300, ff. 273v–284v, where it is attributed to St John of Damascus. See Bouras-Vallianatos (2021: 987, n. 125). This was most probably due to these two historical figures having the same name in Arabic – that is, Yūḥannā = John. The same confusion is also attested in the Latin tradition; see De Vos (2013: 683). On the Latin version of this treatise, see Ventura (2021: 185–99).

the dissemination of Islamicate pharmacological knowledge.[26] Further pharmacological works from the Islamicate world were translated into Byzantine Greek, including some Persian *antidotaria*, which led to a significant diffusion of oriental *materia medica* and new forms of composite drugs in the Greek-speaking eastern Mediterranean world.[27]

A number of important contemporaneous developments can be seen in the field of Jewish medical tradition. It is worth noting that no medical works were written in Hebrew until the end of the twelfth century.[28] Jews often wrote in Arabic in medieval Islamicate milieus. For example, Ibn Biklārish, a Jewish physician and pharmacist who lived in the Spanish city of Almeria, wrote a pharmacological work in Arabic, *Kitāb al-Mustaʿīnī* for al-Mustaʿīn (r. 1085–1109), the Hūdid ruler of Saragossa, in around 1106. The work includes a long list of 704 simple drugs and their properties in tabular form, along with their names in various languages. The author refers to earlier Greek and Arabic works by authors such as Dioscorides, Galen, Ibn Māsawayh, al-Kindī, and al-Bīrūnī (d. after 1050), and follows the Galenic principles of the degrees of intensity of primary qualities.[29] Meanwhile, by the end of the twelfth century, the first translations of Arabic works from Latin into Hebrew were being made in the Western European Christian world, in particular Provence. Further translations directly from Arabic into Hebrew in subsequent centuries promoted the writing of Hebrew texts, including the dissemination of Islamicate pharmacological knowledge in Hebrew, thus coinciding with contemporaneous translation work in other parts of the Mediterranean.[30] Lastly, an interesting collection of pharmacological recipes in Greek had been produced by a certain – most probably Greek-speaking – Jew called Benjamin

[26] See, for example, Bouras-Vallianatos (2020: 152–7). On Arabo/Persian-Byzantine medical translations, see Touwaide (2016).

[27] See, for example, the two Persian *antidotaria* translated into Greek by Gregory Chioniades and Constantine Melitiniotes in the fourteenth century. On these, see Bouras-Vallianatos (2021: 998–1002) and Kousis (1939), respectively.

[28] Caballero-Navas (2011: 1–2). There are two notable exceptions. The first is the so-called *Sefer ʾAsaph* (*Book of Asaph*), composed in the Middle East by the eighth to ninth centuries, which includes a section on *materia medica*. See Yoeli-Tlalim (2021: 26–34). The second was written by Shabbetai Donnolo (913–*c*.982), who was active in Byzantine southern Italy. He wrote a medical book in Hebrew, *Sefer Mirqaḥoth* (*Book of Remedies*), consisting of recipes for composite drugs. See Sharf (1995: 160–77) and Ferre (2004). It is worth noting that this treatise contains only limited references to oriental *materia medica*, such as cinnamon, ginger, myrobalan, and zedoary (*Sefer Mirqaḥoth* (*Book of Remedies*), 9, ed. Ferre (2004): 7).

[29] Burnett (2008). See also Bos and Käs (2016), who discuss the case of Marwān ibn Janāḥ's (d. second quarter of the eleventh century) *Kitāb al-Talkhīṣ* (*Book of the Commentary*).

[30] Caballero-Navas (2011: 324–35).

by the fourteenth century.[31] Unfortunately, we cannot identify where this author lived and worked. The work shows considerable influence from the Islamicate pharmacological tradition and must be seen as a piece of the multifarious puzzle that is the study of Jewish medical authors in the medieval Mediterranean.

This volume discusses examples of the transmission and circulation of medieval pharmacological knowledge in the Mediterranean, and aims to help us reconsider often neglected or little known stages in this process and ultimately to understand the entire area in a more holistic way. The chapters in both parts of this volume have not been arranged in chronological order; nevertheless, an attempt has been made to group together chapters dealing with the same tradition or a similar topic. My discussion of the chapters of this volume does not necessarily follow the order of the chapters in the table of contents.

Jeffrey Doolittle (Chapter 2) examines a group of oral and dental recipes transmitted as part of several Latin medieval medical compilations based on the *Natural History* by Pliny the Elder, including the *Medicina Plinii* as well as five witnesses of a later extended version, the *Physica Plinii*, dated to between the ninth and the fifteenth centuries. He shows how recipe collections relied on common sources, and how subtle but meaningful differences are observed in each version. Doolittle then argues that by the ninth/tenth centuries, ingredients coming from outside the Mediterranean, such as myrrh, pepper, and clove are increasingly recommended. The number of ingredients from Asia is even higher in the PP Flor-Prag manuscript of the *Physica Plinii*, which dates to the fourteenth/fifteenth century, thus confirming the significant spread of Islamicate pharmacological knowledge. This coincides with the facilitation of overland trade from Asia under the unified Mongol Empire, especially after 1304.[32]

The various translations of pharmacological works from one language to another resulted in introducing new terms that were previously unknown to its native speakers. Authors and translators of medical works often made considerable effort to provide synonyms for the *materia medica* for the convenience of readers throughout the Mediterranean.[33] I have already referred to the work of Ibn Biklārish, who in his work on simple drugs included equivalents for the names of ingredients in Syriac, Persian,

[31] The work is unedited and survives in three manuscripts, the earliest dated to the fourteenth century. See Bouras-Vallianatos (2020: 145, n. 23). I am currently preparing its *editio princeps* along with an English translation.

[32] Biran (2015: 551–2). [33] Burnett (2016).

ancient and medieval Greek, Arabic, and *ʿajamiyyah* (Latin and Romance languages). Fabian Käs (Chapter 1) focuses on the unedited *Kitāb quwā l-adwiyah* (*Book on Simple Drugs*) by Ibn al-Tilmīdh (b. *c.*1073), a Christian physician active in the famous ʿAḍudī hospital in Baghdad, who provides synonyms for simples in Arabic, Syriac, Greek, and Persian. Käs argues that including these terms in multiple languages had a practical aim in the multicultural environment of Baghdad, namely to help physicians cross-check entries on *materia medica* in Syriac works or Arabic translations of Greek works. The Persian terms, on the other hand, might have been helpful to merchants involved in trading ingredients across greater Iran.

