

A Short History of Islamic Pharmacy

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Summary

By the middle of the seventh century, Europe was mired in a morass of intellectual stagnation. The ravage of the barbarian hordes had destroyed libraries and irreplaceable manuscripts collected over the centuries. The achievements of a thousand years of Hellenistic civilization in the arts, sciences and humanities had been erased in a few short decades of orgiastic destruction.

While Europe lost, then forgot, its intellectual heritage, the Arab caliphs set out to collect the works of Greek physicians and scholars and supported intercultural institutions like the University of Jundishapur and the House of Wisdom in Baghdad. Islamic medicine, thus planted in fertile soil, blossomed magnificently and the great physicians of the Islamic world were able to illuminate the Europe of the Dark Ages with a well elaborated science whose outline are still familiar today.

This brief historical overview will focus on the work of early Islamic scholars - physicians, botanists, translators, chemists and others in the development of a coherent and comprehensive corpus of pharmaceutical knowledge.

Key Words: Islamic Pharmacy, Europe, Dark Ages

First Stirrings

Interest in medicines has been almost universal and constant since the beginning of man. Within a century of the death of the Prophet, a systematic approach to the study of drugs and their effect was being undertaken in the Umayyad court. Ironically the early processes that led to the development of pharmacy as a science were, in part, driven by poisons and their antidotes and the means of detecting them. As a result it is also not surprising to discover that much of the groundwork for pharmacy was laid down by alchemists serving as toxicologists

The first figure in this area was **Ibn Uthal**, the Christian physician to the first Umayyad caliph, Mu'awiyah. He was skilled in the science of poisons, and during the reign of Mu'awiyah many prominent men and princes died mysteriously. **Ibn Uthal** was later killed in revenge. He was anoted alchemists and is believed to have undertaken a systematic study of antidotes. **Abu al-Hakam al-Dimashqi** another Christian physician, was skilled in therapeutics rather than toxins and enjoyed the support of his prize patient, the second Umayyad caliph, Yazid.

Beginnings of Alchemy

The earliest figure associated with the development of Arabic alchemy, and thus pharmacy, was the

Umayyad Prince, Khalid bin Yazid (d. 704). A grandson of caliph Mu'awiyah Khalid was the heir apparent to the throne. In 683, however, the throne was taken over by his second cousin, Marwan. Khalid turned his attention to the occult and hermetic sciences summoning Marianos, an alchemist hermit from Alexandria, Egypt to Damascus to teach him the secrets of alchemy.

Translation into Arabic began under the rule of the Umayyads in the time of Prince Khalid ibn Yazid. Prince Khalid was interested in alchemy, and so he employed the services of Greek philosophers who were living in Egypt. He rewarded them lavishly, and they translated Greek and Egyptian books on chemistry, medicine and the stars.

A contemporary Khalid was the **Jabir Ibn Hayan (Geber)**, who is known to have promoted the practice of alchemy as a profession and a career. In an argument similar to that surrounding the works of William Shakespeare, the authenticity of Jabir and his writings have been controversial for over 1000 years. In the tenth century, for example, many scholars and book dealers doubted even the very existence of a historical figure by the name of Jabir. The texts carrying his name were considered spurious and were thought to have been written by several alchemists who hid their identity behind the famous and revered

name of Jabir. Others speculated that, even if such a man existed, he could have written only *Kitab ar-Rahmah (The Book of Mercy)*. No one man could have penned such a large number of works, they argued, no matter how prolific he was.

The few works historians agree to attribute to him, such as *The Book of Mercy*, represent a convergence of Greek, Indian, and the indigenous theories prevalent in Egypt and Syria. Apparently, the Umayyad Caliphate lasted for about ninety years, and during that time Islam spread from China in the east to Spain in the west. Translation of scientific books into Arabic had already begun, but under the Abbassids, who succeeded the Umayyads, it was greatly accelerated. An important factor which facilitated the work of translation was the flexibility of the Arabic language, the richness of its terminology, and its capacity for expression.

The Ninth Century

The ninth century marked the beginning of the Golden Age of Islamic learning, and just as Muslim scholars made significant gains in the physical sciences, so to did they learn, master and expand the arts of medicine and the science of pharmacy.

