

ARABIC PHARMACOPOEIA AND TUNISIAN PHARMAOPOEIA

Joëlle RICORDEL¹, Radhi JAZI²

Medicine and pharmacy¹

Medicine and pharmacy are intrinsically linked in the three major classifications of science established by Arab-Muslim philosophers and physicians al-Kindī, al-Farabī and Ibn Sīnā (Avicenna). In the "epistle on intellectual sciences" (*Risāla fī aqsām al-`ulūm al-`aqliyya*), the latter makes a systematic table of sciences. He places medicine among the secondary branches of physics and considers that it consists on the one hand, in the knowledge of the body and its states, on the other hand, on an action that consists to counter illness and in maintain health. Perhaps it is possible to find in the second proposal a place for those who thanks to their knowledge of the medicinal drugs can be active on illness. Al-Rāzī (Rhazès) (865-925) is the first physician to have clearly recalled the separation of medicine and pharmacy. He writes in Book VII (chapter XXII) of *Kitāb al-Ḥāwī*: « The knowledge of medicines and the differentiation between their good or their bad quality, their purity or their falsification are not necessary to the physician...and it is not allowed to call physician, one who has good knowledge of the various kinds of drugs. But, is called physician who knows the effects of medicinal drugs on the human body »².



Rhazes

Al-Birūnī (died in 1048) seems to consider that the individualization of pharmacy is fulfilled when he writes the introduction of the book he devotes to this « art at the service of

¹ SPHERE (UMR 7219) CNRS/ Paris VII, Paris, France

² Membre de l'Académie tunisienne des sciences, des lettres et des arts. Membre de l'Académie Nationale de Pharmacie (France).

medicine »³. He says that « pharmacy consists of knowledge of simple drugs, in terms of their types, their kinds and characteristics, and of knowledge of the preparation of compound drugs according to a proven recipe or according to the request of the person in charge of the treatment »⁴. However, this separation remains theoretical even if there is a specific terminology to differentiate the apothecaries (*ṣayādila*) from physicians (*aṭibbā'*) and from druggists and perfumers.

What paper did the *ṣayādila* play in the medical hierarchy? In the reading of the note that the bibliographer Abī Uṣaybi`a devoted to the physician Ibn al-Ġazzār (died in 980), it is possible to think that it was limited. He says that « at the entrance of his house, he installed a young man called *Rašīq* in whose hands he put all sorts of candieds, syrups and drugs. In the morning, after examining the patients and their urines, he sent them to *Rašīq* to give them the prescribed medication »⁵. According to this note, it does not appear that the mentioned auxiliary was appointed to other functions than the delivery of the drugs and, the perception of the price of the prescribed treatment and other possible expenses.

Were there specific places for drug preparation and distribution? The sale of medicinal substances was practiced often close to the place of consultation of the physicians but also near the stalls of the druggists or of the perfumers. In the Muslim East, the early foundation of hospitals⁶ has allowed for places to be dedicated to the storage of raw material and the preparation of drugs. It even seems that a person has been assigned to the supplies and that helpers assist the physicians in the preparation of syrups, potions and electuaries. In the western part of the Muslim world, Al-Andalus, in the absence of hospital, places in the palaces, called *ḥizāna al-ašriba* or *ḥizāna al-ṭibb*, are reserves for medicinal substances. Physicians are in charge of their management. For example, at the end of the 10th century, in the palace of Madīna al-Zahrā' near Cordova, the physician Al-Ḥarrānī was assisted by twelve young men who cooked the syrups and prepared the electuaries. Should we see in their presence alongside the physician, the beginnings of a class of pharmacists?

It was not until the 13th century that the pharmaceutical profession was officially admitted. At that time, Kūhīn al-`aṭṭār finally talks about pharmacy as one of the noblest professions.



