

# Islamic Pharmacology and Pharmacy in the Latin West: An Approach to Early Pharmacopoeias

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During the final decade of the 15th century and the first half of the 16th century, there were moves to harmonize pharmaceutical therapy in a number of areas of the Mediterranean and Central Europe. The most evident consequence was the appearance of books of compilations of simple and compound remedies specially selected from a wide range of earlier pharmacological literature. These compilations were set up as ‘standards’ by the authorities concerned with public health in many states. In theory, apothecaries were obliged to follow these ‘official’ instructions for preparing and dispensing drugs in order to ensure that the medicines prescribed by physicians were correctly made up and safe. The aim of this paper is to demonstrate the persistence of Arabic drugs and recipes through the content of three of these handbooks between 1499 and 1618.

Most of our Western medical heritage, written in either Arabic or Hebrew, was translated into Latin for the first time in Toledo, as well as in the southern Italian area of Salerno. It was indeed thanks to these translations that Islamic pharmacology was able to keep Greek traditions of drugs and drug-lore alive in the Latin West, with some local and Indian alterations, and to influence European medical texts from the 13th to the 19th centuries. Nonetheless, fascinating as this process may seem, apart from certain notable exceptions, such as the studies by Danielle Jacquart and Albert Dietrich, there are, surprisingly, still great gaps concerning key issues relating to the reception of Islamic pharmacology and pharmacy in the West.<sup>1</sup> Despite the existence of various studies of these translations into Latin from Arabic, Syriac and Indian works, or of the original aspects of Islamic contributions, such as the development of clinical medicine and the role of the *hisba* system in the

maintenance of standards,<sup>2</sup> we still do not have a clear picture of the reconstruction of the intellectual world of Arabized Galenism during the Renaissance within the context of the anti-Arabic Greek and Hellenist humanist rhetoric. There has been one significant exception to this in the work of Luis García Ballester and his school, which has shown the persistence of Arabized Galenism in the medical practice of *converso* or *morisco* minorities in 16th-century Spain.<sup>3</sup>

After an overview of what we already know about the reception of Islamic pharmacology in Medieval Europe, the aim of this paper is to consider some of these still unexplored issues through a discussion of early modern pharmacopoeias, understood as lists of suitable drugs to be safely administered by physicians and prepared and owned by apothecaries in many different political, social and regional environments, although perhaps I will be offering more questions than answers.

I will mainly deal with three early examples: the *Nuovo Receptario* from Florence (1499), the *Dispensatorium* of Nuremberg (1546) and the first *Pharmacopoeia Londinensis* (1618). My object is to determine the exact place of the Islamic contribution within these first attempts at official regulation of the materia medica for remedial therapy. The *terminus ad quem* has not been chosen at random. The first London pharmacopoeia was enforced as an official standard during a period of transition and radical change in medico-pharmaceutical thought in which medical humanism was shaped by a reconsideration of scholastic Galenism mixed with the introduction of iatrochemistry. How great, then, was the contribution of Islamic pharmacology to late medieval and early modern pharmacopoeias and to the medical attitudes they encompass?

### **Islamic sources and latin medieval drug books**

The predominance of the Greek and Roman tradition, after the fall of the Roman Empire, through the Arab Middle Ages was largely due to the Hellenized Christians, Jews and Persians who made up the bulk of population in the newly established Islamic empire and to the persistence of their centres of learning. Arab pharmacologists adopted and simplified Galen's theories on drug action thanks to their being available at an early date in Arabic translation through the recording efforts of Hunayn ibn Ishak (d. AD 873) and others. A well-documented area of pharmacology concerns the recognition and correct naming of drugs through correct knowledge of the linguistic transition from Greek to Arabic.<sup>4</sup> Drug books such as those of Abulcasis (d. c.AD 1013) or Maimonides (AD 1135–1204) were especially devoted to providing synonyms or explanations for the names of drugs (including Persian, Berber, 'Spanish' Arab, etc), in order to avoid adulteration by dealers, or the ignorance of middlemen.