This early rise and development of professional pharmacy in Islam -- over four centuries before such development took place in Europe- was the result of three major occurrences: the great increase in the demand for drugs and their availability on the market; professional maturity; and an unprecedented intellectual curiosity.

Yuhannah ibn Masawayh, a physician at the time of Haroun al-Rashid was ordered by the caliph to translate Greek medical books purchased in Byzantium and was himself the author of books on fevers, nutrition, headache, and sterility in women.

Hunayn ibn Ishaq, was probably the greatest translator in Arab history. He had a superlative knowledge of Syriac, Greek, and Arabic, and carried out a large number of translations from Greek scientific and philosophical manuscripts into Arabic. These included most of the works of **Hippocrates** and **Galen**. After his death, much of this work was continued by his pupils and by his nephew Hubaish. **Thabit ibn**

Qurrah, who wrote on a variety of medical topics as well as on philosophy and astronomy; **Qusta ibn Luqa**, and **Mankah** the Indian, who translated from Sanskrit into Arabic, and translated a treatise on poisons written by the Indian physician **Shanaq**, were also leading figures in this crucial period.

Poisons & Antidotes

As previously stated the topic of poisons was of great interest in both antiquity and the medieval world, generating its own body of literature. Snake and dog bites as well as the ill effects of scorpions and spiders and other animals were a cause of great concern, while the poisonous properties of various minerals and plants, such as aconite, mandrake, and black hellebore, were exploited. **Galen** and **Dioscorides** were considered ancient authorities on the subject, and many spurious treatises on the subject were attributed to them. Numerous Islamic writers discussed poisons and particularly theriacs, the antidotes for poisons

As the sciences of pharmacy and pharmacology were being developed in the early Islamic world, there was also a parallel and necessary achievement in alchemy and toxicology, spawned by the earlier work of the Greeks and Indians as well as the empiric knowledge of the Arabic population. Alchemy was commonly practiced during the ninth century. Although alchemists failed to transmute transmutation of lesser metals into silver and gold, they succeeded in improving chemical techniques, equipment, and processes used, and built up their own methodology, symbolism, and style of communication.

Toxicology and Pharmacy

In the field of toxicology an early manual was *Kitab as-Sumum* attributed to **Shanaq** the Indian and translated into Arabic by al-'**Abbas bin Sa'id al-Jawhari** for the Caliph al-Ma'mun (r.813-833). The text discusses poisons and how they can be detected by sight, touch, taste, or by the toxic symptoms which they cause. Descriptions are given of poisoned drinks, foods, clothes, carpets, beds, skin lotions, and eye salves, as well as narcotics and universal antidotes. Kings were said to guard the book, keeping it in their treasure cabinets, hidden from their children and friends.

Another work, was *On Poisons and their Antidotes* by **Jabir bin Hayyan**. In its six chapters - - Jabir identifies poisons by their kinds and natural origins, their modes of action, dosages, methods of administration, choice of drugs, and the target organ which is attacked by each particular poison -- a proposition that is modern in its chemotherapeutic application. He also discussed general human anatomy, the four humors and how they are affected by purgatives and lethal drugs, warned against poisonous or poisoned matter, and prescribed antidotes.

The Early Abassid Period

The key names in scientific alchemy during the early Abassid period were **Abu al-Fa'id Ohun-Nun** (d. 861) of Egypt and **Ibn Wahshiyyah** (fl. ca. 900) who wrote on a variety of topics including alchemy, toxicology, magic, and astrology. Rational alchemical activities, however, reached a climax in the works of **ar-Razi**, a contemporary of **Ibn Wahshiyah**, and a far more original writer. **Ar-Razi's** works are of much higher caliber both in their relevance to alchemy, as well as to pharmacy and medicine as we shall see shortly. **Ar-Razi's** works, no doubt, pioneered scientific alchemy and outlined a rational course for its development in Islam

The role of scientific alchemy cannot be over-emphasized. The trend, approach, and type of information circulated in ninth century Arabic alchemical manuals represent some of the best work in this field that were written in Arabic. A rational and experimental approach based on originality in interpretations and genuine interest in alchemical procedures is generally present.

