CHAPTER 3

Impossible Imports or Available Exotics?

A Study of Non-local Materia Medica

1 Introduction: the Exotic Ingredients of an Antidote

> A 'sacred' antidote of colocynth. This is the recipe: eryngium roots, polypody roots, balsam bark, Nepal cardamom, long pepper, spignel, ginger, gentian, savin, costus, spikenard, cassia, agaric, sweet flag, colocynth: 2 *drachmae* each. Rustyback fern, wall germander, camphor: 1.5 ounces each. Aloe, saffron, rhubarb, mastic, cinnamon, scammony, dodder, hazelwort, peony: 1 ounce each. You make all this into a powder; add sufficient skimmed honey.[1]

The above ingredient list, found on f. 90r of BAV pal. lat. 1088, names the substances (and their respective amounts) needed to prepare the *Antidotum gira deacoloquintidis*, 'A 'sacred' antidote of colocynth'. A fairly typical antidote, the scribe claims that it treats roughly two dozen different conditions, from head pains to gout—and seemingly everything in between. The scribe even asserts that, in addition to curing present infirmities, it will defend against future maladies: *non solum presentes infirmitates curat, sed futuras egritudines defendit*. While this catch-all approach to treatment raises important questions regarding the practicality and applicability of antidotes more generally, here, I shall explore the *materia medica* listed within the antidote. Like the large number of conditions it supposedly treats, the recipe also incorporates a host of different ingredients—twenty-eight to be specific. Nearly all of these ingredients are derived from plants; honey (*mel*) and agaric (*agarico*), a mushroom, are the only exceptions. Where did these twenty-six different plants grow? Could a

1 BAV pal. lat. 1088, f. 90r: *Antidotum gira deacoloquintidis… Recipit hęc eringio radices, polopodię radices, sirobalsamo, amomo, piper longum, meu, gingiber, gentiana, brathea, costo, spico, casia, agarico, agaro, interiones, ana dragmas II, scolopendria, camitrius, cafora, ana untia I et dimidia, aloę, croco, reopontico, masticę, cinamo, diagridiu, epithimo, asaro, pionia, ana unt I, omnia pulueraem facis, adde mel dispumatum quod sufficit*. Only the recipe's ingredient list is included in the opening quotation; the full entry begins with the conditions the antidote treats and ends with instructions for its preparation; for the entire recipe, see Appendix 2, entry 16.26.

Carolingian individual, such as Walahfrid Strabo tending his monastic garden, have produced or foraged for these ingredients?

Ten of the twenty-eight products could have been grown or produced in northern and western Europe; these include eight plants native to the region—eryngium (*eringio*), polypody (*polopodię*), spignel (*meu*), gentian (*gentiana*), savin (*brathea*), rustyback fern (*scolopendria*), dodder (*epithimo*), and hazelwort (*asarum*)—as well as honey (*mel*) and the fungus agaric (*agarico*). Five plant ingredients, including sweet flag (*agaro*), colocynth (*interiones*), wall germander (*camitrius*), scammony (*diagridiu*), and peony (*pionia*), are generally native to the southern and/or eastern Mediterranean. Although these are not endemic to the territories under Frankish control, they could have been growing in neighbouring regions or perhaps cultivated in protected gardens, though Walahfrid Strabo does not record them in his poem on his own 'little garden', nor are they included in the diagram of the medicinal garden within the *Plan of St Gall*.[2] The remaining thirteen ingredients, balsam bark (*sirobalsamo*), Nepal cardamom (*amomo*), long pepper (*piper longum*), ginger (*gingiber*), costus (*costo*), spikenard (*spica*), cassia (*casia*), camphor (*cafora*), aloe (*aloe*), saffron (*croco*), rhubarb (*reopontico*), mastic (*mastice*), and cinnamon (*cinamo*), are from much further afield. While this three-tiered classification system is relative and some of the more Mediterranean plants may have been growing within the Carolingian world (had sweet flag, for example, been introduced to western European wetlands and riversides by this period? Were peonies being cultivated in aristocratic and monastic gardens, even if they were unrecorded by Walahfrid or the *Plan*?), it reveals that the antidote relies on ingredients of varying levels of localness—or, conversely, exoticness.[3] Secondly, despite this spectrum in localness/exoticness, it is apparent that, if this antidote were used in practice, a significant number of the ingredients, such as pepper, ginger, and camphor, would have travelled very long distances to reach any part of the Frankish Empire.

Many recipes present a picture similar to the antidote above, combining a mixture of potentially local and definitely non-local products. John Riddle's analysis of one of the recipe collections involved in the present study, the first collection in cod. sang. 44 (pp. 228–55), provides a useful example.[4] Using Henry Sigerist's 1923 transcription, he identified 361 different ingredients in the

2 Voigts, 'Anglo-Saxon Plant Remedies'; Walahfrid Strabo, *Hortulus*; Horn and Born, *The Plan of St. Gall*, 181–3.

3 Voigts, 'Anglo-Saxon Plant Remedies', 261–3.

4 Riddle, 'The Introduction and Use of Eastern Drugs', 185–98.

recipes of this collection.[5] Some of these ingredients, such as fennel and rose, are also recorded in the texts relating to gardens mentioned in Chapter 2, whereas others, including camphor and ambergris, appear to have been unknown to classical physicians. After eliminating ingredients used largely as emollients, flavouring agents, or solvents, such as honey, wine, and wax, Riddle delineates the twenty most frequently recorded ingredients: aloe (*aloes*), gum ammoniac (*ammonicum*), Nepal cardamom (*amomum*), parsley or celery seeds (*apium semen*), cinnamon (*cassia*), cumin (*ciminum*), colophony resin (*colofonia*), saffron (*crocus*), fenugreek (*fenugrecum*), frankincense (*libanus*), flax (*linum*), mastic (*mastice*), myrrh (*murra*), parsley (*petroselinum*), pitch (*picea*), pepper (*piper*), scammony (*scamonia*), storax (*storace*), terebinth (*terebintina*), and ginger (*zinziber*).[6] While seven of these ingredients could have grown locally, the remaining thirteen, nearly two-thirds of the ingredients in question, are not native to northern and western Europe. Like the opening antidote, there is a range of exoticness among the non-local products; a number of these ingredients, such as scammony and terebinth, can be found in the southern and eastern Mediterranean, though others, including cinnamon, pepper, and ginger, are grown in southeast Asia. Is it probable (or even possible) that such non-local ingredients were available in the Carolingian world? Is there evidence that reflects the movement and trade of these particular spices, gums, resins, and woods? Or are there signs suggesting that the Franks, like Cynehard, encountered difficulties in obtaining exotic ingredients?

This chapter will explore the question of practicality through the lens of non-local *materia medica*. After first reviewing evidence for the movement of exotic ingredients through gift exchange, trade, and even illicit means, I return to Riddle's study. Riddle and others, such as Michael McCormick, have highlighted the appearance of camphor, ambergris, and several other substances from southeast Asia in early medieval recipes. They argue that their use as *materia medica* in this period reflects the arrival of new pharmaceutical knowledge. Using my significantly larger sample of recipes, I expand on their work, identifying not only additional examples of camphor and ambergris, but also the occurrence of a cluster of new products that, within the recipe literature, appear to have travelled together as a distinct unit of information. By analysing the manuscript contexts in which this ingredient cluster is located and examining additional evidence concerning the trade of exotic substances, I present potential routes for the dissemination and spread of this pharmaceutical

5 *Studien und Texte*, ed. Sigerist, 78–99.

6 Riddle, 'The Introduction and Use of Eastern Drugs', 187–9.

information and suggest that it was, in fact, linked to the movement of the substances themselves. I argue that recipes incorporating such ingredients offer a window into dynamic centres of manuscript production where scribes integrated 'cutting edge' information and updated their recipe collections with new pharmaceutical knowledge. It must be remembered, however, that these non-local products would have been available only sporadically, in limited quantities, and at great expense. Recipes including these substances were not, therefore, practical in that they involved readily available ingredients that suited local conditions, but their inclusion reflects a scribal environment actively engaging with new ingredients and information. The findings of this case study suggest that such recipes were intended to be used if and when the necessary ingredients could be obtained.

2 Evidence for the Movement of Non-local *Materia Medica*

The example of Cynehard presented in Chapter 2 indicates that access to non-local ingredients was a major challenge in some parts of northwest Europe in the early Middle Ages. In this case, Cynehard, bishop of Winchester (d. *c*. 778), asked Lull, archbishop of Mainz (d. 786), to send some of the more exotic *materia medica* listed in recipes since many of these products were unavailable (and even unknown) in early medieval England.[7] The fact that he asked his Frankish colleague for help in supplying these ingredients does, however, suggest that the Carolingian world had better access to these types of ingredients—or at least that Cynehard thought this was the case. Surviving epistolary evidence supports this idea: as noted in Chapter 2, Lull, acting with two other English missionaries, Denehard and Burchard, sent a small selection of *exotica* as a gift to Abbess Cuneburg in England, and, as discussed below, Lull's predecessor as archbishop of Mainz, Boniface (*c*. 675–754), is recorded as having received similar gifts from Rome.[8] Perhaps Cynehard knew of—and wanted to partake in—this network of gift-giving among the ecclesiastical elite.

The early medieval Insular world provides another example that highlights the difficulty of procuring these types of non-local substances. Willibald (*c*. 700–89), an English missionary and later bishop of Eichstätt, travelled to the Holy Land in the early eighth century. In the *Hodoeporicon*, the record of his life

7 Wallis, *Medieval Medicine*, 110–11; 'Epistula 114', in *Die Briefe des heiligen Bonifatius und Lullus*, ed. Tangl, 247.

8 'Epistula 49', in *Die Briefe des heiligen Bonifatius und Lullus*, ed. Tangl, 78–80; 'Epistula 62', 127–8.

that, according to the preface, he dictated to the nun Huneberc, he describes smuggling balsam out of Tyre by concealing it inside a reed plugged with petroleum hidden inside a calabash.[9] Willibald and his companions were arrested and their baggage examined, but they were eventually released when the search turned up nothing more than a calabash smelling of petroleum.[10] Had the balsam been discovered, Willibald claims that the punishment for smuggling out such a valuable product was death. If the story is true, it reveals not only the high price and difficulty of obtaining balsam, but also its importance to Willibald: why else would he have risked his life for this substance? While it is not recorded if this balsam was intended for medical, perfuming, or incense purposes (or a combination of these functions), balsam (*balsamum*), as well as its sap (*opobalsamum*), bark (*xilobalsamum*), and fruits (*carpobalsamum*), is recorded with some frequency in recipes.[11]

Returning to the continent, there are a number of non-medical texts that record the exchange of some of the exotic substances listed in recipes within elite networks. While the written sources introduce a bias towards the literate elite, the expensive nature of these items would suggest that any circulation was limited to individuals operating within well-endowed ecclesiastical, aristocratic, and royal networks. As noted above, epistolary evidence indicates that Boniface, archbishop of Mainz, was sent spices and resins as gifts from Roman clergy on three occasions. In one case, Cardinal Deacon Gemmulus sent four ounces of cinnamon, four ounces of costus, two pounds of pepper, and one pound of cozumber (a derivative of storax detailed below).[12] While it is unknown how long Boniface's supplies would have lasted, perhaps the movement of such products from Rome into the missionaries' territory helps to explain Lull's access to frankincense, pepper, and cinnamon (his gifts to Cuneburg) as well as Cynehard's letter to Lull requesting *exotica*. Did he know that such products had been sent to Mainz at an earlier date? Even if Boniface's gifts were no longer present, it is possible that news of the (past) existence

9 Huneberc, *Vitae Willibaldi et Wynnebaldi*, ed. O. Holder-Egger, *MGH SS* 14.1 (Hanover: Hahn, 1887), 80–117; Huneberc, *Hodoeporicon*, in *The Anglo-Saxon Missionaries in Germany*, trans. Charles Hugh Talbot (London: Sheed and Ward, 1954), 170. On Huneberc, see Bernhard Bischoff, 'Wer ist die Nonne von Heidenheim?' *Studien und Mitteilungen zur Geschichte des Benediktinerordens und seiner Zweige* 49 (1931): 387–8; Peter Dronke, *Women Writers of the Middle Ages: A Critical Study of Texts from Perpetua (†203) to Marguerite Porete (†1310)* (Cambridge: Cambridge University Press, 1984), 1–35.