Minhāj al-dukkān

His book “Good practices for pharmacy”, *Minhāj al-dukkān*⁷, is a practical textbook intended for his son or for one of his close followers. The author provides advice for a good exercise of the profession. He makes recommendations on hygiene and indicates the rules of a good practice. For example, he writes : ” *When you enter your room, take the scales, wipe its trays and its stirrups from the remaining dirt of the day before and which weigh them down. Adjust them so that the balance is fair. Wipe the weights and test them at the beginning of every month, although it is better to do it every week... When you take a container to prepare a syrup, an aromatic water or an essential oil, inspect it before you put something in and observe it before covering it because it will be sealed with your stamp. Scrape the spoons every morning and evening, clean them until there is no odor and wrap them in a clean cloth*”⁸.

Arabic pharmacopoeias

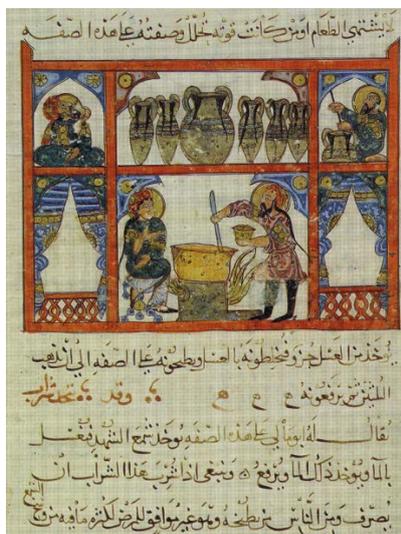
Generally, the first Arabic pharmacopoeias are designated by the word *aqrābādīn*, term coming from ancient Greek introduced into the Arabic language through the Syriac language. Then, they took the name of *dustūr al-adwiya*, which can correspond to pharmacopoeia and de *ṣiyağ al-diwā'iya*, formulary. *Aqrābādīn* or sometimes *qarābādīn* gave the modern form *grabadin*.

The pharmaceutical formularies, pharmacopoeias, antidotaries or *aqrābādīn* are dedicated to compound remedies. They list the ingredients, usually simple drugs (*al-adwiya al-mufrada*),

entering the preparations by pointing out the quantities used, for each of them. The methods of preparation, of administration and of conservation are then detailed. Often the indication appears in the title of the recipe. Some of these formularies are suitable for hospital use and carry title of *dustūr al-bīmāristān*. This kind of textbook, of utilitarian and practical use, aims to serve as a guide in medical prescriptions. It is less intended for medical theorists than for practitioners who are confronted every day with the necessity to manage a treatment.

The treatises called *muğarrabāt* or *tağārib* represent a small branch of the pharmaceutical literature related to the kind of *aqrābādīn*. However, unlike these last, they are compilations of drugs and treatments related to specific and individualized medical cases. *Al-muğarrabāt* gather prescriptions that correspond to clinical - case observations and offer recipes confirmed by experience⁹.

In addition to this list of specialized works, there are the books on poisons that list various recipes of antidotes from the simplest to the most complex. The small or great theriacs are the most notable examples¹⁰. There is not a single drafting model. The classification is diversified, either according to the organ studied, or according to the therapeutic form described. Some of these books are clearly identifiable by their title (*al-aqrābādīn al-kabīr*, *the great formulary*), others are more discreet about their content (*kitāb al-wisād fī al-ṭibb*, *the book of the pillow on medicine*) and others, as the *muğarrabāt*, adopt a particular angle of view. Finally, the medical encyclopædias include generally a pharmacopeia.



Arabic translation of the *Materia Medica* of Dioscorides

The sources of the pharmacopoeias

In its beginnings, Arab-Muslim medicine borrows from a multicultural register to establish its foundations. The medical corpus in Arabic language was mainly based on the writings of Greek physicians, compiled later by scholars as Oribase and Paul of Aegina and then translated into Syriac and Arabic languages. These Greek sources are principally the works of Dioskurides and Galen. However, traditional and pragmatic elements, whether from popular medicine practiced by shamans and healers or from medicines more elaborate such as those of Ancient Egypt or Persia, also enter this pharmacopeia. Indeed, Mesopotamian tablets and Egyptian papyri attest to the existence of traditional medicine although it seems that some of the technics used have been lost. Finally, the contributions and influences of Chinese and Indian medicines are not at all to neglect.