The scope was activity was also immense. In the process of experimenting in the making of amalgama-

tions and elixir several important mineral and chemical substances were used such as sal ammoniac, vitriols, sulphur, arsenic, common salt, quicklime, malachite, manganese, marcasite, natron, impure sodium borate, and vinegar. Among simples of botanical origin, they used fennel, saffron, pomegranate rinds, celery, leek, sesame, rocket, olives, mustard, and lichen. Important gums such as frankincense and acacia, were used (1), Animal products included: hair, blood, egg white, milk and sour milk, honey, and dung. "Lab equipment" consisted of pots, pans, tubes, retorts, alembics, crucibles, and various distilling apparatus; covering platters, ceramic jars, tumblers, mortars and pestles (often made of glass or metals) ; and tripods, scales, and medicinal bottles. The range and scope of alchemical operations included: distillation, sublimation, evaporation, pulverization, washing, straining, cooking, calcination, and condensation (thickening of liquid compounds).

The prolific intellectual ferment that fired the Baghdad schools, support at the highest levels of government and a craving for intellectual pursuits paved the way for greater achievement in the next 400 years. Manuals on materia medica and books of instructions for pharmacists began circulating in increasing numbers.

Pharmacy as a Separate Profession

Arabic pharmacy (*Saydanah*)¹ as a profession and school of thought separate from medicine was recognized by the beginning of the ninth century. Baghdad, the center of learning at the time, saw a rapid expansion of the number of privately owned pharmacy shops, a trend that quickly spread to the suburbs and then to other Muslim cities.

The pharmacists who managed these new shops were skilled apothecaries art and very knowledgeable

¹ In Islam sandalwood first appears in pharmaceutical preparations in the early eighth century, perhaps earlier. It soon became associated with the profession: and pharmacists were called *as-saydanani* or *as-saydalani* (he who sells or deals with sandalwood), and the word *savdanah* referred to a pharmacy. Al-Biruni confirmed that the word Saydanani came from the Indian (Sanskrit) chandanani (or jandanani). In India sandalwood (Sanskrit, chandan or jandan) was used extensively, more than other aromatic woods. Since in Arabic the person who sells amber ('anbar) is called 'anbari, so the person who traded in sandalwood Or chandan was called sandanani) and later sandalani or saydalani. By the same token the apothecary (al-'attar) in Arabic was called ad-dari, since it was reported that ships carrying musk, aromatics, and spices from India and the Orient landed in Darien port. The Arab apothecaries ('attarin), who sold perfumes and aromatics, did not use sandal as often as the Indians. They excluded sandalwood, primarily, because it was not a popular wood in Arabia. Therefore, they applied the title Sandalani (which according to al-Biruni is the most appropriate Arabic rendering of the title) to the highly qualified pharmacist as a dealer of drugs and rare aromatic simples and compounded remedies. The word drug ('uqqar), al-Biruni stated, comes from the Syriac word for the stump of a tree (root, and Greek rizoma). This word ('uqqar) was later applied to all the parts of the tree and was taken by the Arabs to mean a materia medica and in plural, 'uqaqir'.

in the compounding, storing, and preserving of drugs. State-sponsored hospitals also had their own dispensaries attached to manufacturing laboratories where syrups, electuaries, ointments, and other pharmaceutical preparations were prepared on a relatively large scale. The pharmacists and their shops were periodically inspected by a government appointed official *al-Muhtasib* and his aides. These state inspectors were responsible for assuring the accuracy of the weights and measures as well as the purity of the materials used to make the drugs. This served as a means of assuring quality and safeguarding the public.

One of the contributors to Arabic pharmacy in the ninth century was the Nestorian physician, **Yuhanna bin Masawayh** (ca777-857). A second generation pharmacist, **Ibn Masawayh** penned an early treatise on therapeutic plants, listing about thirty aromatics including their physical properties, methods of detecting adulteration, and their pharmacological effects. On ambergris, for example, he explains that there are many types, the best among them the blue or gray (gray-amber) fatty *as-salahiti* is used mixed with the choicest of aromatic mixtures (*ghaliyyahs*, perfumes, or medical cosmetics), and in geriatric electuaries. **Ibn Masawayh** also recommended saffron for liver and stomach ailments. He noted that sandalwood, whether yellow (the best), white, or red is brought from India where it is used in the manufacture of perfumes.