Kathleen Walker-Meikle (Chapter 3) deals with the unexplored Latin translation of an Arabic text on animal *materia medica*, the so-called *De sexaginta animalibus* (*On Sixty Animals*). In the Latin text, one finds extensive use of Arabic terminology for the names of the animals themselves and for units of measurements. The Latin term is often found alongside the Arabic term in transliteration (e.g. the Arabic *al-dhiʾb*, here *ozib*, is followed by the Latin term *lupo*, thus *De ozib lupo*). Terms for exotic animals were sometimes left untranslated; for example, the cheetah, *al-fahd* in Arabic, is rendered as *alphet* or *alfat* in Latin. These examples are a vivid testimony to the ongoing process of assimilation and naturalisation of foreign terms in the field of pharmacology – in this case, within the Latin tradition – as the result of the intensified transfer of knowledge, especially from the Islamicate world.

Maria Mavroudi (Chapter 4) discusses the presence of annotations with Greek plant names in Dioscoridean herbals in Arabic and of Arabic terms, written either in Arabic script or transliterated into Greek characters, in Greek medical manuscripts containing multilingual lexica of pharmacological substances. For example, the Greek terms 'μῆλα' and 'κυδώνια', written in a fluent eleventh-century hand, are provided in the margins for the Arabic *mālā* ('apples') and *qūdhūnīā* ('quince') that appear in the main text in Leidensis or. 289, a codex originating in Samarkand in the late eleventh century. On the other hand, one can find Greek transliterations of Arabic terms, such as 'φαίχισεν' for *al-fāhisha*, which is given as an equivalent for the Greek 'καστόριον' ('castoreum') in late Byzantine dictionaries of synonyms. These cases attest to the intense interaction between the Byzantine and Islamicate pharmacological traditions and the progressive familiarisation of contemporary practitioners with foreign terms for *materia medica*.

The use of Greek – for example, 'τουτίαν' (cadmia) for the Arabic *tūtiyā* – or even Latin loanwords in Greek transliteration is highlighted

by Matteo Martelli (Chapter 11), who discusses the interrelationship between pharmacology, alchemy, and cooking by focusing on an unedited recipe book of the fourteenth/fifteenth century in Parisinus gr. 2314. Martelli shows that the inclusion of such terms provides vital evidence on the process of tracing the interconnections between the diverse medieval medical traditions and the complicated patterns of transmission of medieval pharmacological knowledge.

Another interesting case is presented by Sivan Gottlieb (Chapter 6), who explores a unique group of medical texts – the so-called alchemical herbals – which are characterised by illustrations of plants and their roots (geometric, zoomorphic, or anthropomorphised). She particularly focuses on the Hebrew codex Parisinus 1199 (fifteenth century) from northern Italy, where the text accompanying each plant is a translation from a Latin source. Here, the translator adapted the Latin sources to suit the sensibilities of its Jewish audience; for example, references to Christ were rendered with Hebrew terms for God, while sometimes terms were completely omitted, such as the Latin *Sanctus*/*Sancta* (Saint). Moreover, each illustration is captioned with the name of the plant in Hebrew and Latin or Italian in Hebrew transliteration, whereas in some cases the Latin version may appear in Latin letters as well, thus adding another example of the complexities of transmitting pharmacological knowledge among Mediterranean linguistic communities.

Zohar Amar, Yaron Serri, and Efraim Lev (Chapter 5) discuss the production of a particular composite drug, theriac, in the eastern Mediterranean between the tenth and fifteenth centuries. Theriac was first composed by Andromachus, physician to the Roman emperor Nero (r. 54–68 CE) and was considered a sort of panacea antidote, especially in cases of poisoning by venomous animals. It attained great popularity in the wider Mediterranean in subsequent centuries and also became a famous antidote in the Islamicate world. The authors of this chapter examine testimonies connected with the Syro-Palestinian region, including certain treatises on the subject written by local authors, such as al-Tamīmī (d. *c.*960), who practised in Ramle before he moved to Egypt and wrote works on how to produce different kinds of theriac. The recipes for theriac were often modified by the use of local ingredients, such as asphalt from the Dead Sea, the venom of a particular snake from the same area, and wild plants from the mountains of Jerusalem (e.g. yellow bugle and moon carrot), attesting to notable cases of cross-fertilisation.

I.2 Pharmacological Texts and Contexts

I have already given some examples of texts related to the study of pharmacology in the medieval Mediterranean. A brief example from Vaticanus gr. 300, the manuscript from where the *triphalā* recipe cited in the opening epigraph originates, will further illustrate the urgent need for editions of unpublished and unexplored texts as well as the importance of studying previously neglected versions/redactions of certain treatises. Vaticanus gr. 300 is the earliest surviving copy of the *Ephodia tou apodēmountos* and was copied by four hands; four additional hands annotated the codex in the margin or in the main body of the text. Santo Lucà has convincingly argued for the identification of hand *d* with that of the most likely commissioner of the codex, a physician from Reggio, one Philip Xeros.[34] In fact, this copy of the *Ephodia tou apodēmountos* is unique since it is elaborated with supplemental material, showing Philip's personal involvement.

First, the scribes copied several additional recipes by Philip in various chapters of the translation in the main body of the text, thus constituting an integral part of the *Ephodia tou apodēmountos* in this witness. In some of these Philip addresses his son ('τέκνον'), also a physician, in a didactic tone, as, for example, in the case of a potion made with bugloss for the treatment of melancholy and heart affections.[35] These recipes would not have been printed/included in a conventional critical edition or at best some of them could have been provided in the *apparatus criticus* or in an appendix to the edition, thus not adequately representing the various additional layers/redactions of the text. In this case, these recipes are a rare testimony to Xeros' personal engagement with this copy of the *Ephodia tou apodēmountos* and also give us a glimpse of the medicines Philip most probably used in daily practice.

