

Islamic Pharmacology in the Middle Ages: Theories and Substances

DANIELLE JACQUART

Ecole pratique des Hautes Etudes, Sorbonne, 45-47 rue des Ecoles,
75005 Paris, France. E-mail: Danielle.Jacquart@ephe.sorbonne.fr

From the ninth to the 13th century, numerous works on pharmacology were written in Arabic in Eastern as well as in Western parts of the Islamic world. Starting from Galen and Dioscorides, the Islamic authors greatly improved on the Greek heritage. Among the theories they developed, two major trends stand out. The first trend emphasized medicinal degrees of primary qualities, and thus could lead to the promotion of mathematical rules. The second trend, on the contrary, focused on ‘the whole form’ of the substances, and opened the way to an experimental approach. Both these trends will continue in European pharmacology up to the Modern period.

In his survey of Islamic medicine, published in 1978, Manfred Ullmann was quite severe in his evaluation of medieval Islam’s achievements in pharmacology. After mentioning that Islamic pharmaceuticals fell apart in two branches, namely the use of simple remedies and the use of compounds, and that both these branches had their roots in Galen’s works, he states:

This literary model determined the entire pharmaceutical literature of the Arabs, a corpus of endless extent. The Arabic bibliographers recognize more than a hundred authors who wrote about materia medica, but only a few of these works are original, independent achievements. Most are compilations and hardly in any other branch of literature has so much been copied as here.¹

In spite of the high esteem in which I hold Manfred Ullmann, a very accomplished Arabist, I cannot agree with this harsh judgement. It is true that many Islamic pharmaceutical works seem repetitive, and it is also true that Dioscorides and Galen provided the groundwork for the development of learned pharmacology and pharmaceuticals in the Islamic world. However, this does not mean that the Islamic works in question do not deserve our consideration. It is not without significance that so many authors were active in the field. At the very least, this

suggests there was a major interest in it.² A careful reading shows that there are important variations from one author to another within a framework that could seem repetitive and not very innovative. Further pharmacological or pharmaceutical writings testify to a confluence of cultures, the traces of which are preserved in a very rich, complex and multilingual vocabulary.

So as not to limit myself to generalities, I have chosen to consider in more detail two works, very different in extent and fame. Both were translated into Latin during the medieval period, but again with quite a different diffusion.

Abû l-Salt and medicinal degrees

The first work is the *Kitâb al-adwiya al-mufrada* (*Book on Simple Medicines*) of Abû l-Salt Umayya. Abû l-Salt was born in Eastern al-Andalus, in Denia, in 1068. At some time during his youth he went to Egypt, and on his way back he decided to settle in Mahdiyya, in present-day Tunisia, where he also died in 1134. He was an eclectic author, writing on a great variety of disciplines. He composed poetry, wrote a little book on Aristotelian logic, some works on astronomy, including a treatise on the instrument called equatorium,³ was interested in music and history, and wrote a description of Egypt. In the field of medicine, he wrote a controversial defence of Hunain ibn Ishâq, the great translator from Greek into Arabic and a medical author during the ninth century in Baghdad. This defence was a reply to Alî ibn Ridwân, a physician who lived in Cairo and died the very year Abû l-Salt was born. Finally, Abû l-Salt wrote a treatise on simple medicines. Three main reasons have led me to focus on this text. To begin with, it was written by an Andalusî. Second, it is representative of one major trend of Arabic pharmacology, particularly in the Western Islamic world. Finally, it has recently appeared in a critical edition, along with its medieval translations into Latin and Catalan.⁴ The latter, as well as a Hebrew version, were made from Arnald of Villanova's Latin translation, dating from the end of the 13th century. The Arabic text contains a prologue that is lacking in the diverse medieval translations.