In his medical work, **Ibn Masawayh** recommended the use of well known medicinal plants to build up a natural resistance to diseases. He urged physicians to prescribe one remedy for each disease, using empirical and analogous reasoning. He finally stated that the physician, who could cure by using only diet without drugs, was the most successful and skilled.

Another of **Ibn Masawayh's** books, *Al-Mushajjar al-Kabir* is, a tabulated medical encyclopedia on diseases and their treatment by drugs and diet. Other works include small treatises such as one on barley water, explaining how to prepare it and its therapeutic uses; (in this case on dentifrices; and to ameliorate the effect of purgative drugs).

A younger colleague of **Ibn Masawayh** was **Abu Hasan 'Ali b. Sahl Rabban at-Tabari** born in 808. When 30, he was summoned to **Samarra** by **al-**

Mu'tasim (833-842), where he served as a government officer and a physician. **At-Tabari** wrote several medical books, the most famous of which is his *Paradise of Wisdom*, completed in 850. In addition to discussions on diseases and their remedies, the work also includes several chapters on materia medica, cereals, diets, utilities and therapeutic uses of animal and bird organs, as well as drugs and methods of their preparation.

At-Tabari urged that the therapeutic value of each drug be reconciled with the particular disease, urging physicians not to fall prey to the routine remedy. He identified the best source for several components stating that the finest black *myrobalan* comes from Kabul; clover dodder from Crete; aloes from Socotra; and aromatic spices from India. He was also precise in describing his therapeutics, e.g.:

... a very useful remedy for swelling of the stomach; the juices of the liverwort (water hemp) and the absinthium after being boiled on fire and strained to be taken for several days. Also powdered seeds of celery (marsh parsley) mixed with giant fennel made into troches and taken with a suitable liquid release the wind in the stomach, joints and back (arthritis).

For storage purposes he recommended glass or ceramic vessels for liquid (wet) drugs; special small jars for eye liquid salves; lead containers for fatty substances. For the treatment of ulcerated wounds, he prescribed an ointment made of juniper-gum, fat, butter, and pitch. In addition, he warned that one mithqal (about 4 grams) of opium or henbane causes sleep and also death.

The first medical formulary to be written in Arabic was prepared by **al-Aqrabadhin Sabur bin. Sahl** (d. 869). The book included medical recipes stating the methods and techniques of compounding these remedies, their pharmacological actions, the dosages given of each, and the means of administration. The formulas are organized by the type of preparation to which they belong - i.e. tablets, powders, ointments, electuaries or syrups.

Sabur's formulary-type compendium is unique in its organization and purposely written as a guidebook for pharmacists, whether in for use in their own private drugstores or in hospital pharmacies. As such it is the first true medical formulary ever created.

A few books related to pharmacy were written by the famous scholar **Ya'qub bin Ishaq al-Kindi** (d. 874). His contributions to philosophy, mathematics and astrology, however, were greater than those on medicine and therapy. He was an outspoken critic of alchemists and attacked their procedures and claims as deceptive under the circumstances, insisting upon licensure and training of pharmacists.

Hunayn bin Ishaq's *Ten Treatises on the Eye* was completed in 860. It deserves mention because while the first nine treatises dealt with the diseases of the eye, the tenth was devoted to compounding drugs for eye medication.

Hunayn, whose translation were literally worth their weight in gold, corrected the translation into Arabic of the major part of Dioscorides', *Materia Medica*, undertaken by his associate **Istifan bin Basil** (in the mid ninth century). As a result several books of materia medica were written in Arabic.

Recognition

The large hospitals, such as Azud-al Daulah, employed very large technical and administrative staff. The hospital was run by a non-medical administrator. He was assisted by a Chief Medical Officer (*Mutwalli* or Dean) who was a physician. The other member of the hospitals troika was the Shaikh Saydalani who served as Chief Chemist and overseer of the dispensary.