10 Huneberc, *Hodoeporicon*, 170.

11 Cf. entries for these products in Carmélia Opsomer, *Index de la pharmacopée du I^er^ au X^e^ siècle*, 2 vols. (Hildesheim: Olms-Weidmann, 1989).

12 'Epistula 62', in *Die Briefe des heiligen Bonifatius und Lullus*, ed. Tangl, 127–8.

of these substances in Mainz had spread and/or that the networks between Rome and Frankish ecclesiastical centres resulted in the sporadic distribution of these ingredients in the Rhineland.

A letter in the *Collectio sangallensis* from the second half of the ninth century suggests that access to these types of non-local substances increased in the years following Gemmulus' gifts to Boniface. In this case, the letter records that a bishop, probably Salomon II of Constance, sent Louis the German exotic goods, including fine textiles, an ivory comb, and foreign fruits and spices, in an attempt to appease him.[13] Although there is no reference to medicine, many of the fruits, spices, gums, and resins listed in the letter, such as dates, figs, pomegranates, cinnamon, galangal, pepper, cloves, and mastic, appear as ingredients in medical recipes. Regardless, this text suggests that ecclesiastical and aristocratic elites may have had access to a wider range of foreign products by the middle of the ninth century: Salomon's gifts contained a much more diverse spread.

However, predating Salomon's peace offerings to Louis the German, there is also evidence for an even richer collection of eastern products entering the Latin west. First described by the *Royal Frankish Annals* and then later mentioned by Notker the Stammerer (*c.* 840–912), Harun al-Rashid, the Abbasid caliph (r. 786–809), sent gifts to Charlemagne in 802 and 807.[14] The largesse displayed by Harun al-Rashid was extraordinary, a clear signal of his wealth and power; indeed, among the most remarkable of his gifts was an elephant, the famous Abul Abbas. Other products named include luxurious linens and silks, a water clock, two enormous brass candlesticks, and, most importantly for this study, 'perfumes and ointments and balsam' (*odores atque unguenta et balsamum*).[15] While the *Royal Frankish Annals* do not describe the ingredients of the perfumes and ointments, it is highly probable that they were composed

13 *Collectio Sangallensis*, ed. Karl Zeumer, *MGH Formulae* (Hanover: Hahn, 1886), 29, at p. 415, lines 15–19: *Palliolum coloris prasini et aliud polimitum, spatulas palmarum cum suis fructibus, cynamomi, calangani, cariofili, masticis et piperis fasciculum, Caricas ficorum, malogranata, pectinem elefantinum, vermiculos, cicadas, aves psitacos, merulam albam et longissimam spinam de pisce marino*; Michael McCormick, *Origins of the European Economy: Communications and Commerce, A.D. 300–900* (Cambridge, 2001), 710.

14 *Annales regni Francorum inde ab a. 741 usque ad a. 829 qui dicuntur Annales laurissenses maiores et Einhardi*, ed. Friedrich Kurze, *MGH SS Rer. Germ.* 6 (Hanover: Hahn, 1895). Abul Abbas is first mentioned in the entry for 801 (in transit); for the arrival of these gifts in 802, see p. 117; for 807, see pp. 122–5. Notker, *Gesta Karoli Magni Imperatoris*, ed. Hans F. Haefele. *MGH SS Rer. Germ. N. S.* 12. (Berlin: Weidmann, 1959), 62–5.

15 *Annales regni Francorum*, ed. Kurze, 123–4.

of eastern resins, gums, and spices, including, perhaps, many of the individual substances named in the examples above.

Although these records do not directly link the non-local products involved in elite gift-giving to medical uses, the connection between exotic substances and medicine is more explicit in other sources.[16] The annual purchase of honey and spices, *pigmenta*, for the treatment of sick monks recorded in the *Gesta* of the Abbey of Fontenelle offers one such example. The abbot Ansegisus (*c*. 770-*c*. 833) allocated a pound of silver per year for this purpose.[17] The use of the term *pigmenta* is somewhat ambiguous as the word could refer to a range of products including paints, pigments, and their composite parts as well as spices and medicaments.[18] In this case, it makes sense to read *pigmenta* as spices due to the direct link with medical practice; these substances, however, may have been intended for multiple purposes given that medical recipes share many ingredients in common with paints and pigments.[19] The particular products the abbot intended to buy remains unknown.

A final example offers more specificity while continuing to blur the lines between substances intended for medicinal, artisanal, and ecclesiastical uses: a ninth-century list from Corbie details various items the monks intended to buy at the market in Cambrai—if they had sufficient funds (*si pretium habemus*).[20] A diverse range of products are named, from fairly humble goods, such as wax, to imported spices and resins, including pepper and mastic. While many of these items, such as bandages and leeches, were clearly destined for medical

16 The ointments recorded by the *Royal Frankish Annals* for the year 807 present a partial exception: while their purpose is not stated, it seems likely that they were intended for medical uses.

17 *Chronique des Abbés de Fontenelle* (*Saint-Wandrille*), ed. and trans. Pascal Pradié (Paris: Belles Lettres, 1999), 13.8, at p. 188: *Ad infirmorum curam mel et pigmenta libram I*. See also McCormick, *Origins of the European Economy*, 709.

18 Jan Frederik Niermeyer, *Mediae Latinitatis Lexicon Minus*, 2nd ed. (Leiden: Brill, 2002), 796.

19 For more on ink and paint production, see Dominique Cardon, *Natural Dyes: Sources, Tradition, Technology and Science* (London: Archetype, 2007) and, for the early medieval context, McKitterick, *The Carolingians and the Written Word*, 241–6 and Adriano Caffaro, *Scrivere in oro: Ricettari medievali d'arte e artigianato* (*secoli IX–XI*). *Codici di Lucca e Ivrea* (Naples: Liguori, 2003). For the multipurpose nature of these substances more generally, see also Hilary Becker, 'Pigment nomenclature in the ancient Near East, Greece, and Rome', *Archaeological and Anthropological Sciences* 14 (2022), https://doi.org/10.1007/s12520-021-01394-1; and Nicholas Everett, 'The Manuscript Evidence for Pharmacy in the Early Middle Ages', in *Writing the Early Medieval West*, ed. Elina Screen and Charles West (Cambridge: Cambridge University Press, 2018), 115–30.

20 *Polyptyque de l'abbé Irminon ou dénombrement des manses, des serfs et des revenus de l'abbaye de Saint-Germain-des-Prés sous le règne de Charlemagne*, ed. Benjamin Edme Charles Guérard, 2 vols. (Paris: Imprimerie royale, 1844), vol. 2, 336.

purposes, others could have served a variety functions. The mineral products named, such as sulphur and orpiment, are often associated with the production of inks and paints but are also listed as ingredients in recipes; likewise, many of the exotic spices, resins, roots, and other plant products could have been used to prepare incense or medications—or the incense could have been used for medical purposes, as it, too, appears as an ingredient in medical recipes.[21] Overall, nearly all of the goods recorded in this list could have been used in a pharmaceutical context, thereby offering a glimpse into the range of non-local *materia medica* that was being commercially traded—or at least that the monks expected to be available for purchase—at Cambrai in the ninth century. Intriguingly, the quantities requested for each of the exotic products vary significantly: some substances, such as pepper, were to be bought in bulk (120 pounds), whereas much smaller amounts were named for others, including galangal, spikenard, and cozumber (ten pounds for galangal, five for both spikenard and cozumber). While this could reflect the volume of each product needed by the monastic community, it may also relate to the prices of these individual substances and/or indicate that some products were circulating in smaller quantities.

Before examining non-local *materia medica* in recipes, it is important to consider what these records suggest about the potential availability of exotic ingredients in the Carolingian world. First, given that relatively few non-medical sources document these types of substances, it is likely that access to such products, whether acquired through trade, gift exchange, or even illicit means, would have been extremely limited. The handful of references reviewed above do, however, indicate that at least a number of the many non-local ingredients listed in recipes *did* appear in the Frankish Empire during this period.

Nonetheless, although these items made appearances, the length of time they would have lasted, in terms of both quantity and quality, also deserves consideration. The texts suggest that exotic products did not typically move in large volumes: take the ounces and pounds recorded in the letter to Boniface or the five pounds of spikenard and cozumber in Corbie's 'shopping list'. The large amount of pepper named in this source is an exception, but even 120 Carolingian pounds, roughly equivalent to forty kilograms today, is not a vast sum, depending on how long it was intended to last and/or how widely it was

21 For example, *thymiama* appears as an ingredient in *Ad cadiuo homine* of BAV reg. lat. 1143 (f. 109r); see Appendix 2, entry 18.3. For more on the topic of incense in medicine, see Burridge, 'Incense in Medicine'. Also noted by Henry Sigerist in passing; see Henry E. Sigerist, '"The Sphere of Life and Death" in Early Medieval Manuscripts', *Bulletin of the History of Medicine* 11, no. 3 (1942), 292–303, at p. 296.

expected to be distributed.[22] While the record of gift-giving among elites suggests only the sporadic arrival of these items in the west, the 'shopping list' from Corbie and the annual supply of *pigmenta* documented by the *Gesta* of the Abbey of Fontenelle point to more regular trade in spices. Moreover, as noted above, these records only present evidence of elite communities—royal, aristocratic, and ecclesiastical—partaking in the giving, receiving, and buying of exotic substances. The presence of *exotica* at Cambrai's market, however, reveals that individuals outside of or on the peripheries of these elite networks may have been able to acquire such products, too. Yet, even taking the biases of the sources into account, it seems unlikely that these non-local substances circulated widely among the majority of the population given their expense and relative rarity.

With this review of the general movement and potential availability of a selection of foreign products, let us examine their appearance as ingredients in recipes.

3 Exotic *Materia Medica*

Defining what constitutes 'non-local' presents a number of challenges.[23] At the most fundamental level, given the size of the Frankish Empire, the variety of (micro-)climates within its borders, and its influence into neighbouring regions, where does 'local' end and 'non-local' begin?[24] A monk in St Gall

22 Jean Lestocquoy gives fifteen Carolingian pounds as roughly equivalent to five kilograms; see Jean Lestocquoy, 'Épices, médecine et abbayes', in *Études mérovingiennes. Actes des journées de Poitiers, 1er-3 mai 1952* (Paris: A. et J. Picard, 1953), 179–86, at pp. 184–5. On pepper's comparatively 'mundane' nature among *exotica*, see, for example, Kasper Grønland Evers' study of ancient trade between the Indian subcontinent and Roman Empire, *Worlds Apart Trading Together: The Organisation of Long-Distance Trade Between Rome and India in Antiquity* (Oxford: Archaeopress, 2017), 72–4. Likewise, on pepper's status as a 'necessary luxury' (though focused on the later Middle Ages), see Paul Freedman, 'Spices and Late-Medieval European Ideas of Scarcity and Value', *Speculum* 80, no. 4 (2005): 1209–27, https://doi.org/10.1017/S0038713400001391. See also Zohar Amar and Efraim Lev, *Arabian Drugs in Early Medieval Mediterranean Medicine* (Edinburgh: Edinburgh University Press, 2017).