In the Arab world, the pharmacopeia, like scientific disciplines in general, made great progress in the second half part of the 8th century and especially between the 10th and 13th century.

Based on theories of simple drugs (*al-adwiya al-mufrada*) and their effects on the human body, complex polypharmaceutical formulas are developed which underlie the fact that the method of preparation of compound drugs and their use have been studied. Thus, the opinions of the physicians are always divided on the question which concerns the nature of the compound drug. Some of them consider the quality of the compound drug as a superposition of the qualities of each simple drug, others think that the new mixture has qualities and properties peculiar to it¹¹.

Among the remarkable pharmaceutical forms used by the Arab physicians, it is possible to differentiate some of them: electuaries, syrups, robs, candieds, loaches, ointments, pessaries¹²...

Electuaries (*ğawāriš*): Not known by the Greeks and probably of Persian origin, they are soft-consistency preparations, made by fine powders agglutinated with honey, syrup or liquid resin. Avicenna consider them the remedy of kings.

One of the formulas he transmits includes fifteen substances among which, the three microloans (black, citrin and of Kabul)¹³, peppers, nigella, ginger...

The procedure is to incorporate in the melted sugar the reduced ingredients in fine powder and to make pills the size of a hazelnut. One hazelnut a day, taken with cold water, can treat fistulas, gonorrhoea, venereal disease, joint pain. The remedy, said to be "safe", beautifies the complexion, protects the eyesight and is an aphrodisiac.

Syrups and robs

These two words come from the Arabic language. The difference between these two pharmaceutical forms is explained by Kūhīn al-`Aṭṭār : in the syrup, the sugar is in proportion stronger than the fruits; in the rob, there is more fruits than sugar and sometimes no sugar at all.

Candied

Kūhīn al-`Aṭṭār gives the recipe for candied roses which consists, for a part of rose petals, to take three parts of sugar, to pound everything to express the juice well and let macerate in a container exposed in the sun stirring regularly every two or three days.

Loaches

This word derives from an Arabic root which means to lick. It is a preparation for internal use. Its consistency is syrupy thanks to a mucilage. It contains oily or resinous substances in suspension. Loaches are used in the treatment of coughs, chronic catarrhs and tuberculosis

Sābūr's loach against catarrhs is made of licorice rob, tragacanth, hulled almonds, fennel seeds, gourd seeds and honey. Avicenna recommends a loach against dry cough which contains a single ingredient; the roasted linen seeds mixed in some honey.

Ointments

Usually, they are of soft consistency and consist of resinous substances (pine resin) and fat substances (oil). Kūhīn al-`Aṭṭār indicates a very effective formula for healing wounds. He says it is necessary to reduce to powder a piece of cloth, to add some oil of green olives or of myrtle and galbanum and then to apply to the wound under a bandage.

Pessaries

They may be wool, cotton or cork introduced in silk pocket and coated with the medicinal preparation.

Suppositories

They are a very old pharmaceutical form. They are used as soft evacuator (composed of laxative powders, salt and honey) or drastic (containing scammony, colocynth...).

Without being exhaustive, we will note here the most outstanding texts of Arabic pharmacopeia written between the 9th and 13th centuries, in the Muslim East and the Muslim West (Andalusian world and Maghreb). We will also draw the main lines of the evolution of the Tunisian pharmacopoeia until the contemporary period.