Second, the study of a particular text is not complete without an understanding of the paratextual elements – for example, marginal or interlinear notes and any diagrams that may accompany the text in the

[34] Lucà (1993: 50–6). See also Ieraci Bio (2006); Bouras-Vallianatos (2021: 982–8). Philip Xeros is also the co-author of a recipe book surviving in Parisinus gr. 2194 (fifteenth century), ff. 454r–464v. The title reads as follows: Βιβλίον περιέχον συνθέσεις συναχθὲν καὶ πειραθὲν παρὰ Εὐφημίου Σικελοῦ τοῦ θαυμασιωτάτου· καὶ Φιλίππου Ξηροῦ τοῦ Ῥηγινοῦ (correxi: Ῥιγινοῦ cod.), τῶν θαυμασίων ἰατρῶν (*Book Containing Recipes Compiled and Tested by the Most Marvellous Euphemios of Sicily and Philip Xeros of Reggio, [Who Are] among the Marvellous Physicians*).

[35] Vaticanus gr. 300, f. 91r, ll.15–17: '. . . ὠφέλιμον (correxi: ὠφέλημον cod.) ἐστὶ πρὸς μελαγχολίας καὶ τὰς καρδιακὰς διαθέσεις, καθὼς λέγει τέκνον Φίλιππος ὁ ἰητρὸς καὶ σὸς πατὴρ ὁ Ξηρός'. See Mercati (1917: 10–17), who offers transcriptions of these interventions throughout the codex.

various manuscripts.[36] In the previous case, there are marginal annotations or notabilia, some added by Philip Xeros himself. There are various categories of data given. For example, quite often Philip recommends his readers look at other recipes found in Paul of Aegina's *Epitome*, a seventh-century medical handbook which remained extremely popular throughout the entire Byzantine period – that is, on f. 244v, he refers to the chapter on erysipelas in Paul's work, which attests to the use of other medical texts by contemporary physicians in southern Italy and Sicily.[37] At the same time, Philip creates a complementarity between the *Ephodia tou apodēmountos* and Paul's text, which did not exist in the original Arabic treatise. Another interesting set of recommendations provides further information on certain recipes or details about a particular therapeutic procedure connected with the administration of a drug, thus enhancing the codex's usefulness to practitioners/readers. For example, on f. 173r, we read: 'first of all seek to purge',[38] and on f. 27r, Philip recommends his son not administer medicines that can be smelt, perhaps referring to medicines in the form of incense, since ingredients such as roses, camphor, and musk could strengthen the stomach.[39] The advice is related to the contents of the main text, in which a certain recipe is given in order, inter alia, to purge the stomach.[40] Lastly, a third group of annotations is related to the provision of synonyms in Greek intended to familiarise the reader with the Arabic terms given in Greek transliteration in the main body of the text. For example, in the margin of f. 198r, Philip adds two synonyms in Greek for the Arabic term given in Greek transliteration in the main text.[41] The Greek synonyms are 'βάλσαμον' and 'σισύμβριον', which are both terms used for various species of mint.[42] The Arabic term, 'νεμμέμ', a transliteration of one of the Arabic words for mint (i.e. *nammām*), is highlighted in the text with an asterisk, and the adverb 'ἀραβιστί' is used

[36] 'Paratext' is a term Gérard Genette (1997: 2) coined to refer to the material surrounding a printed text, including titles, prefaces, introductions, and footnotes. Genette's literary interpretation has more recently been applied to the study of manuscripts; see, for example, Cooper (2015).

[37] Vaticanus gr. 300, f. 244v (left margin): 'ζήτει καὶ ἑτέραν πύλην ἐρυσιπέλατος εἰς τὸν Παῦλον'. 'Πύλη' is found throughout the Greek translation of the *Ephodia tou apodēmountos* and corresponds to the Arabic *bāb*, the term for chapter.

[38] Vaticanus gr. 300, f. 173r (right margin): 'ζήτει ἐν πρώτοις τὴν κάθαρσιν'.

[39] Vaticanus gr. 300, f. 27r (right margin): 'μὴ ἐπιδώσῃς ὀσφραντὰ τέκνον ἐν καιρῷ βοηθήματι, τὰ γὰρ ὀσφραντὰ εἰσπνεόμενα, τονοῦσι τὸν στόμαχον, ὡς ῥόδα, νύμφας, μυρσίνας, καὶ τὰ ὅμο[ια] καὶ λευκοΐα, ἡ (correxi: ἢ cod.) καφορά, καὶ ὁ μόσχος'.

[40] Vaticanus gr. 300, f. 27r, ll. 1–4: 'ἐν τούτοις στήλη ἱερᾶς . . . καὶ καθαίρει δὲ καὶ τὸν στόμαχον'.

[41] Vaticanus gr. 300, f. 198r (right margin): 'βάλσαμον τὸ λεγόμενον σισύμβριον (correxi: σεισήμβριον cod.), ἀραβιστὶ δέ'.

[42] LSJ, s.v. βάλσαμον, II: costmary; σισύμβριον: bergamot-mint. Cf. Delatte (1939: II.392.10–11): 'σισύμβριον ἤτοι τὸ βάλσαμον'.

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here to denote the Arabic version. This example is an emphatic reminder of the gradual dissemination and reception of the translations of Arabic medical texts throughout the Mediterranean from the eleventh century onwards.

Having outlined potential outcomes from the study of unedited and very little explored medieval pharmacological texts, I would like to add comments on the nature of the available primary sources. It is quite difficult to categorise medieval pharmacological texts. For example, Henry Sigerist, writing in 1958, attempted to create a categorisation of pharmacological literature by dividing the relevant early medieval Latin texts into four large groups: a) 'materia medica', which mainly includes texts on simple drugs,[43] often accompanied by illustrations, thus adding an art historical perspective to the study of medieval pharmacological texts;[44] b) 'collections of recipes', further subdivided into '*antidotaria*' (lists of composite drugs with many ingredients) and '*receptaria*' (lists of simple recipes); c) 'hermeneumata', brief glosses about pharmacological ingredients or lists of synonyms; and d) 'treatises on weights and measures', which he considered an essential appendix to each collection of recipes.[45] Sigerist's categorisation can also be applied to the output of the various Mediterranean traditions between the ninth/tenth and fifteenth centuries. But rather than attempting to find a way of categorising pharmacological texts, I would like to point out trends that marked the period under examination.