23 On one approach to defining gradations of localness, see Bernhard Zeller, Charles West, Francesca Tinti, Marco Stoffella, Nicolas Schroeder, Carine van Rhijn, Steffen Patzold, Thomas Kohl, Wendy Davies, and Miriam Czock, *Neighbours and Strangers: Local Societies in Early Medieval Europe* (Manchester: Manchester University Press, 2020), xiv-xv.

24 As noted in Chapter 1, Linda Ehrsam Voigts has also considered the potential impact of past climatic conditions on the cultivation of medicinal plants in the Insular world, pointing to another important dimension to take into account when investigating this

would have had relatively easy access to alpine plants but perhaps encountered difficulties in procuring Mediterranean products. On the other hand, an aristocratic household in Septimania might have experienced the opposite situation. While this points to the difficulty of assessing ease of access within the Carolingian world, what about products that would have been imported from outside of the Empire? Would goods sent from the eastern Mediterranean be considered exotic beyond the Alps but more readily available in Rome, Ravenna, and sites that maintained a greater level of contact with the Byzantine world? Even non-local substances, therefore, are subject to varying degrees of accessibility and exoticness. That being said, non-local *materia medica* that were native to the lands beyond the Mediterranean basin, such as southeast Asia, would have travelled extremely long distances—and required significant financial backing—to reach any part of the Carolingian world. These types of substances, including a number of the gums and resins already noted, are unambiguously non-local. This chapter therefore concentrates on *materia medica* that would have been grown or collected far beyond north-western Europe and the Mediterranean region, such as animal products from the Himalayas and spices, resins, and woods from the Maluku Islands.

3.1 *What's in a Name? The Challenge of Identifying Ingredients and Their Origins*

When attempting to understand the relative localness of *materia medica*, geographic descriptors attached to an ingredient's name may seem to provide especially valuable insights. Attic honey, African snails, and Illyrian irises—all recorded as ingredients in recipes—each link a product to a particular location, but do they really indicate their source? It may be useful to consider modern parallels: French fries are not inherently French, nor are Belgian waffles necessarily Belgian, though these geographic labels may provide insights into consumers' perceptions. In some cases, such as *fenugrecum* or *reopontico* (terms for fenugreek and rhubarb, respectively), the geographic descriptor appears to have become integrated into the name of the product itself. On the other hand, as Hilary Becker has noted with respect to the terminology used for pigments in ancient sources, such labels could be used to differentiate between 'discrete varieties', reflecting whence these products originated historically rather than at the time the authors were writing.[25] Moreover, Becker cautions that this nomenclature may not convey the substances' actual points

topic. Voigts, 'Anglo-Saxon Plant Remedies', 261–3. See also Pilsworth, *Healthcare in Early Medieval Northern Italy*, 80.

25 Becker, 'Pigment nomenclature in the ancient Near East, Greece, and Rome'.

of origin and could instead document another location along the journey to their final destination.[26] Given these ambiguities, the ingredients selected for analysis in the present chapter do not contain geographic descriptors as standard elements within their names.

More fundamentally, however, the identities of many ingredients continue to be debated given the challenges posed by translating and interpreting ancient and medieval terms for *materia medica*.[27] Consider, for example, Jerry Stannard's thorough investigation into 'the plant called Moly' that unpacks the many varied modern identifications (at least a dozen) that have been proposed for the plant(s) in question and the convoluted textual puzzle presented by the Greek and Latin sources involved in the 'moly tradition'.[28] Stannard's detective work revealed not only that 'many of the attempts to identify moly have gone astray', but also that 'in the Greek tradition, moly designates at least three different plants', which resulted in further confusions in Latin translations and the descendants of these texts.[29] Stannard found that one of the major turning points in this nomenclatural enigma stemmed from a misinterpretation of a section of Dioscorides' *De materia medica*: just before describing moly, which, in Dioscorides' case, most likely refers to an *Allium* species, the text addresses wild rue.[30] Dioscorides reports a resemblance between the two plants based on their shared colours and explains that, as a result, the Cappadocians also call the former 'moly'.[31] This mention of synonymy appears to have confused later writers, who then interpreted moly as referring to both an *Allium* and wild rue; simultaneously, some authors conflated moly with plants with similar-sounding names (e.g., Galen's 'mylē'), and the range of synonyms for each these plants added further layers of complexity.[32] Becker, too, highlights the importance of regional name variation, while the multiple linguistic traditions on which medical texts drew introduced additional variables.[33]

Yet, as Gavin Hardy and Laurence Totelin note, 'despite all these difficulties, scholars since Antiquity have attempted to identify plants named in 'older' authorities', and, following the development of Linnaean binomial nomenclature, there has been a strong emphasis on species-specific identification.[34]

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26 Ibid.
27 Gavin Hardy and Laurence Totelin, *Ancient Botany* (London: Routledge, 2016), 93–104.
28 Jerry Stannard, 'The Plant Called Moly', *Osiris* 14 (1962): 254–307.
29 Stannard, 'The Plant Called Moly', 254.
30 Stannard, 'The Plant Called Moly', 259–63; Dioscorides, *De materia medica*, 3.46–7.
31 Dioscorides, *De materia medica*, 3.46–7.
32 Stannard, 'The Plant Called Moly', 263–6.
33 Becker, 'Pigment nomenclature in the ancient Near East, Greece, and Rome'.
34 Hardy and Totelin, *Ancient Botany*, 94–5.

However, given that the terms for *materia medica* were unstable and variable (across languages, time, and space), it is often necessary to take a broader and more cautious approach to the identification of ingredients. In fact, it must be remembered that multiple, distinct species can be used to produce a single ingredient. The spice known as 'cinnamon', for example, can be harvested from several different species within the *Cinnamomum* genus, including *C. cassia*, *C. burmannii*, *C. loureiroi*, and *C. verum*.[35] While the early medieval Latin terms *cinnamomum* and *cassia* (and their orthographic variants) are each commonly identified with only one species, it seems more appropriate to classify both as plants potentially related to all those that are today considered to represent 'cinnamon'. Although it may appear problematic that the various species belonging to the *Cinnamomum* genus are native to a vast region, from Sri Lanka to China to Indonesia, it is evident that, regardless of which species is concerned, the tree would have grown in south, east, or southeast Asia and, for the purposes of this study, fall into the category of unambiguously non-local ingredients.[36] The following case study therefore focuses on a select group of ingredients whose origins were, without question, extremely far from Francia.

3.2 *From Ambergris to Zedoary*

The aforementioned work of John Riddle and Michael McCormick offers a useful entry point into an investigation of non-local *materia medica* unrecorded in classical and late antique medical writings. In the first recipe collection of cod. sang. 44 (pp. 228–55), Riddle highlights the appearance of two new products: camphor, an aromatic extract from the wood of the camphor laurel, and ambergris, a pungent substance produced in the digestive tract of sperm whales.[37] In Riddle's analysis of recipes from several manuscripts beyond this study's manuscript sample, he also notes galangal and zedoary, both

35 Pei Chen, Jianghao Sun, and Paul Ford, 'Differentiation of the Four Major Species of Cinnamons (*C. burmannii*, *C. verum*, *C. cassia*, and *C. loureiroi*) Using a Flow Injection Mass Spectrometric (FIMS) Fingerprinting Method', *Journal of Agricultural and Food Chemistry* 62, no. 12 (2014): 2516–21, https://doi.org/10.1021/jf40558oc.

36 Chen, Sun, and Ford, 'Differentiation of the Four Major Species of Cinnamons'. For a helpful visualisation, see Figure 9 in Weiwei Wang, Khanh Trung Kien Nguyen, Chunguang Zhao, and Hsiao-Chun Hung, 'Earliest curry in Southeast Asia and the global spice trade 2000 years ago'. *Science Advances* 9, no. 29 (2023): https://doi.org/10.1126/sciadv.adh5517.

37 Riddle, 'The Introduction and Use of Eastern Drugs', 190–1. See also Bruno Laurioux, 'Parfums d'Orient. La science des épices au Moyen Âge', in *Parfums et odeurs au Moyen Âge. Science, usage, symboles*, ed. Agostino Paravicini Bagliani (Florence: SISMEL Edizioni del Galluzzo, 2015), 61–87.

rhizomes in the ginger family, as similarly newly recorded *materia medica*.[38] McCormick comments on the appearance of *azarum*, camphor, and ambergris in cod. sang. 44 and mentions further examples of camphor in the *Lorscher Arzneibuch*; Glasgow, University Library, Hunter 96; and a section of cod. sang. 217 that is not part of the sample of recipes involved in this study.[39] Both Riddle and McCormick argue that the appearances of camphor, ambergris, and the other ingredients they each identified in the recipe literature reflect the arrival of these products in the Latin west during this period.[40] While it is impossible to prove this without further evidence, such as archaeological finds or additional textual sources (e.g., the record of gift exchanges noted above) that directly confirm the importation of these substances, the linked movement of knowledge and goods will be reconsidered below. The names of these substances—derived, in both medieval Latin and modern English, from

38 Riddle's examples of zedoary and galangal (which he terms 'galingale') come from London, British Library, Harley MS 585; Glasgow, University Library, Hunter 96 (*olim* T.4.13); and Karlsruhe, Badische Landesbibliothek, Aug. perg. 120. These findings are based on his assessment of the published transcriptions of recipe collections in *Studien und Texte*, ed. Sigerist, and Grattan and Singer, *Anglo-Saxon Magic and Medicine* (note: the text of the recipe collection analysed in London, BL Harley MS 585, the *Lacnunga*, is written not in Latin but in Old English). It must also be noted that there is some debate regarding the timing of zedoary's arrival in the west: Heinrich Zörnig claims that it appears in the works of Paul of Aegina and Aetius of Amida, but Riddle suggests that this is a later interpolation. See Riddle, 'The Introduction and Use of Eastern Drugs', 191–2 and Heinrich Zörnig, *Arzneidrogen als Nachschlagebuch für den Gebrauch der Apotheker, Ärzte, Veterinärärzte, Drogisten und Studierenden der Pharmazie*, 2 vols. (Leipzig: Klinkhardt, 1909), vol. 1, 558.

39 McCormick, *Origins of the European Economy*, 714, nn. 83–4. For the manuscripts in question, see Bamberg, Staatsbibliothek, Msc. Med. 1 and Glasgow, UL Hunter 96. Although McCormick suggests that *azarum* was introduced to western Europe during the Carolingian period, I suggest that *azarum* represents an alternative spelling of *asarum*, hazelwort, a plant native to Europe and known in Antiquity. This seems to make more sense in the contexts in which I have seen the term. In the recipes containing *azarum* in cod. sang. 44 (all of which appear within a few folia of each other in one of the manuscript's recipe collections: pp. 345, 351–3), the other ingredients are all locally available products, including beer, a substance highlighted in Chapter 4 in relation to adaptations made to suit local conditions. In one of these recipes, the juice of the ingredient in question (*azari sucum*) is recommended, strengthening an identification with hazelwort rather than a resin. For examples, see Appendix 2, entries 5.18.3 and 5.22.