Muslim East

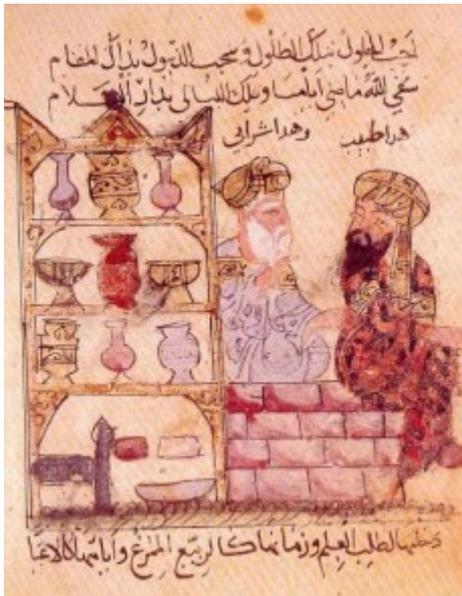
Towards the middle of the 9th century Sābūr ibn Sahl al-Kūsağ¹⁴ who was a Christian physician of Ġundīsābūr in the service of the Abbassid caliph Jafar al-Mutawakkil (847-861), drafted the first *aqrābādīn* in Arabic language. This treatise is known under two forms: *al-aqrābādīn al-kabīr* (the great formulary) which included twenty-two chapters, and *al-aqrābādīn al-ṣağīr* (the small formulary), shorter which had only seventeen. The author describes in this book sixteen different pharmaceutical forms and presents four hundred and nine recipes.

For almost two centuries, this *aqrābādīn* remained the essential reference and probably eclipsed another book written around the same time by Iṣḥāq al-Kindī (800-870). These books testify to the enrichment of the medical material thanks to the substances coming from China and India.

In the 11th century, Al-Tilmīd (1065), physician at the court of the Abbasid caliphs and manager of the al-`Aḍuḍī hospital in Baghdad, wrote a formulary that supplanted Sābūr's and classifies compound drugs according to the diseases.

The authors of the medical encyclopedias also devote an important part of their works to compound drugs. To give just one example, Ibn Sīnā (Avicenna) titles the first part of Book V of the Canon of medicine « About Compound drugs or *Aqrābādīn* ». In twelve chapters, he describes twenty-two pharmaceutical forms.

In the Muslim East, among the famous formularies two works were written in Cairo, the one by Ibn Abī al-Bayān (12th century), the other by Kūhīn al-`Aṭṭār (13th century). The first is intended for hospitals (*dustūr al-bīmāristān*), the second, written in 1260, for the pharmacies (*minhāğ al-dukkān*).



Al-dukkān: the apothecary

Muslim West:

Al-Andalus

In the 10th century, two scholars are known by their treatises on compound drugs. Sa`īd ibn `abd Rabbihi (died 966) composed an *aqrābāḡīn*, *Al-dukkān*, the first of this kind written in Al-Andalus and Abū Bakr Ḥāmid Ibn Samağūn (died 1002) also wrote a book titled *Al-aqrābāḡīn*.

In the category of the pharmacopoeias included in a general work on medicine, mention must be made of that commonly referred to by an abbreviated form of its title, *Al-taṣīf* composed by Al-Zahrāwī (Albucasis) (ca. 936 - ca.1010/1013). In the first book of this encyclopaediae the author justifies the use of the compound drugs. Books three to five concern preparation of long-term conservation drugs as hieras and theriacs and their pharmacological effects. Books six, seven and eight consider the composition of laxative pills, emetics, suppositories, gynecological ovum, enemas and laxative pleasant-tasting potions. The book nine is devoted

to warm and cold cordial medicines. In books ten to eighteen, al-Zahrāwī studies particular pharmaceutical forms: remedies composed with the three microloans, syrups, robs, electuaries, decoctions and powders. The book nineteen deals with cosmetics and recipes for skin and hair. Books twenty to twenty-five concern composed drugs for the eyes and throat. Moreover, the author indicates how to prepare extracts, gums, essential oils and aromatic waters using vegetables substances and how to get and to preserve substances of animal origin¹⁵.