Although Abû l-Salt's book focuses on simple drugs, it was clearly also intended to help physicians to compose mixtures with them. As stated in the prologue, there were several reasons for using compound medicines: they might be compounded in order to reinforce each other, to prevent a strong medicine from harming the body, to facilitate the assimilation of the active substances, to prolong the curative effects, and so forth. There was nothing innovative in these statements, which went back to Galenic pharmacology.⁵ The very first reason put forward by Abû l-Salt was related to another principle, however, which also had its roots in Galen. The main purpose of pharmaceutical treatment was to restore an unbalanced state in the qualities that gave its natural complexion either to the

whole body or to a part of it. The rule was to prescribe drugs having a quality opposite to that which caused problems. An additional difficulty was that each quality – cold, hot, moist or dry – was assigned a degree of intensity, from the first, the lowest, to the fourth, the highest. In a very simple manner, Abû l-Salt states that the main reason for using a compound medicine is to serve as a substitute for a simple one that is not available. The example he gives is the following: if the heat of the body departs from its natural state by two degrees plus, and the physician does not have at hand simple drugs at the second degree of coldness, he may mix a substance of the first degree of coldness with a substance of the third degree of coldness. Probably aware that this rule was a little too simplistic according to pharmacological theories of his days, he added that ‘if the two medicines are not at the same distance from the desired degree [...] one should use the corresponding proportional amount of each one’. The determination of the dose of each component and of the whole compound is not an easy matter either. Again, Abû l-Salt keeps it simple. For the determination of the dose of each component, he refers his reader to ‘a number of famous books’. As for the dose of the whole, the general rule is that the dose of a compound depends on the number of its components. For example, let us suppose that we are combining two *dirhams* of aloes, two *dirhams* of agaric, one-third *dirham* of colocynth pulp and one-half *dirham* of scammony: the sum of all these is five and one-sixth *dirham*. Since there are four ingredients, the dose of the compound would be equal to one-quarter of this amount, or approximately one and one-third *dirham*. Before commenting further on these statements, let us consider the organization of Abû l-Salt’s work. At the beginning of his prologue, he states that the particular order in which he has chosen to list his simple medicines is more appropriate than the more usual alphabetical order. To present substances according to the alphabetical order of their names was what Galen did in some parts of his treatise on simple drugs,⁶ and this principle of organization was often followed by Arabic writers. Abû l-Salt chose to arrange the medicines according to their effects, beginning with those medicines that evacuate and moderate the humours of the body, since this is, in his view, the first intervention that any physician had to make. He then turns to medicines that have an effect on the whole body, through their maturating, constrictive, or appetizing actions and so forth. Next he lists medicines that had an effect on the anatomical parts of the body, i.e. the bones, nerves, muscles and veins. Finally, he deals with the medicines to be used for illnesses affecting one specific organ of the body, ranging from head to toe. The result is that most simple medicines appear several times, and sometimes up to eight times, according to their indications. For instance, absinthe appears four times, in the chapters on bile, on the veins, on the liver and on the stomach. Apart from the drugs mentioned in his sixth chapter, which act on the whole body, the presentation of the effects of each simple

medicine begins with the indication of its two dominant primary qualities with their respective degrees. This was no doubt fundamental in Abû l-Salt's views, and in so doing he reflects an important feature of Arabic pharmacology, particularly in the Western part of the Islamic world. In order to help physicians when they had to prescribe drugs for specific diseases, Abû l-Salt's book mentions 420 substances, for the most part plants, but also mineral or animal substances. To the substances known to the Greek authors he adds substances found throughout the Islamic world. As I have already suggested, the theoretical rules stated in the prologue remain at a superficial level, referring the reader for more detail to other books. Nothing is really said about the calculation of the final degree of a compound, nor about the mutual actions of simple substances within a compound. Galen had made the distinction of four degrees of qualitative intensity but did not hold systematically to this idea in his own works. Some Arabic authors greatly developed this idea, systematically following up on its implications. An innovative work was produced in Baghdad in the ninth-century by the philosopher and scientist al-Kindî, who devised a mathematical rule to calculate the final degree of qualities of a compound, taking into account the mutual actions of the simple substances thus mixed together. This rule was challenged in 12th-century al-Andalus by Averroes. He proposed an alternative, again in mathematical terms. Finally, Arnald of Villanova, in Montpellier, around 1300 wrote *Aphorisms* on this topic in Latin, relying on both al-Kindî and Averroes.⁷