40 McCormick, *Origins of the European Economy*, 714–15; Riddle, 'The Introduction and Use of Eastern Drugs', 190–6; Riddle also highlights zedoary and galangal as new ingredients, though his references to these substances appear in other manuscripts, including Glasgow, UL Hunter 96 and London, BL Harley MS 585. On camphor and ambergris, see also Amar and Lev, *Arabian Drugs in Early Medieval Mediterranean Medicine*, and especially Chapter 3, "Arabian' Substances', 129–227 (camphor is discussed in detail on pp. 144–8, and ambergris on pp. 148–52).

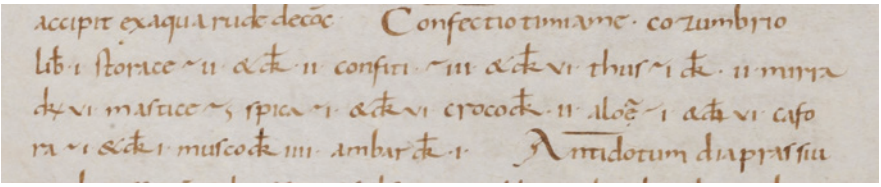

FIGURE 3 *Confectio timiame* in St. Gallen, Stiftsbibliothek, cod. sang. 44 (p. 247), an early medieval composite manuscript, the second half of which contains medical texts and was written in northern Italy in the ninth century (https://www.e-codices.unifr.ch/de/csg/0044/247)

Arabic terms, though often originally stemming from other languages such as Malay—do point to their eastern origins and immediately support the idea that Islamicate trade networks were central to their westward diffusion.[41] Are there additional examples of ambergris, camphor, galangal, or zedoary found in within the manuscripts under analysis? Is there evidence to suggest that knowledge of these products spread within the Frankish Empire?

3.3 *The* Confectio Timiame*: Camphor, Ambergris, and Other Non-local* Materia Medica

Despite highlighting the newness of camphor and ambergris and their appearances in the same manuscript, cod. sang. 44, neither Riddle nor McCormick point out that these two products actually appear in the very same recipe in this manuscript, the *Confectio timiame*, as shown in Figure 3 and detailed below:

> A preparation of incense. Cozumber, 1 pound; storax, 2 ounces and 2 *denarii*; confita, 3 ounces and 6 *denarii*; frankincense, 1 ounce and 2 *denarii*; myrrh, 6 *denarii*; mastic, ½ ounce; spikenard, 1 ounce and 6 *denarii*; saffron, 2 *denarii*; agarwood, 1 ounce and 6 *denarii*; camphor, 1 ounce and 1 *denarius*; musk, 4 *denarii*; ambergris, 1 *denarius*.[42]

41 Camphor, for example, can be traced to the Malay *kāpūr*; Hūšang Aʿlam, 'Camphor', in *Encyclopædia Iranica*, edited by Ahmad Ashraf, Nicholas Sims-Williams, Mahnaz Moazami, Mohsen Ashtiany, Christopher J. Brunner, Manouchehr Kasheff, and Habib Borjian. Vol. 4/7 (1990): 743–7, https://iranicaonline.org/articles/camphor-npers; Riddle, 'The Introduction and Use of Eastern Drugs', 190–2. On camphor, see also Amar and Lev, *Arabian Drugs in Early Medieval Mediterranean Medicine*, 144–8.

42 Cod. sang. 44, p. 247: *Confectio timiame. Cozumbrio lib I, storace ~ II et dr II, confiti ~ III et dr VI, thus ~ I dr II, mirra dr VI, mastice ~ s, spica ~ I et dr VI, croco dr II, aloa ~ I et dr VI, cafora ~ I et dr I, musco dr IIII, ambar dr I*. See Appendix 2, entry 5.7.

Although this is a recipe for incense and does not include a list of ailments it intends to treat, its appearance within a recipe collection and listing of many ingredients that are frequently named in treatments suggest that it was intended for use in a medical context. Its simple presentation is not unlike many of the recipes for composite ingredients, such as oxymel (a mixture of vinegar, honey, and sometimes additional components) or mixed oils (rose oil (*oleo roseo*), cedar oil (*oleo cedrinum*), myrtle oil (*oleo mirtino*), and so on), that would have required advance preparation before they could have been used in recipes. Finally, as noted above, incense appears as an ingredient in recipes, confirming that it could have been used for both pharmaceutical and liturgical functions.[43]

A review of this recipe's twelve ingredients, cozumber (*cozumbrio*), storax (*storace*), confita (*confiti*), frankincense (*thus*), myrrh (*mirra*), mastic (*mastice*), spikenard (*spica*), saffron (*croco*), agarwood (*aloa*), camphor (*cafora*), musk (*musco*), and ambergris (*ambar*), reveals its total reliance on non-local products: not a single ingredient is native to northern and/or western Europe. Most of the ingredients are aromatic gums and resins, although ambergris and musk stand out as animal-based substances.

While Riddle and McCormick emphasised the newness of only ambergris and camphor, the appearance of three other ingredients in this incense recipe, cozumber, confita, and musk, is similarly noteworthy. McCormick does make a passing reference to cozumber, classifying it as an 'exotic substance' and noting that its 'derivation … is unclear'; confita, on the other hand, is mentioned by neither author.[44] According to Carmélia Opsomer's *Index de la pharmacopée du I^er^ au X^e^ siècle*, these ingredients do not occur in classical sources, though both terms are listed in later medical texts, such as the *Alphita*, a thirteenth-century medico-botanical glossary.[45] This text records that the two substances are related to each other (*cozimbrum* is described as *fex confite*) and represent derivatives of storax, an identification which fits within the context of an incense recipe.[46] In Alejandro García González' commentary on this glossary,

43 Burridge, 'Incense in medicine'; Henry E. Sigerist, '"The Sphere of Life and Death" in Early Medieval Manuscripts', 296.

44 McCormick, *Origins of the European Economy*, 708.

45 *Cozimbrium* is recorded six times in *Index de la pharmacopée du I^er^ au X^e^ siècle* (see Opsomer, *Index de la pharmacopée*, vol. 1, 222) in non-classical texts, while there is no entry for *confita*. *Alphita*, ed. Alejandro García González (Florence: SISMEL Edizioni del Galluzzo, 2007). Sigerist describes cozumber as a 'precious kind of aromatic gum' and notes that confita is usually found 'in connection with gums', although he was 'not sure what it actually is'; Sigerist, '"The Sphere of Life and Death" in Early Medieval Manuscripts', 296.

46 *Alphita*, ed. García González: *confita*, entry C4 (at p. 174), and *cozimbrum*, C114 (at p. 184).

he identifies 'confita' as a 'deformation of the Greek *γομφίτης*', thereby linking it more specifically to a gum resin derived from storax, *Styrax officinalis*.[47] The linguistic origins of cozumber, however, remain uncertain (though the *Alphita*'s entry for storax again refers to this substance as a derivative product).[48]

Excepting medical contexts, I have seen cozumber mentioned in only two other contemporary sources, both addressed at the beginning of this chapter: it is recorded in a) the letter to Boniface as one of the gifts sent by Gemmulus, and b) the Corbie 'shopping list' as one of the *pigmenta* the monks were expected to buy at the Cambrai market.[49] The lack of cozumber and confita in classical texts, their appearance in early medieval recipes and, in the case of cozumber, two non-medical records, as well as their continued presence in later medical writings strongly support the argument that these two products, at least in these specific forms, first arrived in western Europe in the eighth century. The documentation of cozumber in non-medical sources, moreover, adds weight to the argument put forward by Riddle and McCormick that both the substances themselves *and* information about them arrived in the Frankish world during this period. While it should not be assumed that cozumber is representative of all of the newly recorded ingredients, the Corbie list also includes galangal and zedoary.[50] The appearance of multiple previously unrecorded non-local substances in this context suggests that these products, and quite possibly other *exotica*, were circulating in the Latin west at this time—if only in small quantities and at great expense. Indeed, since the abbot's instructions only represent a *pigmenta* 'wish list', it remains unknown what substances were *actually* available for purchase at the Cambrai market; that the Corbie monks *expected* to be able to buy these products, however, is significant.

While galangal and zedoary are both named as new ingredients by Riddle and McCormick, and while additional examples can be found in the present recipe sample, neither appear in the *Confectio timiame*.[51] Let us return to this

47 Ibid, 400–1: '*Confita* < deformación del gr. γομφίτης … designa la gomorresina del 'estoraque', una planta identificada con la estiracácea *Styrax officinalis L.*'

48 Ibid, 403, 551. For the entry on storax, see S46 (at pp. 290–1).

49 'Epistula 62', in *Die Briefe des heiligen Bonifatius und Lullus*, ed. Tangl, 127–8; *Polyptyque de l'abbé Irminon*, ed. Guérard, vol. 2, 336.

50 *Polyptyque de l'abbé Irminon*, ed. Guérard, vol. 2, 336.

51 Galangal is listed as ingredient twice in BnF lat. 11218: first in the *Pocio mirabilis contra omnes infirmitates* (f. 99r) and secondly in a recipe for which the title has faded and is no longer legible (f. 124v, following the *Antidotum de peretro* and preceding the *Pocio ad apostema*). Both galangal and zedoary are named as ingredients in BnF lat. 11219: galangal appears in the *Puluera ad epaticos* (f. 221vb) and in a recipe for those who cannot urinate, *Ad eos qui urinam facere non possunt* (f. 225va); zedoary is listed in the *Potio ad*

incense recipe and consider one final ingredient, musk, that appears to represent a reintroduced substance in the Latin west—though likely entirely new to the Frankish world. In Latin, the first attestation of this substance, a secretion of the musk deer, occurs in Jerome's (d. 419) *Adversus Iovinianum*.[52] Musk then disappears from the written record in the west, though it is mentioned by a handful of Greek sources, such as Paul of Aegina (fl. seventh century), during the following centuries.[53] The next Latin references to musk come from Carolingian medical texts, such as this incense recipe, suggesting that it was reintroduced to western Europe during this period. Most significantly from a medical perspective, musk appears in neither classical medical writings nor late antique Latin medical texts, revealing that even if musk had been known in earlier periods, it was not recorded in relation to medicine in the west.[54]

The existence within a single recipe of a cluster of five newly introduced (or reintroduced) non-local ingredients is particularly striking. While the recipe's exclusive reliance on foreign, imported substances adds to its overall exoticness, its listing of a variety of new products is most noteworthy. By incorporating substances unrecorded in classical and late antique medical texts, it becomes clear that not only were multiple sources used in the creation of this recipe collection, but that some of these sources included information beyond the classical canon. Furthermore, this recipe's inclusion within a recipe collection indicates that at least one site of manuscript production had access to non-classical medical information and, crucially, was open to recording it. In this collection, the incense recipe appears to be fully integrated within the composition; information from non-classical and non-local sources is not segregated from the rest of the material or distinguished in any way.

Riddle and McCormick consulted transcriptions of recipe collections from a number of other manuscripts not analysed in the present study, finding

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carbunculum (ff. 223va–233vb). For these recipes see Appendix 2, entries 3.10, 3.16, 4.1, 4.6, and 4.2, respectively.