Other Andalusian physicians are famous in the pharmaceutical art:

- Ibn Wāfid (died 1074) who associates very closely botany with pharmacology. His *aqrābādīn* is called *Kitāb al-wisād fī al-ṭibb* (Book of the pillow). According to a traditional model, all recipes are grouped by type of the diseases which, in turn, are classified by organs type from head to lower limbs. Each recipe enumerates the drugs which enter the preparation and their quantity, specifies their modes of preparation and application. It results a utilitarian book intended for the practice of medicine.

- Abū Marwān Ibn Zuhr (Avenzoar) (died 1062), of whom the safety of the diagnosis is praised. His main work is the *Kitāb al-taysīr li al-mudāwā wa al-tadbīr* followed by a ḡāmi, antidotary which gives fifty-two formulas of compound drugs¹⁶.

- Ibn Ruṣd (Averroes) (1126-1198). Book V of *Kulliyat fī al-ṭibb* (the Generalities on medicine) is devoted to drugs. Averroes is also the author of a treatise on the theriac, *Maqāla fī al-tiryāq*. He questions the galenical principles of the coexistence of opposed qualities in a compound mixture as well as the theory of degrees as it is exposed by al Kindī. He brings the new notion of dose necessary to a medicinal substance to produce its effect¹⁷.

Ibn Maymūn (Maimonides) (1135-1204): The *Kitāb al-sumūm* is a treatise on poisons and the antidotes to mortal remedies. Ibn Maymūn separates the poisons into two categories (hot and cold) and classifies the antidotes according to whether they act on some poisons by their qualities physical or chemical, or counteract the effect of all poisons by a special property. The author states that he chose the most effective and easy-to-use simple or compound prescriptions. He sets doses according to the patient's age, temperament and severity of symptoms. He indicates what are the treatments and how to recognize the toxic substances and lists the different causes of poisoning: bites of venomous animals, bites of enraged dog, bull's blood, cantharides, mushrooms poisons used for criminal purposes¹⁸.



Maimonides

The Maghreb

Tunisia is first included in a larger region called Ifriqiya defined, in the 10th century, by al-Bakrī: it extends in the length from Barqa in the east to tangier in the west and in the width from the sea to the sands of the blacks. Two greats dynasties favored the rise of the civilization of Ifriqiya. The first is the Aghlabid dynasty (800-908) and the second the Hafsīd dynasty (982-1574).

The Tunisian pharmacopoeia in the 10th and 11th centuries

During the first period, what is commonly referred to as the School of Kayrawan is marked by renowned physicians : Ishāq ibn `Imrān, Ishāq ibn Sulaymān and Ibn al- Ğazzār.

Ishāq ibn Sulaymān, died after 961, is author of a treatise on the theriac (*Al- tiryāq*).

Ibn al- Ğazzār (died 980) is the most famous of the three. It can be deduced from the elements reported by bio-bibliographers that he wrote a treatise on compound drugs called *Al-buġya* which is lost now. In his others works, notably in *Zād al-musāfir* (Provisions for the traveler or Viaticum) and in *Kitāb al-`uṭṭūrāt* (The book of the perfumes), Ibn al-Ğazzār describes many pharmaceutical forms. The perfumes which are active on the liver and on the head, which strength the body and soul, are presented in various forms: fragrant powders,

incenses, liquids or semi-liquids. *Zād al-musāfir*, consisting in seven books, is a systematic medical handbook in which the author discusses the different diseases and the treatments. Therapeutic indications often prevail over the clinical aspects as the focus is on different types of treatments¹⁹.

During the Hafsid dynasty, several physicians named as Al-Siqillī were famous.