The post of Inspector-General of Hospitals was created during the Abbasid regime, which was usually occupied by the most outstanding physician of the Islamic world. Another post, that of Chief Chemist was also created, to head the Department which supervised the preparation of drugs. One of the most famous holders of the position was **Zia Ibn Baytar**, the great botanist and herbalist who occupied this post in 1266.

Development of Pharmaceutical Literature

The preparation and use of medicinal drugs had its own specialized literature, a trend that accelerated from the Ninth Century onwards. Not surprisingly, early knowledge of medicinal substances was based initially

on the approximately 500 substances described by the Greek Dioscorides in his treatise on materia medica.

Numerous Arabic and Persian treatises were subsequently written on medicaments. Medical encyclopedias usually had one chapter on materia medica and another on recipes for compound remedies - for example, **Razi's al-Hawi** mentions 829 drugs. Formularies were often composed as larger independent collections of recipes, and some were written for specific use in hospitals.

Pharmacological drugs were classified into simple and compound drugs, '*the mufraddat and the murakkabat*'. The effects of these were detailed and documented in the literature with a high degree of accuracy and completeness.

The earliest Islamic works on pharmacognosy were written before translation of the Greek works of **Dioscorides**. Titles such as '*Treatise on the power of drugs their beneficial and their ill effects*' and then again *The Power of simple drugs*' were written in the ninth century AD.

Pharmacy As a Profession

With all this information circulating it is not surprising that the Islamic *saydalani* introduce a number of new substances and techniques including senna, camphor, sandalwood, musk, myrrh, cassia, tamarind, nutmeg, cloves, aconite, ambergris and mercury. They further introduced hemp & henbane as anesthetics, and established the monopoly on the dispensation of ointments, pills, elixirs, confections, tinctures, suppositories and inhalants.

As was the case in Europe and America up to modern times, many prominent physicians in Islam, prepared the necessary medications for their patients. **Al-Majusi, az-Zahrawi, and Ibn Sina** (d. 1037) are good examples.

But this was the exception, an allowance if you will, for the extremely gifted. For the typical medical professional, the role of educated pharmacists in the medical field and in society could not be ignored and was, in fact, welcomed. As part of the health profession, pharmacy had become independent of medicine, just as grammar is separate from the art of composition, prose from poetry, and so forth. Pharmacy,

therefore, was recognized as a provider of essential tools and a separate profession with high standards..

One of the finest definitions of the pharmacist, his role and his profession, was given by **Abu ar-Rayhan al-Biruni** (d.1048). In his work *as-Saydanah fit-Tibb*, **al-Biruni** defined the Pharmacist (as-Saydanani) "as the professional who is specialized in the collection of all drugs, choosing the very best of each simple or compound, and in the preparation of good remedies from them following the most accurate methods and techniques as recommended by experts in the healing arts." A description that varies only slightly from the modern one.

Al-Biruni promoted the idea of academic training of pharmacy students coupled with day-to-day practical experiences with drugs. As a result, he said these trainees would become more and more familiar with the shapes, physical properties, and kinds of drugs. They would then be able to differentiate one from the other and would possess the know-how, a knowledge that could not be taken away from them.

He also argued that a pharmacist should also be able to substitute or to discard one drug for another. The knowledge of how drugs work on the body (pharmacology), however, is more important than the mere skill of preparing them, he said. In substituting one drug for another the various actions of each should be considered and accounted for. Cure can be sought through a draft, ointment, anointing oils, or by fumigation. Thus, in seeking a substitute, all these and other applications should be considered. Without this knowledge one falls short of professional goals.

Ibn Sina and Clinical Trials

Discussing **Ibn Sina** is like describing a force of nature. In the area of pharmacy he made many contributions, including describing 760 drugs. Perhaps his most lasting in the field of pharmacy was his work in laying down the following rules for testing the effectiveness of a new drug or medication. These principles still form the basis of modern clinical drug trials.

1. The drug must be free from any extraneous accidental quality.
2. It must be used on a simple, not a composite, disease.
3. The drug must be tested with two contrary types

of diseases, because sometimes a drug cures one disease by its essential qualities and another by its accidental ones.