52 Anya H. King, *Scent from the Garden of Paradise: Musk and the Medieval Islamic World* (Leiden: Brill, 2017); Amar and Lev, *Arabian Drugs*, again, see Chapter 3, 'Arabian' Substances', 129–227 (musk is discussed on pp. 157–62).

53 King, *Scent from the Garden of Paradise*, see especially pp. 133–6 for late antique references to musk.

54 Amar and Lev, *Arabian Drugs*, 157–62. Although galangal is generally thought to have been newly introduced to the west during this period, it may have followed a similar trajectory; cf. Dioscorides, *De materia medica*, 1.4–5. For the standard interpretation, see Amar and Lev, *Arabian Drugs*, 110–12; for the idea that it was introduced in the thirteenth century, see Carlo Battisti, 'Ripercussioni lessicali del commercio orientale nel periodo giustinianeo', in *Moneta e scambi nell'alto medioevo, 21–27 aprile 1960*, Settimane 8 (Spoleto: Fondazione Centro italiano di studi sull'alto medioevo, 1961), 627–82, at p. 639.

additional examples of recipes with their highlighted ingredients (ambergris, camphor, galangal, and zedoary). This indicates that knowledge of these ingredients was not limited to a single centre of manuscript production, namely, the northern Italian site in which cod. sang. 44 was copied, but rather that this information was spreading within the Latin west. Yet, given that the studies of Riddle and McCormick were based on a more limited sample of recipe collections from the Carolingian period (i.e., the transcriptions of Sigerist, Jörimann, and Stoll), their work only scratched the surface of the so-called 'miscellaneous' recipe literature. Indeed, McCormick notes, 'I have not had the leisure to undertake the exhaustive philological and historical study these treatises—and their MSS—deserve: they may still hold some surprises'.[55] By considering a larger sample of recipes, what can now be said about the dissemination of this knowledge?

3.4 *The Recurrent Cluster: Parallels Among Incense Recipes*

Each of the five newly introduced ingredients found in the *Confectio timiame* (ambergris, camphor, confita, cozumber, and musk) appears in additional recipes within the sample. In nine recipes, one or two of these newly recorded ingredients are listed alongside typical *materia medica*, both local and exotic. This chapter's opening example, the *Antidotum gira deacoloquintidis*, which included camphor among its ingredients, represents one of these nine recipes. Nineteen additional recipes, however, have been identified as closely related variants within an incense recipe tradition—a tradition to which the *Confectio timiame* also belongs. I shall first review the spread of this family of incense recipes with its unique group of ingredients before exploring the appearance of these ingredients individually.

The manuscript evidence suggests that knowledge of this incense preparation was rapidly disseminated. As shown in Table 2, I have identified variants of it in five other manuscripts. Four of these codices are today located in the Stiftsbibliothek St. Gallen (codd. sang. 752 and 761 each contain one recipe, cod. sang. 878 preserves two, and cod. sang. 899 lists three), though they were produced in several different, if closely connected, writing centres (St Gall, Fulda, Reichenau, and St Gall, respectively).[56] A manuscript in the Bibliothèque nationale de France, BnF lat. 11219, adds a further twelve recipes

55 McCormick, *Origins of the European Economy*, 714, n. 84.

56 Cod. sang. 752, p. 82; Cod. sang. 761, p. 66; cod. sang. 878, p. 334; cod. sang. 899, p. 137; see Appendix 2, entries, 10.3, 12.5, 13.2.1–2, and 14.3.1–3, respectively.

that are also based on this core group of ingredients.[57] These numerous recipe variants and their constituent parts deserve a more detailed examination.

The titles of the recipes in codd. sang. 752 and 761, *Thymiama paltgrimi* and *Thimiama*, respectively, leave no doubt that these, too, are preparations for incense. The two recipes in cod. sang. 878, representing the only material written on p. 334, lack such an obvious reference to incense: the first recipe, labelled 'cod. sang. 878 (a)' in the tables, is missing a title, while the second recipe, 'cod. sang. 878 (b)', is listed as *Item aliter*, 'likewise in another way'. It can be assumed, however, that these recipes also concern incense given the parallels they share with the other recipes and the absence of this particular combination of ingredients in other contexts. Like cod. sang. 878, the groups of incense recipes in cod. sang. 899 (see Figure 4) and BnF lat. 11219 are clustered together on individual folia and represent the only material on the pages in question. In both manuscripts, titles explicitly link these recipes to incense.[58]

As seen in Table 2, the twenty recipes, despite containing a variety of different ingredients, centre around a primary group of five substances (i.e., ingredients that appear in at least ninety percent of the recipes), and these almost perfectly parallel the five newly recorded ingredients. The five core ingredients are agarwood, confita, cozumber, camphor, and musk, meaning that ambergris is the only newly recorded product that is listed less consistently. Of the five primary ingredients, agarwood appears in all twenty recipes, confita and cozumber in nineteen (ninety-five percent), and camphor and musk in eighteen (ninety percent). Notably, agarwood, the fragrant wood of aquilaria trees, is both the only ingredient to appear in every recipe and, despite its similarly exotic origins, the only ingredient within the core group that was already recorded in the west in Antiquity.[59] Table 2 reveals that, in addition to these five most frequently named ingredients, frankincense, storax, cloves, and cinnamon are listed in the majority of recipes, while ambergris, spikenard, saffron, myrrh, mastic, and galingale appear in half of the recipes or less. Although these twenty recipes are evidently related and share many similarities, very few present exactly the same group of ingredients and none is perfectly identical; that is, even though several preparations, such the second recipe of cod. sang. 899 and seventh recipe of BnF lat. 11219, contain the same ingredients, they are arranged differently and/or name varying quantities.

57 BnF lat. 11219, ff. 227r–227v; see Appendix 2, entries 4.8–19.

58 Note: while all twelve incense recipes in BnF lat. 11219 are found on f. 227v, the title of this section occurs on the preceding page, f. 227r.

59 Arlene López-Sampson and Tony Page, 'History of Use and Trade of Agarwood', *Economic Botany* 72 (2018): 107–29, https://doi.org/10.1007/s12231-018-9408-4.

TABLE 2 Incense recipes containing the ingredient cluster

Ms	Cod. sang. 899 (a)	Cod. sang. 878 (b)	BnF lat. 11219 (h)	Cod. sang. 44	BnF lat. 11219 (e)	BnF lat. 11219 (i)	BnF lat. 11219 (a)	Cod. sang. 899 (b)	BnF lat. 11219 (g)	BnF lat. 11219 (j)
Recipe title	*Confectio timiamatis*	*Item aliter*	*Confectio timiamatis*	*Confectio timiame*	*Confectio timiamatis ad gragantum*	*Item timiamatis confectio*	*Timiama*	*Item alia timiamatis confectio*	[untitled]	*Item*
Ingredients	cozumber	cozumber	cozumber	cozumber	cozumber	cozumber	cozumber	cozumber	cozumber	cozumber
	confita	confita	confita	confita	confita	confita	confita	confita	confita	confita
	agarwood	agarwood	agarwood	agarwood	agarwood	agarwood	agarwood	agarwood	agarwood	agarwood
	camphor	camphor	camphor	camphor	camphor	camphor	camphor	camphor	camphor	camphor
	musk	musk	musk	musk	musk	musk	musk	musk	musk	musk
	ambergris	ambergris	ambergris	ambergris	ambergris	ambergris	ambergris			
	frankincense	frankincense	frankincense	frankincense	frankincense	frankincense	frankincense	frankincense	frankincense	frankincense
	storax	storax	storax	storax	storax	storax	storax	storax	storax	storax
	cloves	cloves	cloves		cloves	cloves	cloves	cloves	cloves	cloves
	cinnamon	cinnamon	cinnamon		cinnamon	cinnamon	cinnamon	cinnamon	cinnamon	
	spikenard	spikenard	spikenard	spikenard	spikenard	spikenard		spikenard	spikenard	spikenard
	saffron	saffron	saffron	saffron						saffron
	myrrh	myrrh	myrrh	myrrh						
	mastic	mastic	mastic	mastic						
	galingale	galingale	galingale							

Note: the order of the ingredients in each recipe has been rearranged to illustrate their parallels more clearly; recipes are ordered from most complex to simplest

TABLE 2 Incense recipes containing the ingredient cluster (*cont.*)

Ms	Cod. sang. 899 (c)	BnF lat. 11219 (c)	BnF lat. 11219 (f)	BnF lat. 11219 (d)	Cod. sang. 878 (a)	Cod. sang. 761	Cod. sang. 752	BnF lat. 11219 (l)	BnF lat. 11219 (k)	BnF lat. 11219 (b)
Recipe title	*Item alia*	*Item Alia*	[untitled]	*Alia*	[untitled]	*Thimiama*	*Thymiama paltgrimi*	*Confectio timiama*	*Item*	*Tymiamum*
Ingredients	cozumber	cozumber	cozumber	cozumber	cozumber	cozumber	cozumber	cozumber	confita	cozumber
	confita	confita	confita	confita	confita	confita	confita	confita		
	agarwood	agarwood	agarwood	agarwood	agarwood	agarwood	agarwood	agarwood	agarwood	agarwood
	camphor	camphor	camphor	camphor	camphor	camphor	camphor	camphor		
	musk	musk	musk	musk	musk	musk	musk		musk	
					ambergris	ambergris			ambergris	
	frankincense	frankincense	frankincense	frankincense				frankincense	frankincense	frankincense
	storax	storax	storax	storax	storax			storax		
	cloves	cloves	cloves	spikenard				cloves		cloves
	cinnamon	cinnamon	cinnamon					cinnamon		cinnamon
	saffron									

Note: the order of the ingredients in each recipe has been rearranged to illustrate their parallels more clearly; recipes are ordered from most complex to simplest

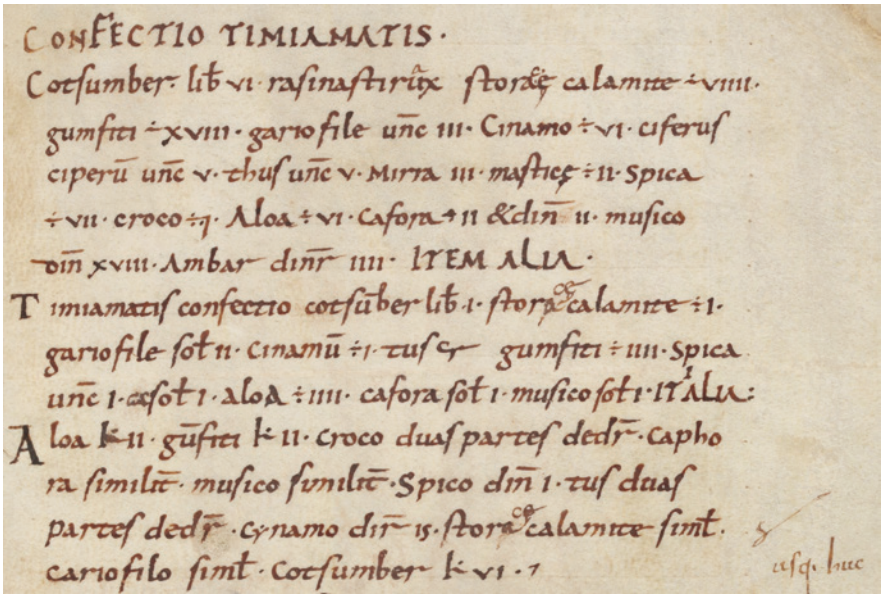

FIGURE 4 Three incense recipes in St. Gallen, Stiftsbibliothek, cod. sang. 899 (p. 137), a poetry manuscript that also includes several sections of recipes (https://www.e-codices.unifr.ch/de/csg/0899/137)