Focusing on medicinal degrees and, consequently, on a pharmacology that relied mostly on the primary qualities of substances, seems to have been a major trend in al-Andalus. In North-Africa, at the end of the 10th century, Ibn al-Jazzâr had written works on drugs that carefully took medicinal degrees into account.⁸ In Toledo, in the 11th century, Ibn Wâfid wrote an important pharmacological work admired by his contemporary, the famous historian and astronomer Sâ'id al-Andalûsî. Ibn Wâfid, he said, was very careful in giving the most simple and natural medication, in having organized what he had found in ancient authors, and in taking care to give the correct degrees of drugs.⁹ Closer in time to Abû l-Salt, Ibn Buklârish, who lived in Almeria and Zaragoza, also wrote a book on simple drugs, which he organized in alphabetical order. In his prologue and introductory chapters, Ibn Buklârish deals at length with the question of the degrees of intensity of qualities, without avoiding the difficulty in setting reliable rules.¹⁰

Avicenna and the effect through 'the whole form'

Now let us return to the beginning of the 11th century and cross to Iran and Central Asia, to meet my second representative of Islamic pharmacology, Avicenna, a major figure in medieval philosophy and medicine.¹¹ He was born around 980 in Bukhara and died in 1037 in Hamadan. Avicenna devoted many

years, while travelling from place to place, to the writing of his huge *Canon of Medicine*. Of the five books that compose this cleverly organized masterpiece, two are devoted to pharmacology, presenting both theories and substances. Moreover, as Avicenna states himself in the fifth book of his *Canon*, the reader can also find information on treatments and recipes in the third book, dealing with diseases from head to toe, and in the fourth book, dealing with diseases affecting the whole body, such as fevers or poisoning. In the first book are to be found general rules about pharmaceutical therapy.¹²

The second book dealt with the same matters as Abû l-Salt's treatise: simple drugs. The first part expounds general rules and proposes what was called 'the science of the powers of medicines'. Those powers, according to Avicenna, were known in two ways: by reasoning and by experiment. Even if, in the very early days of the medical profession, these qualities had been discovered through observation, it was from bookish knowledge and by reasoning that the learned physician could deduce from the qualities of any substance what qualitative change it could produce. As for the powers only known through experiment, these were not deduced from the qualities or the appearance of the pharmaceutical ingredients, but they rather acted through their whole form or substance. Their action could only be revealed by an experimental test. Yet this did not mean that ordinary physicians themselves had to undertake such experiments. Rather, they relied upon experiments carried out by their predecessors. Pharmaceutical action through the whole form or the whole substance had already been mentioned by Galen, but Avicenna greatly expanded upon the latter's theory. In the second book of the *Canon*, after having put forward his general assertions, he lists about 800 simple substances, plants as well as minerals and animal substances. At variance with Abû l-Salt, Avicenna opted for an alphabetical order, and for a uniform presentation of each substance. The information provided for every simple substance contains, always in the same order, its name, its criteria of goodness, which sometimes included a description of the simple substance as it is found in the natural world, and its nature, that is its primary qualities. Then are listed general actions from a range of 22 possibilities – resolution, astringency, softening and so forth. After that, specific properties are listed according to a grid of 11 kinds of diseases. The last item concerns eventual substitutes. In order to reduce the inconvenience of alphabetical order, the successive headings within each listing were graphically distinguished. This part of Book II was thus a double entry table, through the names of simple drugs, and their main features. Let us focus on the heading 'nature', which provided information about the primary qualities of the simple substances. Again, different from Abû l-Salt, who gave only one alternative, Avicenna mentions the differences of opinion between authors: for instance, for absinthe, he states that it is hot at the first degree, and dry at the second, but also relates that some authors had stated