First, vast reference works were created that attempted to systematise previous knowledge, often elaborated with knowledge derived from practical experience. I have already referred to the late eleventh-century Latin collection of recipes, the so-called *Antidotarium magnum*. By the early fourteenth century, the vast *Dynameron* by the so-called Nicholas Myrepsos had been composed in Greek, providing a long list of 2,650 recipes of composite drugs, making it the most extensive medieval work on the topic.[46] The *Dynameron* is not a list of official recipes aimed at regulating pharmaceutical activity, as was the case for the Latin *Ricettario Fiorentino*, the first European pharmacopoeia, which was published in Florence in 1499,[47] although it could be seen as the first Byzantine

[43] On medieval collections of *materia medica*, see the thought-provoking study by Ventura (2017).
[44] The Greek treatise of Dioscorides, *De materia medica*, and its versions and translations constituted the main source of influence on Mediterranean pharmacological traditions. For a comprehensive introduction to the topic, see Collins (2000).
[45] Sigerist (1958: 144). See also the more detailed categorisation by Touwaide (2005).
[46] The text has recently been edited by Valiakos (2020). [47] See Colapinto (1993).

pharmacopoeia that attempted to systematise the composition of drugs and offer a reference manual of standardised recipes. Another notable example is *al-Jāmiʿ li-mufradāt al-adwiyah wa-l-aghdhiyah* (*Collector of Simple Drugs and Foodstuffs*) by the Andalusian Arab Ibn al-Bayṭār (d. 1248), who provides a description of 1,400 simples in alphabetical order based on more than 150 ancient and medieval authors as well as his own observations.[48]

Second, this period also saw the production of practical manuals for daily practice – for example, collections of the most useful and 'tested' recipes, often connected with the activity of one or more practising physicians and apothecaries or a particular place of healing, such as a hospital. One can point to several examples of the so-called *iatrosophia*[49] in Byzantine Greek or the collections of recipes connected with Byzantine hospitals, the so-called *xenōnika*;[50] the Arabic equivalents are the *aqrābādhīnat*.[51] There are also recipe books from the medieval Latin tradition, including those connected with hospitals,[52] or those associated with apothecaries.[53]

Third, the large number of Arabic works translated into Greek, Hebrew, and Latin and the existence of diverse multicultural milieus in the Mediterranean created a real need for glossaries of pharmacological ingredients. These can vary from just one folio to massive tomes. Perhaps the most prominent Latin witness of this process is the thirteenth-century *Clavis sanationis* (*Key to Healing*) by Simon of Genoa, which is written in narrative form. It is a huge work (there are 770 entries starting with 'A' alone), and about 75 per cent of its content is pharmacological, providing details about simples (etymological date, descriptive date, healing uses), including synonyms in Greek and Arabic.[54] A large number of bilingual and multilingual glossaries also survive, which provide synonyms for terms in one or more languages, usually arranged alphabetically in parallel columns.[55] These are usually given in transliteration using the alphabet

[48] Cabo Gonzalez (1997).

[49] The term may be applied to the treatise itself, even to a manuscript that contains a collection of practical medical treatises, including both diagnostic and therapeutic information. On Byzantine examples, see Touwaide (2007) and Zipser (2019).

[50] Bennett (2017).

[51] On examples of hospital formularies from Byzantium and the Islamicate worlds, see Horden (2013). On recipe books in the medieval Islamicate world, see Álvarez Millán (2020–1: 248–68).

[52] See, for example, the *Ricettario* of the hospital of Santa Maria Novella in Florence as preserved in Florentinus Magliabechianus XV.92. Although the codex dates to 1515, it contains many recipes dating back to the fifteenth century. Henderson (2006: 297–300) suggests that it may have been copied from existing collections.

[53] Silini (2001).

[54] Bouras-Vallianatos (2013).

[55] On medieval medico-botanical synonym lists, see the traditional introduction to the topic by Steinschneider (1892).

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of the source language (e.g. Arabic, Latin, and Ottoman Turkish synonyms for Greek terms in Greek transliteration or even more complicated examples, including synonyms in Latin, Romance, and Arabic in Hebrew characters, but without any lexical material, in Hebrew, and so on).[56] Similarly one can also find lists of substitute drugs, which were often appended to pharmacological works in manuscripts and which may have had a highly practical value in medieval societies where some of the substances were not always readily available.[57]

Some of the contributions to this book discuss a significant number of previously little studied and/or unedited pharmacological texts. Fabian Käs (Chapter 1) provides the first critical presentation of the contents of the unpublished work *Book on Simple Drugs* by Ibn al-Tilmīdh by looking at the two surviving manuscripts – that is, Londiniensis BL or. 8294 and Wellcomensis or. 9. The work contains 287 entries, which provide a wealth of information arranged in five sections.

The first section provides synonyms for the Arabic terms in various languages. The next two deal with the primary qualities and degrees of intensity of the drugs concerned, and the fourth deals with therapeutic information. Käs notes the influence of Ibn Sīnā's *Qānūn fī al-ṭibb* (*Canon of Medicine*) on Ibn al-Tilmīdh's work, in particular on sections two and three, thus confirming the authority Ibn Sīnā's work had in the Islamicate medical tradition.

Perhaps the most interesting section is the last one – that is, the fifth part – where the author provides information about the use of each ingredient in the composite drugs administered in the ʿAḍudī hospital in Baghdad. This is a unique reference where the author makes a connection between the theoretical details he provides about pharmacological ingredients and their place in the daily routine of a medieval medical institution.

Leigh Chipman (Chapter 10) writes about the thirteenth-century *Minhāj al-dukkān* [*How to Run a Pharmacy*], a manual for pharmacists in Arabic by an otherwise unknown Jewish druggist from Cairo, al-Kūhīn al-ʿAṭṭār. By comparing preparations from *Minhāj al-dukkān* and an anonymous fourteenth-century cookbook from Cairo *Kanz al-fawāʾid fī tanwīʿ al-mawāʾid* (*Treasure Trove of Benefits and Variety at the Table*), she found a large number of almost identical recipes. Interestingly, the pharmacological manual often provides additional details, including an earlier written source and a brief attestation of efficacy, such as the term

[56] For examples from the Greek and Hebrew traditions, see Touwaide (1999) and Bos and Mensching (2005), respectively.
[57] On these kinds of texts, see Touwaide (2012).

mujarrab ('tried and tested'). Efficacy statements had often been added to pharmacological recipes since antiquity, aimed to attest the validity of the therapeutic effect of the recipe to later readers.[58] They may have been added by an author or a later scribe in the form of an annotation, and sometimes became an integral part of the text. Although it is unclear whether those who added such statements had actually tested a recipe, such additions nevertheless were clearly an indicator of the most effective drugs. Similar statements are also found in Arabic medical self-treatment compendia discussed by Paulina Lewicka (Chapter 9), as well as in Latin medieval recipes or the accounts of simple drugs in Hebrew discussed by Jeffrey Doolittle (Chapter 2) and Sivan Gottlieb (Chapter 6), where statements such as *ualde prodest* ('very beneficial') and *baḥun* ('tested') respectively are found.