Overall, the consistency of the five core ingredients, all exotic and the majority newly recorded in the west, suggests that an incense recipe tradition from the east arrived in the west during this period. To investigate how this knowledge spread, it is essential to consider when and where the manuscripts containing these recipes were produced.[60] Codd. sang. 761 and 878 represent the earliest of the six manuscripts that contain this distinctive cluster of ingredients, with Bischoff dating both to the first half of the ninth century. Regarding cod. sang. 878, Walahfrid Strabo's *vademecum*, Bischoff has identified the hand on p. 334 as Walahfrid's own and has categorised it as belonging to his penultimate script phase, thereby dating it to the second quarter of the ninth century.[61] In contrast, cod. sang. 44 was composed in the second half of the ninth century and cod. sang. 752 has been dated to the very end of the century,

60 See Appendix 1 for full descriptions of the manuscripts.

61 Bischoff, *Katalog der festländischen Handschriften*, vol. 3, no. 5862; Bernhard Bischoff, 'Eine Sammelhandschrift Walahfrid Strabos (Cod. Sangall. 878)', in *Mittelalterliche Studien. Ausgewählte Aufsätze zur Schriftkunde und Literaturgeschichte*, ed. Bernhard Bischoff, vol. 2 (Stuttgart: Hiersemann, 1967), 34–51.

c. 900.[62] Cod. sang. 899 and BnF lat. 11219 were traditionally dated to the late ninth or early tenth centuries (with some individual hands dated even later), but more recent analyses have dated the hands responsible for these recipes to the late ninth century.[63] The page of incense recipes in the latter codex, f. 227v, is particularly striking: the varied scripts indicated that the twelve recipes were written by at least six different individuals, the implications of which will be revisited below.

Codd. sang. 752, 761, 878, 899, and BnF lat. 11219 were written at centres north of the Alps (St Gall, Fulda, Reichenau, St Gall, and 'western Francia', respectively), whereas the medical half of cod. sang. 44 was produced in northern Italy and then moved to St Gall shortly after its composition.[64] Despite being among the later manuscripts in this group, the movement of cod. sang. 44 illustrates a possible route for the transmission of this recipe and parallels the known movement of cozumber based on the gifts sent to Boniface. With this in mind, I suggest that the new incense tradition may have been first included in Latin medical texts in the Italian peninsula. Links between intellectual centres in northern Italy and present-day Switzerland and Germany, such as St Gall, Reichenau, and Fulda, then resulted in the dissemination of this recipe within the Carolingian world.[65] Indeed, Florence Eliza Glaze has drawn attention to the movement of manuscripts with medical texts between several monastic centres in this region, including Reichenau, St Gall, and Murbach, though the codices in which these incense recipes are located were not addressed.[66]

The high degree of subtle variation seen between all twenty incense recipes suggests that individuals may have been experimenting with using these newly introduced ingredients, learning what ratios produced the desired result, and trialling with which other substances they worked well in combination. The creation of variants may also reflect ad hoc adaptation responding to the

62 Bischoff, *Katalog der festländischen Handschriften*, vol. 3, nos. 5530 and 5845; Bernhard Bischoff, 'Italienische Handschriften des neunten bis elften Jahrhunderts in frühmittelalterlichen Bibliotheken ausserhalb Italiens', in *Il libro e il testo: Atti del Convegno Internazionale, Urbino, 20–23 Settembre 1982*, ed. Cesare Questa and Renato Raffaelli (Urbino: Università degli Studi di Urbino, 1984), 169–94.

63 My thanks to Rosamond McKitterick and Anna Dorofeeva for their reassessments of the scripts in these manuscripts.

64 Bischoff, *Katalog der festländischen Handschriften*, vol. 3, nos. 5845, 5847, 5862, 5865, 4670–1, and 5530, respectively; Bischoff, 'Eine Sammelhandschrift Walahfrid Strabos', pp. 34–51; Bischoff, 'Italienische Handschriften', 177–8.

65 Bischoff, *Manuscripts and Libraries in the Age of Charlemagne*, trans. Gorman, 33, 122, 147–8.

66 Glaze, 'The Perforated Wall', 73–5, 92–8; Contreni, 'Masters and Medicine', 267–82.

fluctuating availability of ingredients. Given that the vast majority of the substances listed in these recipes represent unambiguously non-local products (whether newly recorded or long known), ingredient access may have been highly unstable and uncertain. The page of incense recipes in BnF lat. 11219 offers a remarkable window onto an evolving body of knowledge: as noted above, a new palaeographical assessment of f. 227v suggests that these twelve incense recipes were written by at least half a dozen different scribes.[67] Most significantly, the scripts appear to be closely related, possibly representing a series of teachers and students. These scribal relationships suggest that the individuals responsible for the different recipe variants were all working at the same writing centre and added to the manuscript over the course of a few generations, building up a collection of distinct yet related incense recipes in the decades around the year 900. Ultimately, this growing corpus of incense recipes bears witness to an active scriptorium where scribes continued to engage with and add to manuscripts over time, recording the latest iterations of this incense tradition.

To contextualise this family of incense recipes, it is important to investigate whether alternative, unrelated incense recipes circulated in the Carolingian period. My analysis of the recipe sample uncovered two additional incense recipes, the *Conpositio thymiamatis* and *Tymiama simplex*, both located in cod. sang. 759.[68] Despite sharing titles similar to those seen above, these two recipes, as seen in Table 3, contain none of the core ingredients observed in the twenty other incense recipes reviewed above and appear to derive from an entirely distinct tradition. They do, however, share some ingredients with the longer incense recipes, such as myrrh and storax, and generally rely on similar types of substances—namely, non-local gums, resins, and spices—but all of their ingredients represent products that were recorded in the classical and late antique west. It should also be noted that, although these two recipes in cod. sang. 759 are the only other incense recipes found within the sample, the contents list of a lost collection in BnF lat. 6882A parallels the list of the collection in which the two recipes occur in cod. sang. 759.[69] Therefore, while BnF lat. 6882A no longer includes incense recipes, its contents list indicates that this alternative incense recipe group circulated more widely than the surviving recipes would suggest.[70]

67 My thanks to Anna Dorofeeva for her palaeographical analysis of this material.

68 Cod. sang. 759, p. 89: *Conpositio thymiamatis*; and p. 91: *Tymiama simplex*; see Appendix 2, entries 11.20–1.

69 Cod. sang. 759, pp. 53–8; BnF lat. 6882A, ff. 1v–8v.

70 BnF lat. 6882A, f. 7r; the titles are listed here as *Conpositio timiamatis* and *Timiama simplex*.

TABLE 3 Ingredients in incense recipes from cod. sang. 759

Recipe title	***Conpositio thymiamatis***	***Tymiama simplex***
Ingredients	myrrh	myrrh
	storax	storax
	ungiculas marinas	*ungellas*
	bdellium	
	cinnamon	
	ladanum	
	iris	
	saffron	
	Nepal cardamom	
	wine	
	honey	
		mastic
		rose

Several further points may help to shed light on how and why the incense recipes containing newly introduced ingredients and those in cod. sang. 759 differ. First, the ingredients listed in the latter manuscript appear to have much in common with biblical recipes for incense.[71] Exodus XXX.34, for example, offers the following instructions: 'And the Lord said to Moses: Take unto thee spices, stacte, and onycha, galbanum of sweet savour, and the clearest frankincense, all shall be of equal weight'.[72] Although the recipes in cod. sang. 759 record neither galbanum nor frankincense, both list spices, myrrh (stacte), and possibly onycha, paralleling the biblical incense recipe.[73] Secondly, Bischoff dated both manuscripts to the first half of the ninth century, suggesting that

71 On the reception of recipes in Exodus, see especially Béatrice Caseau, 'La parfum de Dieu', in *Parfums et odeurs au Moyen Âge. Science, usage, symboles*, ed. Agostino Paravicini Bagliani (Florence: SISMEL Edizioni del Galluzzo, 2015), 3–22 and Iolanda Ventura, '"Sume tibi aromata prima": Profumi ed aromi nell'esegesi ad *Ex. 30*', in *Parfums et odeurs au Moyen Âge. Science, usage, symboles*, ed. Agostino Paravicini Bagliani (Florence: SISMEL Edizioni del Galluzzo, 2015), 349–428.

72 Exodus XXX.34: *Dixitque Dominus ad Moysen: sume tibi aromata, stacten et onycha, galbanen boni odoris, et tus lucidissimum; aequalis ponderis erunt omnia*.

73 The terms *unguiculas* and *ungellas* may be linked with onycha, but the interpretation of all three words is debated; for more on this debate, see Harold J. Abrahams, 'Onycha,

cod. sang. 759 was written in Brittany whereas BnF lat. 6882A was written in southwest France.[74] These origins not only place the manuscripts on the early end of the spectrum of those considered in this study but also outside of the northern Italian-transalpine network noted above. While it is true that BnF lat. 11219, the manuscript containing the largest number and range of incense recipes with newly introduced ingredients, is also thought to have been produced at a site outside of this network, it represents one of the latest manuscripts included in the study. Taking these factors into consideration, it seems plausible that knowledge of the 'new' incense recipe family (i.e., the recipes containing the newly recorded ingredients) had not reached the centres that produced cod. sang. 759 and BnF lat. 6882A by the early ninth century. The gradual accumulation of recipes in BnF lat. 11219 demonstrates that this situation changed over time: the new tradition was widely diffused and further expanded during the ninth century and beyond. Based on the evidence of the manuscripts' origins as well as the lack of newly recorded ingredients in the recipes of cod. sang. 759, it appears that this codex preserved an older incense tradition, and possibly one with biblical influences.[75] Finally, that the recipe collection in cod. sang. 759 was based on an earlier exemplar (since the same collection was once part of BnF lat. 6882A, too) adds further weight to the age of this incense recipe. Given that two early ninth-century manuscripts produced in different (and distant) writing centres are known to derive from this lost exemplar, it seems likely that the original collection was compiled no later than *c*. 800, though it could be considerably earlier. As such, these recipes could predate the earliest surviving recordings of the newly introduced ingredients, such as the letters that document the eighth-century gifts of cozumber to Boniface, and their physical presence in the Latin west.

Before turning to evidence for the arrival of these substances in the Carolingian world, and how this relates to the practicality of the recipes that record them, the appearance of the newly introduced ingredients in recipes *independent* of preparations for incense must also be considered.

3.5 *Moving Beyond Incense: the Spread of Knowledge*

As noted above, this chapter's opening recipe, the *Antidotum gira deacoloquintidis* of BAV pal. lat. 1088, already confirms that at least one of these ingredients, camphor, can be found in other pharmaceutical prescriptions and was

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Ingredient of the Ancient Jewish Incense: An Attempt at Identification', *Economic Botany* 33, no. 2 (1979): 233–6.