that it was dry at the third degree, which seemed perhaps more accurate. The differences could be more radical. Cypress, for instance, is hot at the first degree according to some authorities, but utterly cold according to others. The fact that Avicenna systematically mentions this kind of divergence, most of the time without indicating his own preference, strongly suggests a reluctance to take seriously the theory of medicinal degrees, and this reluctance is borne out in other parts of his *Canon*. In Book I, he only mentions, without lingering on this, that medication implies the measuring of primary qualities, by attributing to each of them a degree. This reluctance is confirmed by the content of Book V, devoted to compounds. The introductory chapter, which expounds the reasons for using compounds, does not mention medicinal degrees at all. Where Avicenna at first sight seems to concur with Abû l-Salt, is when he states that if a physician did not have at hand one simple medicine that is, for instance, hot enough, there would then be a need to aggregate two simple medicines. Nevertheless it is not degrees which are involved in this passage of Avicenna's Book V. If a one quarter part heating medicine is needed, and the one at hand is one third part heating, it is possible to add another which is one fifth part heating, in the hope that the whole is equal to one fourth part. The fact that the scale goes down to the fifth part strongly suggests that the word 'part' (*al-ju'z* in Arabic) here does not mean 'degree'. At the very end of this introductory chapter, Avicenna gives as a general rule that it is better to use proven remedies (*mujarrab*), which have been tested through experience. As explanation he offers the following. The action of any compound results either from its simple components or from its whole form. Just as the simple drugs act either by their qualities or by their whole form or substance, a compound cannot be considered as the result only of the interacting qualities of its components. It also has its own whole form, which can be known only through experience. Thus, it is not sufficient to know what the qualities and actions of the simple components are in order to deduce the power of a compound. The latter can be unexpected. Moreover, the resulting own form that the complexion of the mixture acquires might have a stronger effect than expected from its components. Under these conditions, we understand why Avicenna does not put forward any rule for measuring the final qualities of a compound. In a sense, Avicenna seems more faithful to Galen's pharmacology, which also did not take into account so much medicinal degrees.

The emphasis on tested medicines explains why the fifth book of the *Canon* looks like a huge compilation of recipes. The purpose was to provide the reader with as wide a range of proven remedies as possible. As for its organization, Galen served as a model with his work on compound medicines, in which the first ten books listed medicines according to the parts of the body they were supposed to treat, whereas the final seven books listed remedies according to their kinds.¹³ In the first part of Book V, Avicenna lists different kinds of

medicines, starting with great compositions, involving not only combining simple substances but also compounds, and finishing with ointments and plasters. This first part is completed by a kind of index, recapitulating the names of the compounds according to their main indications. In the second part of this Book V, complementary recipes are organized according to the parts of the body for which they are intended.

The first part of Book V is no doubt a compilation, reproducing descriptions (of compound drugs) mostly found in books recording statements by predecessors that testified to their proven value. Contrary to his habit in the other books of his *Canon*, where he seldom mentions his sources, even when he quotes verbatim, in Book V Avicenna cites numerous names of authors, Greek as well as Arabic and Indian. It is not impossible that he did not himself put together this huge bunch of descriptions, but rather relied on compilations already existing. However, there are the personal remarks, pointing out for instance the discrepancies between Galen's description and the recipe that Avicenna reproduces from another source, and more generally pointing out variations from one description to another. Sometimes his own expertise is evident. Here is one example, among many. Describing a composition called *shîlthâ* (*scelithe* in Latin),¹⁴ Avicenna expresses some scepticism. According to all physicians, this compound possessed extraordinary power, with a multiplicity of indications. Avicenna is far from being convinced. He considers this medicine as badly devised and indicated only for softening the tongue. On other occasions, after having given descriptions from other authorities, he gives his own recipe. Sometimes he also relates the usual conditions under which some products are available. For instance, for a candied compound, the basis of which is the root of *shaqâqul*, identifiable with an umbelliferous plant, a kind of wild carrot, Avicenna points out that it is imported from India already candied, and that it is of high quality. He also reports how it is prepared in his time and region. He makes the same kind of observation about ginger, which was imported from China, candied with honey or rice-water; he also relates how it is candied in his time and region with honey and spices. So this part of Book V is not only an erudite compilation of book knowledge, it is also intended to deliver information adapted to Avicenna's time and cultural environment.

From Arabic to Latin

The confluence of cultures I alluded to earlier is testified to by the fact that Avicenna's *Canon* found its way to Toledo, where it was translated into Latin.¹⁵ Of course, its translator, Gerard of Cremona, like his potential readers, was less interested in discovering unknown cultures than in useful information. Even though all this pharmaceutical information more often than not gave rise to

misinterpretations or unsolved puzzles, it still changed Western habits significantly, because it made clear that Arabic pharmacology and pharmaceuticals had greatly improved on the Greek heritage. Revised theories were proffered, new substances and vocabulary were introduced, as well as new techniques of preparation, notably distillation.