There is evidence of a growing specialisation on the part of apothecaries in the twelfth and thirteenth centuries across the Mediterranean, and not only in Mamluk Egypt, as suggested in the discussion earlier in this introduction.[59] Apothecaries formed guilds in various Italian cities, as the large number of surviving statutes suggests. It was mainly for the doctor to diagnose and prescribe and for the apothecary to prepare and deliver the drugs.[60] An example from guild statutes in fourteenth-century Venice attests that apothecaries were neither allowed to make drugs without the consent of doctors nor even to treat the injured although there was considerable variation in this respect among Italian cities.[61] Furthermore, specific state mechanisms were developed to control the production of important composite drugs, including theriac.[62] On the Byzantine side, evidence suggests the operation of guilds by the so-called *myrepsoi* by the thirteenth century – for example, in the city of Thessaloniki.[63] Strict regulations were also imposed on the preparation of drugs and the administration of poisons in Byzantium. We are informed of great concern about deaths caused by poisonous drugs made by apothecaries, something considered more serious than a death caused by the sword.[64]

[58] On efficacy statements, see Jones (1998) and Totelin (2011). See also Álvarez Millán (2020–1: 216–24), who discussed drug testing in the Islamicate medical tradition.

[59] For example, the separation of the profession of physicians from apothecaries by an edict of Frederick II (r. 1220–50), promulgated in 1231 in Melfi. On apothecaries' practice in the western Mediterranean, see Bénézet (1999).

[60] On the interaction between apothecaries and physicians, see Moulinier (2006).

[61] Ciasca (1927: 316, n. 6).

[62] Moulinier (2006: 121–3).

[63] Kislinger (1988: 117). On pharmacy-related professions in Byzantium, see Varella (2007).

[64] See the fourteenth-century legal synopsis of the statements of canon and civil law by Matthew Blastares, *Treatise in Alphabetical Arrangement*, ed. Potlis and Rallis (1859) 361.

As regards the practice of apothecaries and the preparation and selling of drugs, interdisciplinary study of the surviving apothecaries' jars (*albarelli*) and bottles (*unguentaria*) remains a *desideratum*.[65] An excellent example of the wealth of information that one can derive from combining historical and archaeological data comes from the study of an *albarello*, a bottle, and a ceremonial cup found in the thirteenth-century burial of a Turkic prince in southern Ukraine. Renata Holod and Yuriy Rassamakin have argued for a Mediterranean origin for the *albarello* and the bottle, while the palynological (i.e. concerning the study of pollen dust and particles) and botanical analyses of the cup revealed a large amount of vegetal ingredients from the steppe.[66]

Jeffrey Doolittle (Chapter 2) points out the urgent need for palaeopathological studies when discussing medieval Latin dental recipes. Dental evidence could provide useful information on diet and social stratification, which in turn could help us understand the access of the lower classes to medicines. Doolittle provides a transcription of *Physica Plinii*, chapters 28–41, on oral and dental health from Montecassino Cod. 69, Archivio dell'Abbazia, and emphasises the importance of consulting different manuscripts of the *Physica Plinii* when studying a particular text, which was continuously modified and elaborated in the Middle Ages. The principal trajectory of these changes reflects gradual increases, not only in the number of recipes themselves, but also in the attention given to signs of precision – including the use of formal pharmaceutical nomenclature and metrological units and symbols – and the inclusion of a diverse range of new ingredients. These recipes also reveal shifting and patterned uses for particular medical ingredients and substances described by classical authorities and provide insight into the ways that medieval medical writers were reading, interpreting, and adapting their sources. The recipes can be very short, containing just one or two ingredients, as in the case of a preparation for teething in infants, where the use of goat's milk and/or rabbit brain is recommended, while at other times, as in the case of the recipe for a dentifrice, it has up to seven ingredients, i.e. cloves, African mastic, oyster shells, pumice, burned bread, galingale, and vinegar.

Kathleen Walker-Meikle (Chapter 3) focuses on the manuscript transmission of the *De sexaginta animalibus* and shows that it is a translation of an Arabic work on the properties of the body parts of animals by an

[65] On examples from Florence, Thessaloniki, and Ayyubid Syria, see respectively Cora (1973), Antonaras (2010: 408–13), and Jenkins-Madina (2006: 132 and passim).
[66] Holod and Rassamakin (2012).

eleventh-century physician, ʿUbaydallāh ibn Bukhtīshūʿ, by comparing the text with the *manāfiʿ* (usefulness) section from an Arabic bestiary by the same author. She also argues for the existence of two recensions by studying the manuscript tradition of the work for the first time and comparing each entry in both recensions with Ibn Bukhtīshūʿ's text and ʿĪsā ibn ʿAlī's *Book on the Useful Properties of Animal Parts: De sexaginta animalibus* details the medical uses of animal ingredients, sometimes juxtaposed with information with magical connotations with no separation between the two. The text contains about fifty-six chapters and starts with man and the quadrupeds, followed by birds, vermin, and aquatic creatures. Each animal entry then includes different sections on various pharmacological ingredients, such as blood, bile, fat, liver, and urine. A significant number of ingredients were particularly popular in medieval pharmacological recipes. Fat from pigs, goats, and sheep was an essential ingredient for the preparation of various kinds of unguents, a prominent dosage form for local application to the skin. Some animal ingredients, such as musk and ambergris, could originate from as far away as India and the Far East, having to be transported across large areas, which was reflected in their remarkably high price. The famous Venetian merchant traveller Marco Polo (*c*.1254–*c*.1324) refers to musk as an extremely expensive substance.[67]