On the other hand, Galen's insistence on the correlation between the 12 categories of drug intensity and the patient's condition was developed further in

the Islamic world. Authors such as al-Kindi (d. AD 873) established a gradation of the efficacy of drugs according to which the geometric progression of drug dosage produces an arithmetic increase in the sensation of their effect; a sort of mathematical pharmacology that was subsequently developed by Arnald of Vilanova, thanks to the translations made by Gerard of Cremona in Toledo.<sup>5</sup>

Whilst that process was being accomplished in the East, North Africa and Southern Spain, the rest of Europe, apparently lacking their theoretical and practical corpus of pharmacological wisdom, was making a great effort to preserve at least empirical knowledge of plants, animals and minerals as therapeutic tools thanks to compilations of ancient drug lore drawn up at monasteries and/or commissioned and prized in court circles.<sup>6</sup> By the end of the 13th century these *herbarius* compilations, sometimes based on abridgements of Dioscorides, were no longer of general value because the translation of Arabic medical treatises and the importance of theoretically oriented medical literature rendered these outmoded texts of little use to educated physicians, particularly those trained at the new universities.

By 1056, when Arab power was decreasing, the southern Italian city of Salerno had become an active centre of translation of this scientific heritage from Arabic into Latin. It was at that time that figures such as Constantine the African, a Nestorian Christian, put Galenic theories into Latin and it was precisely the theory of interaction of properties that soon found an application in pharmacology. One of Constantine's translations, *De gradibus*, gave a clear definition of Galen's notion of degree, one of the four parts into which the Ancients divided the temperament of a medicine.<sup>7</sup> The details provided by *De gradibus* were integrated in the *Circa instans* by Mattheus Platearius, a member of an important Salernitan family of doctors, and which became one of the most widely-used sources of medieval and Renaissance pharmacopoeias and, together with other easily available pharmacological texts, such as the *Antidotarium Nicolai*, formed a handbook for the pharmacist and medical man, even a suitable manual for the masters of medicine of Salerno whose task was to control the making of medicines by pharmacists.

Around the middle of the 15th century, Saladin of Ascoli, physician of the Prince of Taranto, wrote a *Compendium aromatariorum*, which has been considered to be the first work on pharmacy *sensu stricto*.<sup>8</sup> Saladin advised apothecaries to read these 6 texts: Avicenna's *Canon* (whose books 2 and 5 are devoted to pharmacy and materia medica), the book on simple medicines by Serapion, the *Liber servitoris* by Abulcasis, the *Clavis sanationis* by Simon of Genoa, the *Grabadin*, *De consolatione* by Mesue, and the *Antidotarium* by Nicholas of Salerno. As intermediaries between pharmacy and medicine, these guides were able to offer useful tools to practitioners when faced with the task of prescribing detailed treatment and having it prepared by the apothecary. As Danielle Jacquart states 'ils complétaient et rassemblaient de manière commode ce que l'Occident avait connu à travers les traductions précédentes de l'arabe ou du grec'.<sup>9</sup>

### The “Nuovo Receptario” (1499)

Later, during the last decade of the 15th century and the first half of the 16th century, there were movements towards harmonizing pharmaceutical therapy in various areas of the Mediterranean and Central Europe. The most evident consequence was the appearance of books of compilations of simple and compound remedies especially selected from a wide range of earlier pharmacological literature. These compilations were set up as ‘standards’ by the authorities concerned with public health in many national areas. In theory, apothecaries were obliged to follow these ‘official’ instructions for preparing and dispensing drugs in order to ensure that the medicines prescribed by physicians were correctly made up and safe. One such set of instructions was behind the *Nuovo receptario* from Florence (1499), whose aims can be clearly seen in the prologue:

We, Doctors of the Arts and Medicine of the famous College of Florence, most respected Consuls, have considered that the sick of our city undergo great danger since our pharmacists, be they in the city or in its surroundings, also commit many errors as a result of comparing the necessary books of regulations used until now for preparation, selection, preservation and elaboration, so that the physicians who exercise here are the object of defamatory comments. For this reason, we seek to fight, insofar as we are able, against such discomforts and such dangers for the sick, and thus in the future avoid the bad reputation which the physicians have gained, by correcting it in an honest and dignified manner [...] In the hope of confirming Plato’s sentence – There is no book that cannot be improved, either because it is too short and obscure or because it is too long and tiresome [...] Nothing should be overlooked, nor is it necessary to add anything, but rather the order of Mesue, Nicholas, Avicenna, Galen, [Rhazes’] Almansor and all authors who have made use of brevity should be followed.<sup>10</sup>