74 Bischoff, *Katalog der festländischen Handschriften*, vol. 3, nos. 5846 and 4419, respectively.

75 Amar and Lev, *Arabian Drugs*, 129–227.

not exclusively associated with incense. In total, the sample contains a single non-incense recipe with ambergris, two with camphor (including the aforementioned *Antidotum gira deacoloquintidis*), two with confita, three with cozumber, and three with musk (see Table 4).[76] These eleven references represent only nine recipes since two recipes, both in cod. sang. 44, include two newly introduced ingredients: the *Confectio saponi Constantini* lists both confita and musk and the second recipe under the entry titled *Potio maniacis siue gutta catiua* contains confita and cozumber.[77] While it must be recognised that the appearance of these products within the recipe sample remains very limited overall, it is significant that *each* of these substances are named in at least one non-incense recipe. In fact, as discussed below, I suggest that their limited distribution is central to understanding the dissemination of these eastern *materia medica* and the knowledge regarding their uses.

Although cod. sang. 44 and BAV pal. lat. 1088 contain the bulk of the examples, with both including four instances of newly recorded ingredients, three other manuscripts, cod. sang. 751, BAV vat. lat. 5951, and BAV reg. lat. 1143, each include an additional example of one of these ingredients in a recipe.[78] Musk and cozumber appear most frequently and exhibit the widest spread among manuscripts, each occurring three times and in three separate manuscripts. Notably, only one of these manuscripts, cod. sang. 44, contains an incense recipe. This is also the only manuscript to record recipes that use multiple newly introduced ingredients in a single preparation. Two recipes, the *Potio muscata ad omne infirmum* of BAV vat. lat. 5951 and the *Medicamentum ad maculas oculorum et ad caliginem* of BAV pal. lat. 1088 have been inserted in the margins, representing slightly later but near contemporary additions.[79]

76 While further examples of galangal and zedoary have also been identified (see above), the following section concentrates on the appearances of the ingredient cluster connected to the incense recipe tradition given the chapter's primary focus.

77 Cod. sang. 44, p. 282: *Confectio saponi Constantini*; and p. 285: *Potio maniacis siue gutta catiua*; see Appendix 2, entries 5.14 and 15. On the wider tradition of the *Sapone Constantini*, see Innocenzo Mazzini, 'Il sapone di Costantino', in *Costantino il grande: dall'Antichità all'umanesimo: colloquio sul Cristianesimo nel mondo antico, Macerata, 18–20 Dicembre 1990*, ed. Giorgio Bonamente and Franca Fusco (Macerata: Università degli studi di Macerata, 1992–3), vol. 2, 693–9. The recipes in the manuscripts Mazzini consulted do not contain these ingredients.

78 In cod. sang. 44 and BAV pal. lat. 1088, two ingredients are repeated, such that only three different substances within the cluster are found in these manuscripts.

79 BAV vat. lat. 5951, f. 1r: *Potio muscata ad omne infirmum*; BAV pal. lat. 1088, f. 34v: *Medicamentum ad maculas oculorum et ad caliginem*; see Appendix 2, entries 19.1 and 16.1, respectively.

TABLE 4 Newly introduced exotics outside of incense recipes

	Manuscripts					
Ingredients	**Cod. sang. 44**	**Cod. sang. 751**	**BAV vat. lat. 5951**	**BAV pal. lat. 1088**	**BAV reg. lat. 1143**	**Total**
Ambergris	-	1	-	-	-	1
Camphor	-	-	-	2	-	2
Confita	2	-	-	-	-	2
Cozumber	1	-	-	1	1	3
Musk	1	-	1	1	-	3
Total	4	1	1	4	1	11

By reconsidering the origins of the five manuscripts containing examples of newly introduced *materia medica* outside of (or in addition to) incense recipes, it is possible to assess the spread of medical knowledge from another perspective and compare these findings to the distribution of manuscripts containing incense recipes. As noted above, cod. sang. 44 appears to have been written in northern Italy in the second half of the ninth century, before moving to St Gall shortly after its composition; cod. sang. 751 followed the same trajectory.[80] The early ninth-century BAV vat. lat. 5951 has been located to either Italy or Burgundy while BAV pal. lat. 1088 has been linked to Lyon in the middle or second half of the ninth century.[81] Finally, Bischoff suggested that BAV reg. lat. 1143 was written in Mainz in the early ninth century.[82] With this context in mind, three features stand out. First, codd. sang. 44 and 751 fit with the pattern observed above: evidence such as the letter to Boniface indicates that, at least in some cases, these eastern substances moved north into the Frankish Empire from the Italian peninsula. These two manuscripts, which together contain recipes listing ambergris, confita, cozumber, and musk (not to mention the full suite of ingredients included in the incense recipe of cod. sang. 44), followed a

80 Bischoff, *Katalog der festländischen Handschriften*, vol. 3, no. 5844.
81 Ibid, nos. 6927 and 6574.
82 Ibid, nos. 6766–7.

similar path, moving from northern Italy to St Gall and helping to disseminate information about these new products.

Secondly, the single instance of one of the newly recorded exotic products in BAV reg. lat. 1143 is particularly interesting when considered in view of its origins. In this case, the recipe *Ciraturiu artriticus opotatricus a parlasensis*, found on ff. 187r–187v, records cozumber as its thirty-fifth ingredient (out of an astounding list of sixty-four ingredients).[83] This relatively early manuscript was composed in Mainz, the seat of Boniface, who, as noted above, received exotic gifts from Rome—and these gifts included cozumber. While it may be tempting to connect the existence of cozumber at Mainz to its subsequent inclusion in a medical recipe, this is a fairly large leap to make given that the manuscript was composed roughly two or three generations after Boniface's death. It should not be assumed, therefore, that there is a direct link between the appearance of cozumber in a recipe and the gifts received by Boniface, though this possibility, or that Mainz was known to have had access to these products, is an attractive hypothesis, especially in the light of Lull's gifts to Cuneburg and Cynehard's request for exotic *materia medica*.

The possible Burgundian origins of BAV vat. lat. 5951 and BAV pal. lat. 1088 suggest another direction in which this knowledge and these products travelled. Like cod. sang. 44, BAV pal. lat. 1088 contains four references to the newly introduced products but, in contrast to cod. sang. 44, these represent four separate recipes (cod. sang. 44 only contains two recipes with new ingredients since each recipe lists two of the substances in question).[84] The relatively high number of newly recorded ingredients listed in BAV pal. lat. 1088, combined with its later date, supports the idea that the number of available exotics, or at least an awareness of them, increased throughout the Carolingian period. The origins of this codex also call to mind BnF lat. 11219, the manuscript that contains the highest number of incense recipe variants. As the latter manuscript is thought to have been produced in western Francia at the very end of the ninth century, it demonstrates that knowledge of these newly recorded products had spread far beyond the northern Italian-transalpine network by *c*. 900, extending into the heartlands of Frankish territories and beyond. It is also important to remember that the Corbie monks' shopping list for the Cambrai market indicates that at least some of these substances themselves were circulating

83 BAV reg. lat. 1143, ff. 187r–187v: *Ciraturiu artriticus opotatricus aparlasensis*; see Appendix 2, entry 18.10.

84 As noted above, for both manuscripts, the four references to newly recorded ingredients refer to three separate ingredients (confita is mentioned twice in cod. sang. 44 and camphor is recorded twice in BAV pal. lat. 1088).

in this part of the Empire in the ninth century. The individuals compiling the recipes that contain references to these specific ingredients may have acquired first-hand knowledge of these products by this time (or were only a few steps removed from first-hand knowledge).

With this in mind, and by comparing the frequency of incense recipes to non-incense recipes with individual newly introduced ingredients, it becomes possible to consider how pharmaceutical information about these *materia medica* spread within the Carolingian world. Although cod. sang. 44—the only manuscript to contain both an incense recipe *and* unrelated recipes that include newly introduced ingredients—represents an exception, I suggest that the dissemination of the incense recipe tradition and of pharmaceutical information concerning the individual ingredients took separate, if at times intersecting and ultimately converging, paths.

The diffusion of the incense recipe appears to reflect a rapid process, and one in which a core unit of knowledge—the five primary ingredients—was consistently transmitted over time and between sites. Although I have focused on the use of incense in medical contexts, its primary role was liturgical, and I propose that this burst of incense recipe interest was underpinned by wider developments in the Carolingian world, namely, that the legislation promulgated by the court brought about an increased use of incense in the liturgy.[85] Although, as noted in Chapter 2, normative evidence does not necessarily reflect smooth transitions on the ground, the liturgical use of incense does appear to have expanded during this period.[86] The provision of sufficient quantities of incense thus became an urgent matter in terms of both spiritual and corporeal health.[87]

The arrival of this new incense recipe tradition would have offered an alternative to the older, possibly biblical recipes, such as those recorded in cod. sang. 759 and BnF lat. 6882A. By relying on different ingredients, the new recipe would have provided more options for sourcing the components of incense, thereby allowing for greater overall production or for the creation of a substitute if certain ingredients were unavailable. The recording of so many variants

85 Burridge, 'Incense in Medicine'. On the symbolic significance of incense, perfumes, and odour, and especially in relation to the Church, see selected chapters in Agostino Paravicini Bagliani, ed., *Parfums et odeurs au Moyen Âge. Science, usage, symboles* (Florence: SISMEL Edizioni del Galluzzo, 2015), including Rémi Corbineau and Patrice Georges-Zimmermann, 'Le parfum de la mort. Plantes et aromates pour la préparation des corps (Moyen Âge et période moderne)', 161–80 and Martine Ostorero, 'L'odeur fétide des démons: une preuve de leur présence corporelle au sabbat', 259–88.

86 McCormick, *Origins of the European Economy*, 716–19.

87 Leja, *Embodying the Soul*.

that use different combinations and/or ratios of ingredients likewise would have offered alternatives that could have augmented these monastic communities' abilities to produce enough incense to satisfy both pharmaceutical and ecclesiastical purposes.

Returning to the non-incense recipes that incorporate individual newly recorded ingredients, the introduction of these particular *materia medica* seems to have occurred for different, though ultimately related, reasons. Several key patterns emerge: first, these recipes do not appear in the same manuscripts as the incense recipes themselves, with the exception of cod. sang. 44. Secondly, as noted initially, the spread of this knowledge seems to have been fairly limited given that these ingredients are found in only nine recipes across six manuscripts. That being said, it is diverse: unlike the incense recipes, none of these recipes represents a variant of another, which is a particularly interesting finding given that cod. sang. 44 and BAV pal. lat. 1088 share a substantial number of recipes. Critically, the recipes are often located in manuscripts that were produced in areas (or even at specific sites, such as Mainz) in which these ingredients appear to have circulated. This correlation between the recorded knowledge and the appearance of the substances themselves suggests that individuals within this milieu may have encountered some of these ingredients directly (or perhaps had heard of earlier gifts of the substances, knew someone who saw the range of products available at the Cambrai market, etc.). Taking account of these factors, I suggest that the individual inclusion of newly recorded ingredients reflects these encounters: while the scribes responsible for the surviving recipes may not have been the individuals who received, purchased, and/or used these substances, they have documented the experiences of someone who did. This slow spread of knowledge—a case-by-case diffusion based on access to expensive, rare substances—contrasts with the rapid dissemination of the incense tradition, where a core unit of information was transmitted with relative speed due to the urgency of incense production. Both patterns of movement appear to be linked to the arrival of the substances themselves and reveal that individuals in the Carolingian world were open to adopting and adapting new sources of knowledge and novel *materia medica* to suit their needs.