Maria Mavroudi (Chapter 4) is concerned with the very little known and poorly edited Byzantine *Lexikon tōn Sarakēnōn* (*Lexicon of Saracens*), which consists of around 400 entries. It is a bilingual lexicon of mainly animal and plant substances. Arabic names for *materia medica* transliterated in Greek characters are accompanied by the equivalent Greek terms. Mavroudi shows that this lexicon was actually composed as an essential companion to the Greek translation of Ibn al-Jazzār's aforementioned Arabic *Ephodia tou apodēmountos.* Intriguingly, one can also find words of Latin origin, thus confirming that the translation was made in a place where Latin was also in use. Mavroudi argues that the transliteration of the Arabic terms was not only provided for reasons of accuracy – that is, so that the Greek-speaking reader would be aware of the exact Arabic terms – but it also had practical significance: contemporary Greek practitioners had to be familiar with the names of pharmacological substances in Greek, Arabic, and Latin in order to acquire them in multicultural southern Italy and Sicily. Another example given by the author of this chapter enlightens us

[67] Jacoby (2006: 201–3). See also King (2017: 219–69). On ambergris, see the comprehensive case study by Durak (2018).

further on the role not just of the written but also of the oral transmission of medieval pharmacological knowledge. An eleventh-century Greek copy of Paul of Aegina's medical handbook, Parisinus gr. 2205, transmits Greek notes referring to oral consultations with a Muslim inhabitant of the city of Veroia in the southern Balkans in order to identify plants such as 'σάμψυχον' ('marjoram'). This note provides us with an insight into the other business associated with the practice of medicine in a medieval context, including obtaining, processing, and transporting *materia medica*.

Sivan Gottlieb (Chapter 6) discusses the texts of the herbal Parisinus hébr. 1199. Each entry gives details in Hebrew and Latin about the use of one plant; various parts of the plant may be used as simple drugs or can form a compound with the addition of other ingredients such as eggs, milk, honey, wine, or even bear fat. Pharmacological information is often associated with details about the geographical distribution of the plant and its habitat. The most common references to therapeutic uses are for wounds and eye affections, both quite common in the Middle Ages. The texts sometimes include the names of physicians who had confirmed the usefulness of a certain recommendation, including very famous medical authorities such as the thirteenth-century pioneer physician and founder of academic medical training in Bologna, Taddeo degli Alderotti.[68] Intriguingly, these references have been removed from the Hebrew versions. We are particularly fortunate in being able to identify a distinct group of marginal annotations by someone who was most probably a past owner of the manuscript. This person provided brief, additional material for certain entries, including efficacy statements (e.g. *kvar baduḳ*/'already verified') or additional uses – for example, *le-keʾevey ḥaze ṿe-ʾisṭumakha*, *le-keʾevey shinayim* (i.e. for pains in the chest and stomach, for toothache), thus confirming that the manuscript was used by later readers and actively connecting the material of the codex with medical practice. Most interestingly, this manuscript includes illustrations for seventy-two of the ninety-eight plants mentioned. Although the illustrations do not represent the plants accurately, they give an essential visual overview of their parts. In many cases, the depiction of the plants is associated with their uses – for example, the anthropomorphised illustration of mandrake as a female figure is connected with the plant's use as a fertility agent, thus highlighting its gynaecological significance.

Paulina Lewicka (Chapter 9) examines two previously fairly unexplored self-treatment manuals written in Arabic, Ibn al-Akfānī's (d. 1349) *Ghunyat*

[68] On Taddeo degli Alderotti, see Siraisi (1981).

al-labīb fī mā yustaʾmal ʿinda ghaybat al-ṭabīb (*Wealth of Information for the Intelligent Man When the Doctor Is Not Around*), originating in Mamluk Egypt; and al-Qurashī's *Ghunyat al-labīb ḥaythu lā yūjad al-ṭabīb* (*The Richness of Information for the Intelligent Man When the Doctor Is Not Around*), which remains unedited and for which we have no details about the dates and provenance of its author.

Self-treatment compendia go back to the Graeco-Roman world, where, for example, in the first century AD Rufus of Ephesus, among others, wrote a medical work addressed to the layman, which no longer survives. The Islamicate medical tradition comprises a considerable number of self-treatment manuals, and the earliest surviving example is by al-Rāzī (*Man lā yaḥḍuruhu al-ṭabīb*/*For the One Who Is Not Attended to by a Doctor*), who emphasised the need for a book to provide instructions on how to prepare affordable and easily procurable drugs. Ibn al-Akfānī prioritises ensuring a regulated diet over the use of drugs, which, according to him, should be as simple as possible and not include too many ingredients. Among the compound drugs he nevertheless discusses are references to popular medicaments such as rose syrup, barley water, and oxymel. Lewicka argues that most of the recipes for composite drugs derive from either al-Rāzī's *Kitāb al-ḥāwī* or Ibn Sīnā's *Qanūn fī al-ṭibb*, both very influential works in the medieval Islamicate world. Al-Qurashī was concerned in his treatise to provide advice on 'well-known and easily available ingredients', thus recalling al-Rāzī and echoing the well-known notion of the so-called *euporista*, simple and compound drugs that could be obtained easily.[69]

A last point of interest is the unusual types of ingredients often suggested by both authors. For example, al-Qurashī recommends blood of hoopoe to remove a leucoma from the eye or burnt lung of a wild donkey or horse mixed with honey or pomegranate syrup to treat a heavy cough. In both cases, these ingredients clearly derived from folk or occult medical practices. In fact, in both manuals one finds magical and religious content interwoven with medical advice.

I.3 Boundaries of Pharmacology

This volume aims to play a decisive role in promoting the study of non-medical texts as sources of information about medieval pharmacology and its entanglement with magic, religion, philosophy, cooking, alchemy, and

[69] On *euporista*, see now Brodersen (2020).