One of them, Muḥammad ibn Uṭmān Al-Siqillī (14th century) dedicated his book, *Al-muḥtasar al-fārisī*, to the ruler Abū al-Fāris al-`azīz. Book ten is devoted to compound drugs. The author describes twenty-five galenic forms for internal and external use such as theriac, medicinal jams, syrups, ointments, *ḡawāriṣ* (gastrointestinal electuaries), robs, loochs, hieras, pills, tablets, decoctions, oils, enemas ...²⁰

The Tunisian pharmacopoeia in the 19th and 20th centuries²¹

Before 1888, no diploma is required for the practice of pharmacy and no rule governs the preparation and dispensation of the drugs. Thus, the sale and consumption of the drugs are not subject to any control. The pharmacy remains dependent on the medicine. Often, the Tunisians practitioners use personal recipes and the foreign physicians who work in Tunisia, treat with recipes coming from their own country. There is no official pharmacopoeia.

In 1850, an Italian from Tuscany, Eminente, qualified pharmacist, opens the first pharmacy in Tunis and in 1868, Sinigaglia, after graduating in Italy, settles down in Tunis, at first in a place that quickly became too cramped, then in a much larger local because he provides all the physicians of the city.

Under the French protectorate (1881-1956)

The first decree organizing the pharmaceutical profession dates from 1888, after seven years of Protectorate. Its purpose is to regularize the practice of the profession by prohibiting it to those who are not holders of the diploma, to oblige the creation of pharmacies where there will be no trade and to introduce rules of ethics and deontology.

The decree of 31 March 1913 and its orders regulate the pharmacy as in the following examples:

- The Article 11 prohibits the delivery of toxic substances if the request is not accompanied with a medical prescription as well as the sale of secret remedies. The

secret remedy is the old or new remedy “whose sale has not been authorized by the State of which the inventors, owners or manufacturers are from”.

- The article 12 makes mandatory the use of French Codex in the most recent edition. Indeed, until then the physicians of various foreign communities living in Tunisia based their prescriptions on diverse Codex (French, Italian...). This article aims to standardize the preparations in their dosage and their titration.

The Tunisian pharmacopoeia after independence (1956)

The French Pharmacopoeia in its most recent edition remained compulsory in every pharmacy. The law of 3 August 1973 defines the pharmaceutical activities reserved to the holders of pharmacy diplomas. These activities include, among others, the preparation of the drugs for human and veterinary medicines if they comply with the Pharmacopoeia and the sale of medicinal plants listed in the Pharmacopoeia. The law specifies that the pharmacists have to hold in their pharmacies, simple drugs, chemicals and stable preparations described therein and that they must be able to prepare, in conditions described in the Pharmacopoeia, unstable substances. However, as a first step, the legislators, in the absence of a Tunisian Pharmacopoeia, have not specified the one that should serve as reference. A ministerial decision of 1975 will establish as the reference in Tunisia, the French Pharmacopoeia.

¹ Ricordel J., *Al-Musta`īnī* : Les « Tables des médicaments simples » d’Ishāq Ibn Biklārīš – Edition, traduction et analyse (des lettres alif à zāy), Thèse de doctorat en épistémologie et histoire des sciences, Université Paris7-Denis Diderot, 25 novembre 2004.

² Katouzian-Safadi M., « Séparation de la médecine et de la pharmacie : plaidoyer d’Al-Rāzī » in *Science and technology in the islamic world* », XXth international Congress of History of Science (Liège 1997), Ansari R/ Berariu D (éd.), Brepols, vol. XXI, p. 220-221.

³ Al-Birūnī (Abū al-Rayḥān), *Kitāb al-ṣaydana fī l-ṭibb*, Zaryāb A. (éd.), Téhéran: Iran University Press, 1991.

⁴ Traduction Stéphan N., « La pharmacie médiévale d’expression arabe » in *La médecine au temps des califes*, Institut du monde arabe, 1996.

⁵ Ibn Abī Uṣaybi`a, *‘uyūn al-anbā’ fī ṭabaqāt al-aṭibbā’*; *Sources d’informations sur les classes des médecins. XIIIe chapitre : Médecins de l’Occident musulman*, Publié, traduit et annoté par Jahier H et Noureddine A., Alger : Librairie Ferraris, 1958, Publications de la faculté mixte de médecine et de pharmacie d’Alger, IV, p. 418-482.