In this table we can appreciate to what extent formulas coming from the Arabic works translated into Latin are relevant as regards compound medicines recorded in the *Nuovo receptario* as a whole. Indeed, most of the 512 compound medicines which appear in the *receptario* are of Islamic origin: 232 of the compounds are from Mesue, 71 from Nicolaus, 36 from Ibn-Sina, others from Abulcasis, Avenzoar and Abolai. From Mesue we find 24 electuaries, 12 lenitive medicines, 12 loch, 26 juleps, 19 trochiscs, 28 pills, 23 sief, 15 colliria, 14 unguents, 13 plasters and 19 oils. (The occurrence in the *Receptario* of so many compound medicines made with elements of oriental origin is quite representative of the period.) The name Mesue refers to Yuhanna ibn Masawayh al-Mardini, known in the Latin world as Johannes Mesue. He was a supporter of Avicenna’s doctrines and many highly regarded works which circulated in Latin during the Middle Ages are attributed to him. Those works were commented on by well-known western masters such as Pietro d’Abano, Mondino dei Liuzzi and Christophorus de Honestis, who taught in Bologna from 1379 to 1386 and wrote an extensive

commentary on the Antidotary or *Qrabaddin*.<sup>11</sup> Latin translations of his writings were among the very first works on medicine to be printed, and in a variety of centres: *De medicinis universalibus et particularibus* (Venice, 1471), *De consolatione medicinarum simplicium* (Venice 1471), *De medicinis aegritudinum* (Strasbourg, 1475), *De re medica* (Lyon, 1544), the *Canones universales* (Florence 1471), *De simplicibus* (Florence 1471), *Grabaddin seu compendii secretorum medicamentorum*. (Antidotarium, Florence 1471).

‘Nicholas’ may refer to Nicholas of Salerno. But there is great confusion concerning this author. His recipe compilation seems to be a reduced version of the *Great Antidotary*, compiled at Salerno by 1100. Henry Sigerist pointed out that half of its descriptions are to be found in book X of *De Practica* in the *Pantegni*. However, thanks to the studies carried out by Danielle Jacquart, that part of the *Pantegni* seems to contain additions that do not appear in the original work by al-Magusi.<sup>12</sup> In addition, the Antidotary of *Nicolaus* contains ingredients and compounds whose names, in Persian or Arabic, have passed into modern western languages through their transliteration into Latin, e.g. ginger, styrax, balsamum, etc.

The *Receptario* is divided into three books, the first of which also considers the prerequisites for setting up an apothecary’s shop and the most essential books for the work of the professionals. Among these texts, Simon of Genoa’s *Clavis sanationis* (a sort of botanical dictionary compiled on the basis of Greek and Arabic writers), Matteo Silvatico’s *Liber pandectarum*, and Abu al-Qasim’s (Abulcasis) *Liber Serapionis* stand out. The author of the *Receptario* was Master Hyeronimo, son of Master Lodovico dal Pozzo Toscanelli, physician and citizen of Florence. He came from a family of pharmacists, physicians and scholars, and he had a shop in the 15th century in Via S. Martino in Florence. He was associated with a trading house of drugs and spices imported from the East belonging to Lodovico Toscanelli, who died in Pisa in 1483.

Many of the most commonly used simple medicines among the recipes also have an Eastern origin,<sup>13</sup> for instance:

Aloe	Aloe sp.
Rose	Rosa gallica
Gerosani	Charyophyllorum aromaticum
Gengiovo	Zingiberis sp.
Anici	Pimpinella anisum
Finochio	Anetum foeniculum
Regolitia	Glycyrrhiza glabra
Appio	Apium graveolens
Pepe lungho	Piper longum
Cardamomo	Elettuarium cardamomum

In addition, the final two chapters in the *Nuovo receptario* list the electuaries then ‘in use’ according to Mesue, Avicenna and other authorities, together with

the required frequency of dosing and the duration of their action. The second book constitutes the antidotary proper, in which some linguistic connections with Arabic may be seen in: de locchi, giulebbi, robubbi, suffuff and sieffi.