The two main trends illustrated by Abû l-Salt and Avicenna also found their way into Latin Europe. Some physicians, such as Arnald of Villanova, were more attracted to a pharmacology founded on a rational estimation of the interaction of primary qualities, whereas others were more inclined to emphasize the notion of total form or substance, which opened a path to experiment and to pharmaceutical know-how. The notion of total form was then better known under the term of 'specific form' or 'substantial form', an expression and concept that persisted until the 17th and 18th centuries.

References and Notes

1. M. Ullmann (1978) *Islamic Medicine* (Edinburgh: Edinburgh University Press), p. 193.
2. M. Levey (1973) *Early Arabic Pharmacology, An Introduction based on Ancient and Medieval Sources* (Leiden: Brill).
3. M. Comes (ed.) (1991) *Ecuadorios andalusies. Ibn al Samh al-Zarqâllu y Abû l-Salt* (Barcelona: Universitat de Barcelona).
4. Abû l-Salt Umayya (2004) *Kitâb al-adwiya al-mufrada*. Arabic text, Latin and Catalan medieval translations, edited and introduced by A. Labarta, J. Martínez Gázquez, M. R. McVaugh, D. Jacquart and L. Cifuentes. *Arnaldi de Villanova Opera Medica Omnia XVII* (Barcelona: Universitat de Barcelona).
5. On Galenic pharmacology see A. Debru (ed.) (1997) *Galen on pharmacology* (Leiden, New York, Köln: Brill).
6. Galen, *De simplicium medicamentorum temperamentis et facultatibus*, edited by C. G. Kühn (1964–1965) *Claudii Galeni Opera Omnia XI–XII* (Hildesheim). Olms (repr. of the edition of 1821–1833).
7. Arnald of Villanova (1975) *Aphorismi de gradibus*. In: M. R. McVaugh (ed.) *Arnaldi de Villanova Opera Medica Omnia II* (Granada-Barcelona: Seminarium Historiae Medicae Granatensis).
8. See M. Ullmann (1970) *Die Medizin im Islam* (Leiden, Köln: Brill), pp. 268–269.
9. Sâ'id al-Andalusî (1991) *Tabaqât al-'Umam*. Translated into English by S. I. Salem and A. Kumar (Austin: University of Texas Press). Edition of Ibn Wâfid (1995) *Kitâb al-adwiya al-mufrada (Libro de los medicamentos simples)* by L. F. Aguirre de Cárcer (Madrid: C.S.I.C.–I.C.M.A.).
10. A. Labarta (1981) El prólogo de *al-Kitâb al-Musta'inî* de Ibn Buklârish. Texto árabe y traducción anotada. In: J. Vernet (ed.) *Estudios sobre historia de la ciencia árabe* (Barcelona: Universitat de Barcelona), pp. 181–316.
11. See G. Strohmaier (1999) *Avicenna* (München: C.M. Beck).
12. Ibn Sînâ (1877) *al-Qânûn fî l-tibb*, 3 vols. Bûlâq (ed.) (Cairo).

13. Galen, *De compositione medicamentorum secundum locos*,
De compositione medicamentorum per genera, edited by C. G. Kühn
(1964–1965) *Claudii Galeni Opera Omnia* XII–XIII (Hildesheim). Olms
(repr. of the edition of 1821–1833).
14. Bûlâq (ed.) vol. 3, p. 318.
15. Avicenna, *Liber Canonis*, ed. Venice 1507 (reprod. Hildesheim: Olms,
1964).

About the Author

Danielle Jacquart is Professor of the History of Science in the Middle Ages at the Ecole Pratique des Hautes Etudes (Paris, Sorbonne). Her published books include *La médecine arabe et l'Occident médiéval* (1990), *La médecine médiévale dans le cadre parisien* (1997), *L'épopée de la science arabe* (2005). She is a Corresponding Fellow of the Medieval Academy of America and a member of the Academia Europaea.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.