⁶The first hospital of Islam was founded by al-Walid I (705-715) but the structure is unknown. As early as the 9th century, the first Baghdad hospital was built by order of Hārūn al-Rachīd (786-809).

⁷ *Dukkān* means, in its original sense, the platform on which the merchant deposits his articles and, consequently, a shop, then finally a pharmacy

⁸Arabic text : Qūhīn al-`aṭṭār, *Minhāġ al-dukkān*, Ḥasan `āṣī (ed), Dār Manāhil. Beyrouth, 1992, p. 265; Ricordel J., « *Al-Musta`īnī* », 25 novembre 2004; Ricordel J., "Bonnes pratiques officinales selon Qūhīn al-`aṭṭār, S.H.P., 16 novembre 2017.

⁹ Abū al-`alā' Zuhr (m. 1130), *Kitāb al-muḡarrabāt (Libro de las experiencias médicas)*. Edición, traducción y estudio por C. Alvarez Millán, Madrid: Consejo superior de investigaciones científicas, Agencia de cooperación internacional, 1994, Fuentes arábico-hispanas, 17.

¹⁰ Ricordel J., « La thériaque en débats dans les traités arabes », *Revue d'Histoire de la pharmacie*, LVIII, n° 367, 2010, p. 271-284.

¹¹ Ricordel J., « Quantifier la force des médicaments composés : des exemples en médecine arabomusulmane » in *La juste mesure*, PUV, Temps et espaces, St Denis, 2005.

¹² Jazi R., Asli F., « Les formes pharmaceutiques dans les anciennes pharmacopées arabes (IXème – XIIIème Siècle J.C.) », *Essaydali*, n° 67, Mars 98, p. 11-17.

¹³ *Terminalia horrida Stend.* ; *Terminalia citrina Roxb.* ; *Terminalia chebula Retz.*

¹⁴ Latinized in Sapur.

¹⁵ Hamarneh S., Sonnedecker Gl., *A pharmaceutical view of Albucahis al-Zahrāwī in moorish Spain with special reference to the « Adhān »*, Leyde : Brill (éd.), 1963.

This title has been translated as: "The practice for those who do not know how to compose the remedies" or "The book of manipulations for those who are unable to compose recipe ... " The Latin translation was made by Simon of Genoa with the help of the Jewish scholar Abraham ben Šem Tob at the end of the 13th century.

¹⁶ Colin G. S., *Avenzoar : sa vie et ses œuvres*, Paris : E. Leroux, 1911 ; Abū Marwān Ibn Zuhr, *Kitāb al-taysīr li al-mudāwā wa al-tadbīr*, Al-Rūdānī M. (éd.), Rabat, 1991.

¹⁷ Ricordel J., « Le traité sur la thériaque d'Ibn Rushd », *Revue d'Histoire de la pharmacie*, XLVIII, n°325, 1^{er} trim 2000, p. 81-90.

¹⁸ Ricordel J., Maïmonide : « Quelques réflexions sur sa formation et sa pensée dans le domaine médical », *Revue d'Histoire de la pharmacie*, LIII, n° 348, 4^{ème} trim 2005, p. 588-595.

¹⁹ Jazi R., « L' *aqrābādīn* d'Ibn al-Ġazzār », *Essaydali*, n° 64, Juin 97, p. 46-39 (in Arabic language).

²⁰ Asli F., « Un ouvrage de médecine tunisien inédit du XV^e siècle : al-Moukhtassar al-Farissi de Mohammed ibn Othman as-Siquilly », *Revue d'Histoire de la pharmacie*, XXXV, n° 279, 4^{ème} trim., 1988, p. 343-354.

²¹²¹ Ben Azzouna R., Hamdane R., *Histoire de la pharmacie tunisienne (VIII^e siècle-1976)*, Paris: L'harmattan, 2011.