### The “Dispensatorium” by Valerius Cordus

By 1542, Valerius Cordus, the author of the *Dispensatorium*, which is the second pharmacopoeia discussed here, had a reputation for the careful, detailed study of nature. Johannes Crato says of him: ‘He frequently undertook difficult journeys just to investigate one plant’ and ‘he inquired after herbs with wondrous devotion and endured all sorts of hardships in order to know them precisely’.<sup>14</sup> Valerius Cordus lived in the times of what is known as medical humanism with its anti-Arab rhetoric, represented by contemporaries such as Niccolò Leonicensi, whose most important treatise was *Plinii et aliorum medicorum in medicina erroribus* (On the errors of Pliny and other physicians). The ‘other physicians’ are almost without exception Arabs. These writers drew their errors from the same source as Pliny, they copied earlier writers without understanding. To Leonicensi, the Arabs’ errors were far more dangerous than Pliny’s. Pliny, he claimed, was valued as a literary figure, not as a source on materia medica, but the Arabs were another matter, their mistakes lead to deadly errors on the part of physicians who followed them slavishly. Leonicensi’s main target was Avicenna and he even promised in *De Plinii erroribus* to produce a separate treatise devoted solely to the mistakes made by Avicenna ‘a cruel tyrant whose followers trust their leader completely and constantly affirm that which no experience has taught them.’ Finally he accused the Arabs of being chiefly responsible for the confusion of names that had caused so much trouble for students of plants. But Leonicensi’s criticisms took shape within the framework of his teaching and an attempt to reform the medical curriculum at the University of Ferrara, where in the late 15th century teaching texts were predominantly those written by Arabs, and where pharmacy was taught from Book two of Avicenna’s Canon.<sup>15</sup>

How is the Arab legacy approached in the list of suitable drugs by Valerius Cordus? Who is he referring to in his *Praefatio* when he says *dispensatorium ex omne genere bonorum auctorum, quum veterum tum recentium, de Pharmacorum omnium, quatenus in usu sunt?* Cordus’ Dispensatory was the first text to be legitimised by an authority, the Senate of Nuremberg, which went beyond the guilds of Florence. Cordus’ principal contribution was described as follows in the compendium of his works prepared by Conrad Gesner: ‘In the *Dispensatorium* (1546), by means of a limited selection of prescriptions, he established order in the existing unsystematic corpus of medication, with the result that it soon became the obligatory pharmacopoeia for all Germany.’<sup>16</sup> Apart from the description of approximately 225 medicinal plants and minerals, Cordus also

referred to the origin and adulteration of drugs. The expertise of Cordus in pharmacognosy, leaving aside the small publication *De Halosantho* (1566), is very apparent in his *Dispensatorium* and the *Annotationes*, which are based on his wide knowledge of materia medica. In his assessment of remedies, he took into account the experience he had acquired in the pharmacies of Leipzig and Wittenberg.

In his writings, the occurrence of compounds of Arabic origin has decreased slightly compared with the *Inventario*, but the *Annotationes* show us to what extent Arabic sources were taken into account and were constantly being quoted by the so-called ‘humanist’ botanists, beyond the supposed errors attributed to them by Leonicensis. Cordus not only tried to clarify some Arabic terms but also tried to restore the original information transmitted by some Arabic sources to help the everyday practice of pharmacy. As for Diathamaron (Nic.): ‘Tamar means date among the Arabs, that is the fruit of the palm, so Diathamaron is the name of the confection’ (*Thamar Arabibus dactylum, palma arboris fructum significat, unde confectio nomen Diathamaron*). As for Succus Eupatorii, one of the ingredients in Dialacca maior (Mes.), ‘that juice must not be prepared from the vulgar Eupatorio, neither from Greek Eupatorium, which today is called Agrimonia, but from the Eupatorio described by Mesue’. (*Hic succus non debet fieri ex vulgari Eupatorio, neque ex Eupatorio Graecorum .i. Agrimonia falso hodie, sed ex Eupatorio quod Mesuae describit*). As for Electuarium Laetificans (Ras.), Cordus concluded that Neremisch was ‘according to Rhazes’ Rosa asinina. But the translator of Averroes identified Rosa asinina with Paeonia. Thus, according to this, Neremisch is the same as Paeonia: although Rhazes made different chapters for each of them. Thus we cannot say that Paeonia was Neremisch (*Apud Rasim est Rosa asinina. Averrois autem interpretes dicit Paeoniam esse rosam asinorum, ergo secundum hunc Neremisch Idem esset quod Paeonia: nisi Rhasis de utraque, id est, de Neremisch et de Paeonia, duo propria faceret capitula, tanquam de rebus diversis. Certo igitur statuere non possumus, quid sit Neremisch*).<sup>18</sup> Many more examples could be offered of Cordus’ linguistic and botanical skills, but it is important to point out that from the total of compound medicines in Cordus’ text, 212 were of Arab origin compared with 208 from non-Arab sources.