Due to the overarching importance of incense, this recipe tradition blossomed in an atmosphere receptive to new information about its production. This openness to previously unknown substances, as well as the knowledge of how to use them, laid the groundwork for the spread of these newly introduced ingredients both alongside and independent of the incense recipe tradition. The particular cultural and intellectual environment and the needs of

monastic communities thus links the two discrete patterns of dissemination highlighted in this case study.

4 The Practicality of Non-local *Materia Medica*: Putting the Case Study in Perspective

On the basis of this analysis, what can now be said about the practicality of these ingredients? And what are the implications of this case study for assessing the recording of non-local ingredients more generally?

The above review of a selection of newly recorded *materia medica* has highlighted the movement of both knowledge *and* ingredients. The correspondence between the arrival of pharmaceutical information regarding these previously unrecorded ingredients and the physical substances themselves points to the practical nature of these recipes, though a number of important caveats must be addressed. First, while it is true that sources beyond the medical literature bear witness to the existence of exotic substances in the west in this period—and, of particular note, include several of the key ingredients analysed in this chapter—it must be remembered that much of this evidence, such as records of diplomatic gifts, registers exceptions rather than norms. That is, not only did such exchanges occur sporadically, but the surviving records emphasise the movement of especially noteworthy goods within very elite networks. Therefore, while this evidence remains immensely valuable, caution is needed.

On the other hand, the Abbey of Fontenelle's annual supply of *pigmenta* or the shopping list from Corbie do suggest more regular trade in these types of imported substances. Still, these sources only paint a partial picture of the situation on the ground. They reveal what these communities *intended* to buy and not what was actually available. Ultimately, the documentary evidence indicates that some unambiguously non-local products, including newly introduced *materia medica*, were circulating in the Carolingian world. This circulation, however, was limited. Even if certain *exotica* were available at the market at Cambrai, for example, it is likely that most non-local items were present in relatively small quantities (though the 120 pounds of pepper suggests that larger amounts of some substances may have been available) and, given their expense, restricted to an elite clientele. In short, evidence for the occasional existence of these ingredients should not be read as evidence for their regular availability.

Nevertheless, I would suggest that recipes including newly recorded ingredients were practical in a limited way. Although the ingredients in question would have been far from local, the recipes that include them appear to demonstrate

some degree of familiarity with these substances, if only indirectly. Such recipes would have provided blueprints for possible preparations *when* these ingredients were available. This is particularly relevant when considering the rapid dissemination of the new incense recipe: its addition to existing western incense traditions opened up multiple options for incense production depending on the availability of ingredients; having a range of options may have been necessary for these communities given their increasing incense needs and the variable availability of the ingredients involved. Overall, although the evidence for the existence of these substances in the Latin west is sporadic and should not be understood as reflecting their sustained presence, the sources reveal the possibility of their availability within the Frankish Empire. The repeated inclusion of the five newly recorded exotics in medical recipes can therefore be seen as practical information that was ready to be deployed when a need arose and when the ingredients were on hand: this is 'latent knowledge'.

Finally, the wider implications of this case study must be considered: to what extent can we extrapolate from these findings? Are these newly recorded ingredients representative of non-local *materia medica* more generally? While it would be dangerous to use this case study as a proxy for all exotic ingredients, it is notable that a significant number of non-local ingredients that were known in classical Antiquity, such as pepper, ginger, and cinnamon, not only continue to appear in the recipe literature but are also named in the non-medical sources examined above. The monks of Corbie, for example, intended to buy these three products, among a number of other foreign goods, at the Cambrai market. This combination of medical and other documentary sources therefore suggests that many exotic substances, not unlike the newly recorded ingredients, may have been practical in that they stored this latent knowledge—information that was by no means always or even consistently useable, but that offered options when the conditions were right. It must be noted, however, that previously known ingredients present a more challenging group to study: since they have long been recorded in pharmaceutical prescriptions, their individual appearance in recipes, in contrast to the newly introduced ingredients, cannot be used to trace the dissemination of knowledge and its possible connection with the presence of the physical substances themselves.

Despite this general picture of practicality, there are counter examples that challenge this finding. The case of silphium presents one such case: this plant is thought to have become extinct during Antiquity and yet continues to appear in later recipes.[88] Within the sample analysed in this study, it is recorded over

88 Ken Parejko, 'Pliny the Elder's Silphium: First Recorded Species Extinction', *Conservation Biology* 17, no. 3 (2003): 925–7.

twenty times. Although it is possible that the term may have been used to refer to a different, related plant in the early Middle Ages or that scribes continued to copy it without knowing it had gone extinct (or perhaps with the hope that it might be identified in the future) or that they were simply unsure (and wanted to record it, again, in case of possible future use), the surviving evidence does not provide additional information. Instead, the inclusion of recipes that rely on substances that would have been impossible to obtain suggests that, in some cases, older authorities may have been copied without a consideration of the possible practicality of the information they contained *or* that they were preserved for other reasons.[89] While the silphium example represents a very small percentage of the total number of recipes, it is a useful reminder that, despite the strong evidence for practicality on the basis of latent knowledge, the situation remained highly complex and variable.

5 Conclusion

This chapter offers just a glimpse of the vast range of non-local *materia medica* recorded in early medieval recipes. The analysis of a cluster of newly introduced ingredients speaks to the arrival and distribution of this knowledge within northwest Europe. Tracing the distribution of incense recipes containing these core ingredients as well as the appearance of each of these ingredients individually has uncovered patterns in the diffusion of this information and related this diffusion to the movement of the substances themselves. The need for increasingly large amounts of incense appears to have been a key factor underpinning the spread of the new incense recipe. Simultaneously, the entry of the substances themselves allowed for their gradual application in medical contexts. While these patterns are grounded in the evidence provided by the recipes and the manuscripts in which they are located, non-medical texts have offered important insights into the movement of the ingredients, as well. By bringing together these varied types of evidence, it becomes possible to see the *potential* practicality of recipes that incorporate non-local *materia medica*.

89 For example, a number of rough parallels can be found with treatments listed in Marcellus' *De medicamentis liber*. A recipe for *Sales catarticos* in cod. sang. 751 (p. 418) that uses *silfiu* is similar to several preparations in Book 30 of *De medicamentis liber*, including recipes 51 (*Confectio salis cathartici*) and 52 (*Liquamen catharticum*); see Marcellus, *De medicamentis liber*, ed. Liechtenhan and Niedermann, trans. Kollesch and Nickel, 30.51–2 (pp. 532–5); see Appendix 2, entry 9.21.

The findings presented in this chapter connect to several major debates. In particular, while some scholars argue that the Mediterranean (and beyond) was still a zone of connectivity during this period, others hold a more minimalist view.[90] This debate has major implications for understanding the degree to which, if at all, exotic goods were entering continental Europe and also relates to the question of whether trade can be used as a more general proxy for assessing networks of communication and exchange. The results of my analyses support a middle ground: while it appears that such non-local products were known in the west, they may not have been regularly available—and when they were available, these ingredients were probably only present in small quantities and, given their expense, accessible to a select few. As stated above, evidence for the existence of these substances should not be equated with their *regular* presence and widespread availability. The recipes that include such rare, expensive, non-local *materia medica* therefore represent latent knowledge: they offer additional options for treatments and/or liturgical incense use if and when the necessary ingredients were available.

Finally, although this chapter has focused on the spread of non-local *materia medica* within the Carolingian world, these developments represent only the very end point of movements on a much larger, global scale. While space does not permit me to examine these movements in detail, ingredients coming from as far away as the Himalayas and the Maluku Islands likely travelled west via multiple, intersecting networks. The Abbasid Caliphate's expanding power and trading connections during this period, especially in the east, must have played a particularly important role in introducing a greater range of products from southeast Asia in western Europe. Indeed, diplomatic exchanges, such as Harun al Rashid's gifts, exemplify the potential for direct links between the two empires. The Arabic origins of many of the terms for these substances (in both Latin and English) confirm that the trade networks of the Islamicate world

90 McCormick provides a useful overview of the maximalist-minimalist debate in the opening chapter of *Origins of the European Economy*, see pp. 1–24. Caroline Goodson has presented convincing evidence for a more minimalist interpretation (personal communication and 'Ingredients for Medicine in Early Medieval Italy', Goodson's paper at the Society for the Promotion of Byzantine Studies' 2019 Symposium, *Blood in Byzantium* (1 April 2019)). For more on this debate, see also the work of Chris Wickham, Richard Hodges, and Sauro Gelichi, including Chris Wickham, *Framing the Early Middle Ages: Europe and the Mediterranean, 400–800* (Oxford: Oxford University Press, 2005) and Sauro Gelichi and Richard Hodges, eds., *From One Sea to Another. Trading Places in the European and Mediterranean Early Middle Ages: Proceedings of the International Conference, Comacchio 27th-29th March 2009* (Turnhout: Brepols, 2012), with chapters from Gelichi, Hodges, McCormick, and Wickham.

were central to the movement of these products across Eurasia. Recent scholarship has also suggested the impact of simultaneous developments in Tang China on the diffusion of both knowledge and *materia medica*.[91]

Meanwhile, within the Mediterranean world, the spread of non-local substances may have also been facilitated by Byzantine connections and Radhanite traders.[92] That some of the newly recorded ingredients, such as confita, appear to reflect an evolving Latinisation of originally Greek terms suggests that Byzantine networks were involved in the introduction and spread of the incense recipe tradition. Considering the movement of information and substances between sites in the Italian peninsula and communities north of the Alps, intellectual, policital, and ecclesiastical centres with strong Byzantine connections, such as Rome and Ravenna, likely represent key nodes in the transmission of pharmaceutical knowledge and products, crucial gateways linking east and west.[93]

Ultimately, a combination of all these networks may have been involved in the introduction of the newly recorded ingredients, and further investigations into the dynamics underpinning this long-distance trade must be pursued in a future study. This chapter confirms McCormick's remark that the manuscripts 'may still hold some surprises'.[94] It is evident that these types of 'miscellaneous' recipes offer new insights into the evolution of medical knowledge and practice in the Carolingian world. To develop a more complete understanding of early medieval medicine, it is essential to explore this rich corpus in greater depth within both global and local frameworks, and the next chapter turns to the latter perspective.

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91 Alain George, 'Direct Sea Trade Between Early Islamic Iraq and Tang China: From the Exchange of Goods to the Transmission of Ideas', *Journal of the Royal Asiatic Society* 25, no. 4 (2015): 579–624. https://doi.org/10.1017/S1356186315000231.

92 Amar and Lev, *Arabian Drugs*, 129–227. On Byzantine connections in the west, see, for example, T. S. Brown, 'Byzantine Italy, *c*. 680-*c*. 876', in *The New Cambridge Medieval History* II, *c. 700-c. 900*, ed. Rosamond McKitterick (Cambridge: Cambridge University Press, 1995), 320–48; Michael McCormick, 'Byzantium and the West, 700–900', in *The New Cambridge Medieval History* II, *c. 700-c. 900*, ed. Rosamond McKitterick (Cambridge: Cambridge University Press, 1995), 349–80.

93 Thomas S. Brown, 'Ravenna and Other Early Rivals of Venice: Comparative Urban and Economic Development in the Upper Adriatic c.751–1050', in *Byzantium, Venice and the Medieval Adriatic: Spheres of Maritime Power and Influence, c. 700–1453*, ed. Magdalena Skoblar (Cambridge: Cambridge University Press, 2021), 173–87.

94 McCormick, *Origins of the European Economy*, 714, n. 84.