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diplomacy. A useful critical examination of the medieval concept of drugs as therapeutic agents in light of Byzantine sources on sorcery is presented by Richard Greenfield (Chapter 7). He first sets out a case study of the use of a vegetal substance, the asphodel, which was widely used by ancient and medieval medical authors as an expectorant, an emmenagogue, and for a variety of affections, including kidney and urinary. Asphodel also appears in the popular magico-therapeutic treatise *The Magical Treatise of Solomon*, where it is recommended for various ailments, including headache and dysentery. It could also be used for expelling demons or protecting against the evil eye. Nevertheless, the drug is not connected with the theories of humoral pathology but is presented as having attained its properties due to its planetary connection with Saturn. There are further superstitious details about the gathering of the plant, which may include a Christian prayer and the invocation of magical names.

The connection of astral bodies with the properties of simple or composite drugs is also emphasised by Paulina Lewicka (Chapter 9); by examining Ibn al-Akfānī's medico-pharmacological self-treatment compendium, she shows that it often includes chapters that discuss the occult or magical properties (*khawāṣṣ*) of certain ingredients.[70] For example, the effectiveness of a mixture of the gall of a mountain goat with wild lettuce in protecting against poisons is said to be enhanced if consumed when the sun enters Aries.

The 'sacred' or 'magical' character of therapeutic material is even more obvious in the case of amulets. Greenfield gives an example from *Kyranides*, a widely circulated Greek magico-medical textbook dated to the fourth century, which records that, if someone wears an amulet made of rocket, nightingale, sea urchin, and a gemstone, along with an image of Venus, they will be well-liked/loved and will be avoided by wild animals. This operates on the principles of sympathetic magic, for example, by evoking the alluring song of the bird or the involvement of Venus, a symbol of love, sex, and fertility.

Similarly, in a Christian context in Byzantium, pious believers trusted that someone who wore an amulet containing a holy image or the relic of a certain saint or even oil from a lamp or wax from a candle from a shrine would receive effective therapy. Such was the popularity of 'sacred' substances that the use of holy water or holy oils is not only mentioned in Christian miracles, but they could often be found as ingredients in

[70] On occult science in the Byzantine and Islamicate traditions, see Mavroudi (2006) and Saif and Leoni (2021), respectively.

composite drugs in Byzantine medical recipe books where superstitious elements were usually present.[71] Overall, Greenfield argues that amulets with magical or religious connotations and used as therapeutic agents could be seen as a substitute for drugs.

In fact, the use of amulets containing animal, mineral, and vegetal ingredients for therapeutic purposes had been quite widespread since antiquity and corresponding advice is even found in the works of physicians such as Galen and Alexander of Tralles. In his *On the Capacities of Simple Drugs* Galen recommended an amulet made of peony root be hung around the neck of an epileptic child. He attempted to explain it in a rational way by suggesting the patient may inhale particles from the root.[72] Similarly, Alexander of Tralles, writing in the sixth century, recommends the use of a large number of amulets for the treatment of epilepsy and gout but, although he accepted from his own experience (*peira*) that they might sometimes work, he never attempted to give a rational explanation. He grouped this kind of advice in separate sections of his works under the so-called *physika* (natural remedies, i.e. alternative or occult therapeutic practices, including the use of amulets, incantations, etc.).[73] Details about the use of certain simples as amulets were often intertwined with pharmacological or magical properties. For example, in the alchemical herbal examined by Sivan Gottlieb (Chapter 6) are eighteen references to the use of amulets, and the same applies in Kathleen Walker-Meikle's discussion of animal *materia medica* (Chapter 3), where each entry contains medicinal and magical properties side by side.

In another context, Phillip Lieberman (Chapter 8) examines the views of the well-known Jewish rabbi, philosopher, and physician Moses Maimonides (1138–1204), who worked in Morocco and Egypt, on the use of amulets. In his *Dalālat al-ḥāʾirīn* (*The Guide to the Perplexed*) Maimonides accepts the use of magical remedies, which may be also found in rabbinic literature or Arabic medical literature such as al-Tamīmī's *Kitāb al-murshid* (*The Guide*), including the use of amulets made of vegetal, mineral, animal, or even human parts (e.g. fox's tooth,

[71] On the use of holy water in Byzantine healing miracles, see Narro (2019). For examples in Byzantine medical recipe books, see John Archiatros, *Iatrosophion*, 208.א, ed. Zipser (2009) 164.29–30: 'ἁγιάσματος τῶν ἁγίων θεοφανίων' ('Epiphany water', i.e. holy water sanctified with special blessings on the Feast of Epiphany) and *Therapeutikai*, 38, ed. Bennett (2003) 423.4: 'ἁγίου ἐλαίου τῆς ἁγίας Ζηναϊδός' ('holy oil of St Zenais').

[72] Galen, *On the Capacities of Simple Drugs*, 6.3, ed. Kühn (1826) XI.859–60. Cf. Jouanna (2011). On the reception of this recommendation in Byzantine and post-Byzantine prayer books (*euchologia*), see Stathakopoulos (2020: 77–9).

[73] Bouras-Vallianatos (2014); Grimm-Stadelmann (2020: 103–18).

the nail of one who has been hanged, peony, dog dung, marcasite). Interestingly, Maimonides allows these remedies to be recommended – 'even if not prescribed by reason' – once there is adequate experience confirming their effectiveness, which reminds us of Alexander of Tralles' empirical approach to the use of *physika*. Similarly, Lewicka provides examples of the use of amulets (e.g. coconut for malarial fevers, ruby for plague) where Ibn al-Akfānī often confirms that their suitability as curatives has been tested by experience.

Athanasios Rinotas (Chapter 12) addresses a closely related topic by focusing on the medico-philosophical approaches of the thirteenth-century philosopher and theologian Albertus Magnus. Although not a practising physician, Albertus wrote about medicine. In his work *On Minerals* Albertus refers to certain stones in the form of amulets worn around the neck as capable of treating diseases such as epilepsy and melancholy. Yet Albertus does not touch upon or refer explicitly to how these stones could act. The Dominican master adopted the notion of the medical properties of stones from authorities of the past, such as Pliny the Elder and Dioscorides, mainly through the works of Arnold of Saxony (fl. 1225) and Thomas of Cantimpré (*c*.1200–*c*.1270), and he often put great weight on experience, especially as regards the powers of stones, most probably influenced by Ibn Sīnā's Latin translation of the *Canon of Medicine*.