4. The quality of the drug must correspond to the strength of the disease. For example, there are some drugs whose heat is less than the coldness of certain diseases, so that they would have no effect on them.
5. The time of action must be observed, so that essence and action are not confused.
6. The effect of the drug must be seen to occur constantly or in many cases, for if this did not happen, it was an accidental effect.
7. The experimentation must be done with the human body, for testing a drug on a lion or a horse might not prove anything about its effect on man.

Maturity

Another theme of pharmaceutical interest that continued to draw attention during the eleventh century was **toxicology**. A good example is **al-Munqidh**, by **al-Husayn b. al-Mubarak**, completed about 483/1091, and dedicated to the wazir al-Mufaddal b. Abi al-Barakat in San'a, Yemen.

Ibn al-Mubarak explained that there were two dangers to avoid at all costs. One, spiritual, meant getting rid of hatred, envy, malice, and the like. In so doing one avoided troubles and illness, for the body and the soul. The second danger was related to poisons that are fatal to the body in the shortest possible time. Poisons are hidden weapon in the hands of enemies to take revenge and to kill.

Ibn al-Mubarak was concerned with the safety of, his sponsor, the wazir al-Mufaddal, who was always exposed to servants and ministers, and decided to write a book on poisons and poisoning in foods, drinks, and things that could be smelled, such as flowers. He also made a study of antidotes, many of which he copied from the ancient sages of India.

In his writings he described how to be on guard against intrigues by relatives, attendants, and opponents. He also noted poisonous symptoms and physical properties of poisoned substances for foods.

What is most interesting was **Ibn al-Mubarak's** description of the physical effects of poisons on inanimate object. If milk or butter was poisoned it showed up like an iris with many colors ranging from green to yellow to red and foam-like whitish. Butter became moist and putrid; sour milk showed reddish dots or lines and oils displayed rosy coloration like a sunset and putrefaction while sesame oil exhibited a dark, cloudy appearance. White linen clothes turned yellow if poisoned; colored clothes were bleached. Incenses and amber became inflammable, leaving dark ashes and giving off bad odors and cloudy smoke. Poisoned iron utensils, arrows, and swords show grey, swarthy colors.

The largest and most popular of materia medica manuals was that by **Ibn al-Baytar**, who was born in Malaga in the kingdom of Granada towards the end of the 12th century and became 'Chief of Botanists' in Cairo in the first half of the 13th century. His Arabic treatise, *The Comprehensive Book on Materia Medica and Foodstuffs (Kitab al-Jami' li-mufradat al-adwiyah wa-al-aghdhiyah)*, was an alphabetical guide to over 1400 simples taken from his own observations as well as from 150 written sources that he names.

Al-Baytar's manual formed the basis of many subsequent manuals on medicinal substances, including that written in the 18th-century by **Muhammad Husayn ibn Muhammad Hadi al-'Aqili al-'Alavi**, a practitioner in India and grandson of a well-known Indian practitioner.

A century later **Abu al-Muna Ibn al-'Attar** of Cairo penned a manual on practical pharmacy in about 260. **Ibn al-'Attar**, an experienced pharmacist, dedicated the manual to his son, also a pharmacist, who was about to take charge of the business in place of his aged father. He gave attention to the important

practical aspects of pharmacy, the upkeep of the drug store, and good management. Like **az-Zahrawi**, he also emphasized skill in the technique of compounding and dispensing pharmaceutical preparations, and knowledge of the materia medica.

Conclusion

This brief overview has demonstrated the crucial role played by a series of Islamic scholars, physicians, scientist, authors and an army of unsung plain folk in the development of pharmacy as a separate profession. While much of what is discussed here may seem self-evident and so commonplace in its application as to not be seen as significant, that would be an error. Islamic scholars laid done a legacy that reflects itself in every prescription that is filled, every license that is granted, every elixir, syrup and medicament that is created, used or tested. And if what these men did now seems to be a simple and obvious thing, it is only because in their intellectual ferment and genius they found the core simplicity that is where real truth lies.

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