As we can see, a deep feeling of historical specificity and particularity can be discerned precisely in the very tension between the humanists’ idea of the ancient world (idealized and schematic as it was) and the demands of their own times. After all, even according to Leonicensis, it was Avicenna who admitted he was but the interpreter of Galen, and who advised that those who did not wish to believe their senses should be burnt or whipped, so that by experiencing pain they would come to realize that the judgements of the senses are true. It seems then that ignorance of texts should have practical consequences for physicians,

whose pharmacopoeia should be considered poorer as a result of their neglect of ancient knowledge.

### **The London Pharmacopoeia**

In 1618, the Royal College of Physicians of London witnessed the birth of a text, a new pharmacopoeia, conceived at the end of the 16th century, although it did not see the light until 1618. By then, medicine as practised by Galen and Hippocrates had been modified by the Arabs and had more recently been revolutionized by Paracelsus and his followers with the introduction of the so-called 'chemical remedies'. The battle concerning the 'chymical' concept represents but the culmination of a fierce struggle between the representatives of the two schools (chymics or hermetics and Hippocratic and Galenists, on the other hand) that had begun much earlier.<sup>18</sup> Still, the 'chymical' concept long antedates Paracelsus. For instance, the process of distillation regarded as a chemical process was known to the ancients and developed by the Arabs during the Middle Ages. If any individual were to be credited with the introduction of the 'chemical' concept into Western therapy, this individual should not be Paracelsus but Arnald of Villanova.<sup>19</sup>

It should be taken into account that associations between knowledge of useful matters and commercial interests were very clear in the medical market place and in the very fierce struggle against iatrochemistry. Iatrochemistry, or medical alchemy, was used to dissolve and alter substances, breaking them down into their component parts. One of the most common alchemical processes was to extract the essence of substances through distillation. Distillation apparatus had become powerful by the end of the 13th century thanks to the Islamic legacy. Using distillation and similar methods of preparation, medicines could be made in large quantities relatively cheaply yet last for long periods without obvious loss of potency. In fact, apothecary shops are frequently portrayed with distilling apparatus in the lower left corner. At the same time, the method of chemical preparation itself disguised the ingredients, helping to keep the secret remedies secret. As a result, many people who marketed remedies of their own making found iatrochemistry to be fundamental for their business.<sup>20</sup>

By the end of the 17th century at the Hague Collegium Medico-Pharmaceuticum, apothecaries had to abide by various rules, including compounding all ingredients according to the 'Antidotarium' (the relatively short medieval *Antidotarium Nicolai*, stipulated by an ordinance of 1550). On the other hand, Inventories and price lists of various drugs on sale all over Europe show how the expertise of apothecaries rested on the claim to know about the often exotic substances in which they dealt. Substantial civic medical gardens (where specimens were sent) were seriously needed by apothecaries and physicians given the revolution occurring in botany and pharmacy

and the increasing availability of medicinal substances from exotic places, to say nothing of rapid developments in iatrochemistry, thanks to the awakening of trade.<sup>21</sup> In this pharmacopoeia, prescriptions from Arab origin are reduced to 215 versus 497 compounds from Graeco-Roman, or of unknown origin. The Arabic recipes, then, are reduced almost to nothing, and there is little of the linguistic discussions about identification favoured by Cordus and other humanist pharmacists such as Matthioli.

The Pharmacopoeia paid attention to the careful description of the observable world rather than theorizing. In the 1990s, Danielle Jacquart and Françoise Micheau drew our attention to the fact that, in the framework of a form of medicine that describes itself as wise (*savante*), ‘There is no hiatus between the theories discussed in academic circles and those offered by the drug merchants’ shop. And it is thus within this framework that it is not difficult to imagine that Islamic medicine was of specific influence on many aspects of western life’.<sup>22</sup> Not only is this statement still valid, but it continues to be the main gateway to a fascinating agenda of research for the future, an agenda that has to clarify the prevalence of Islamic medicine and Arabized Galenism in depth within the very ‘intimate history’ of medical practice long after the Renaissance. The changes in the prescription and usage of Arabized drugs and recipes shown by these three handbooks are not just evidence of a shift in medical thinking from books to practical expertise, or of a deliberate rejection of things Arabic. They also attest to a tradition of empirical observation and collecting in which Arabic authors, and often their Western translators, also shared.

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