Rinotas argues that in dealing with epilepsy and melancholy, Albertus attempted to philosophise the knowledge of stones. He accepts a humoral understanding of disease (e.g. connecting phlegm with epilepsy and black bile with melancholy) and uses his theory of colours to give a philosophical explanation. For example, the hot and dry nature of red stones could control the moistness and coldness epilepsy causes in the human body. Similarly, the blackness of onyx could be a factor in increasing the symptoms of melancholy.

This volume also shows that the fields of cooking and alchemy can often be very close to that of pharmacology and their comparative study can be beneficial in contextualising various pharmacological recommendations. Leigh Chipman (Chapter 10) explores common recipes for compounds in al-ʿAṭṭār's pharmacological work *Minhāj al-dukkān* and the anonymous cookbook *Kanz al-fawāʾid fī tanwīʿ al-mawāʾid*. For example, a recipe for a snack to go with alcoholic drinks in the cookbook is labelled as a recipe for strengthening the digestion in the pharmacopoeia. In the case of a recipe for an oxymel of chewy candy, the cookbook even refers to humours and qualities, thus giving more medical information than the

Minhāj al-dukkān. Chipman argues that a certain recipe can take on a particular meaning in a particular context. Thus, a recipe in the cookbook that is surrounded by recipes for drinks and food dishes has a purely nutritional character, while the same recipe in a pharmacological context stresses its healing rather than its nutritional effect. In another case Chipman shows how the dietary advice on consuming sour grape juice and pickled almonds at the end of a recipe from the Genizah collection, T-S Ar. 30.305, can be better contextualised by studying *Kanz al-fawā'id*, which contains a large number of recipes of dishes 'for the nourishment of the sick'.

Matteo Martelli (Chapter 11) critically examines unedited manuscripts with examples of pharmacological recipes intermixed with alchemical formulae. For example, in Bononiensis 1808, a medical miscellany, recipes for composite drugs appear side by side with procedures for making metallic, black, and coloured inks; two of them on silver ink in particular very closely resemble techniques of preparation used in pharmacological recipes (e.g. grinding ingredients up in a mortar). In another example from Vaticanus gr. 1174, which includes a large compilation of mainly alchemical texts, four alchemical recipes (e.g. on making gold, or on how to polish adulterated silver) are followed by a pharmacological recipe for a salt ascribed to St Gregory the Theologian.

Byzantine medical manuscripts contain unedited recipes for salts which have been attributed to a variety of sacred figures, including St Luke, St Gregory the Theologian, and others. In this case, the recipe consists of eleven ingredients, including vegetal ones (e.g. Cretan hyssop, pennyroyal) and minerals (e.g. common salt), without, however, providing any indications for the recipe's use. Martelli has managed to find a similar recipe for a salt in Nicholas Myrepsos' *Dynameron*, which is recommended for improving vision and sharp-sightedness, thus giving us a new appreciation of pharmacological recipes found in alchemical collections. In fact, goldsmiths were often affected by eye conditions and early Byzantine medical sources (e.g. Oribasios, Aetios of Amida) report the use of eye salves to treat them, as Martelli aptly shows.

Koray Durak's study (Chapter 13) views medieval evidence on medicines from a highly interesting angle. He deals with diplomatic exchanges in the form of gifts, and, in particular, of simple and composite drugs carried out between Byzantium and its neighbour states. By exploring a large number of medical and non-medical sources from the Byzantine and the Islamicate worlds – letters, hagiographical and historiographical works, and works on trade and commerce – Durak shows how medicines could effectively

support diplomacy and extracts useful details about the high price and availability of certain spices, such as pepper, and composite drugs – for example, theriac.

Interestingly, Durak also points out the usefulness and practical value of drugs as healing substances for members of royal families or even for the animals of royal hunting establishments, such as hawks and falcons, compared to merely decorative gifts or 'objects of display', such as wall hangings or gold vessels and coins. For example, theriac was considered an invincible antidote against poisons; *moumie* (bitumen or asphalt/Ar. *mūmiyāʾ*), a rare panacea simple drug, is recommended for any kind of fractured limbs, whether human or animal; and a certain unnamed stone of triangular shape was used to treat dropsy. The latter is actually the only documented simple drug/ingredient sent from Byzantium to an Islamicate court: the vast majority of the evidence shows diplomatic gifts going in the other direction. Durak demonstrates that the study of diplomatic gifts can give us a better understanding of the multidimensional patterns in the introduction and dissemination of various rare substances from the Islamicate world to Byzantium and the wider Mediterranean, including vegetal (e.g. aloeswood, camphor, saffron), animal (e.g. ambergris, musk), and mineral ingredients (e.g. *mūmiyāʾ*).

In the case of compound drugs, the prestigious nature of theriac, along with the rarity of some of its ingredients, allowed it to enter the diplomatic arena. Apart from its role as a powerful antidote, theriac was also used prophylactically as a drug for the preservation of health. It was included with luxurious liturgical objects Ignatios, Patriarch of Constantinople, gave to Pope Adrian II in 871 and to the king of the Anglo-Saxons, Alfred the Great (r. 871–*c*.886). It was among the gifts sent by Byzantine emperors with embassies to both the West and the Islamicate world. It was also among the gifts Abbasid and Mamluk rulers sent to the Byzantines and other states, thus confirming its prominent status in various Mediterranean regions and showing that the same drugs or elements of *materia medica* often characterised the pharmaceutical practices of the entire Mediterranean.

This book is the best proof that advances in the study of medieval pharmacology cannot happen in isolation but only through careful interdisciplinary research, a true dialogue of equals among specialists in the Byzantine, Islamicate, Jewish, and Latin traditions. The fascinating insights afforded by the contributions included in this volume corroborate the links between these traditions and the complex ways in which knowledge was transferred though translations, annotations, and adaptations.

While the importance of the Islamicate medical and pharmacological tradition and how it became familiar to the rest of the medieval Mediterranean world is undeniable, the transfer of knowledge was not a one-way street. Nor did the development of the pharmacological tradition within each cultural sphere happen in isolation from medical practice or from other fields such as cooking, alchemy, and magic. All these factors contributed to the process that this collection of essays dynamically outlines and explores. Finally, this volume makes clear that to move forward, it is necessary to produce new and improved editions of texts – to study and comment on their origins, date, formation, sources, and use. Only then can we hope to do justice to this complex and fascinating aspect of medieval science, scholarship, and practice.

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