THE ORIGIN OF PHARMACY

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The Arabic period, stretching from the 7th to the 12th century, can be regarded as the period of transmission of the cultural and scientific heritage of Antiquity and of the East to the West.

One science, however, owes everything, even its very existence, to the Arabs : pharmacy.

Pharmacy always existed, but not so for pharmacists. Originally medicine and pharmacy were not independent from one another. He who made the diagnosis also provided the medicine, be it in prayers, exorcisms, amulets, herbs or whatever. The physician was a man of authority, the magician a man without formal education but with much experience, an old man, a presbyteros, to be translated as "elder" or "priest".

When the physician could no longer cope with his work, he hired a servant who collected herbs for him and who made preparations under his supervision.

This servant set up, during the Roman period, a small occult shop in a little street where products could be obtained which should not be seen in daylight : a poison, an abortifacient, a love potion (philtrum or poculum amoris). These servants were called pharmacopolae, unguentarii, pigmentarii, aromatarii, serplasarii but they were no pharmacists.

It were the Arabs who, with their clear insight and mathematical

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approach, realized that this situation could not persist and that people dealing with the health of others ought to acquire a solid education, both professionaly and ethically. They also realized that the simultaneous exercices of medicine and pharmacy were incompatible. The mutual control between physician and pharmacist provides a much higher degree of safety, as is the case in the cooperation between architect and contractor but in a domain where people care most for their health and life.

The Arabs demanded that those who prepared medicines would do so in an independent profession, not in a side profession or as the servants of physicians.

Thus, for the first time in history, medicine and pharmacy were divided. The first pharmacy was opened in Bagdad in 770 under caliphe Al-Mansoer, who cared very much for science. The first pharmacists had much experience with medicines but did not possess the required education. This would change under caliphe Al-Mamoen, who ruled from 813 to 833 and founded in Bagdad "The House of Wisdom", a precursor of universities, where also pharmacists would acquire a solid education.

Up to now nothing is known about the curriculum and the first legal regulations, which explains why some historians set the founding year of pharmacy in 1231, when Frederic II von Hohenstaufen enacted his Constitutiones in relation to medecine, in which he devided medicine into 3 distinct groups : 1) dogmatic medicine, which makes diagnoses; 2) manual medicine, which performs surgical interventions; and 3) pharmaceutical medicine, which collects, mixes and conserves medicines. In fact, Frederic II fixed in legal norms a factual situation which had been established by the Arabs.

The profession of pharmacist was from the start an honorable one, and sons of pharmacists never omitted to mention their origin in their name : ibn al-attar, son of a pharmacist.

Pharmacists were often called sayadilah in Arabic works, Sandali in Latin, i.e., sellers of sandal-wood which was an expensive kind of wood from India from which they extracted a fragrant oil also used

in medicine.

From the start government instituted the inspection of pharmacies : the Mutashib or head-inspector supervised the purchase and sale of poisonous substances; the Arifs or assistant-inspectors weekly inspected the pharmacies of their district as to identification, purity and prices of the medicines sold.

The name of one head-inspector has remained famous : Dhija ed-Din Aboe Mohammed Abdoellah Ben Ahmed el Malaki (from Malaga) el Andaloesi (from Andalousia) el Ashshab (the herbalist) Ibn (son of) al Baitar (the veterinarian), currently known as Albaitar. He was of Spanish descent and lived from 1197 to 1248. He was a much-travelled man and a distinguished pharmacognost. His book Djami el Moefridat, in Latin Liber Magnae Collectionis, also named Liber simplicium medicamentorum, contains the description of more than 2,000 simple medicines. Sarton regards this work as the greatest of its sort from Dioscorides until the 19th century.

Apart from the founding of pharmacy the Arabs have also the merit to have expanded the pharmaceutical armamentarium.

The vastness of the Arabic empire and the fact that Mohammedans from the farthest corners met each other on their pilgrimage to Mecca provided for the exchange of ideas as well as of goods between people from India and China as well as from Spain. Thus a lot of new medecines were introduced into medicine : accajou wood, amber, amomum, ammonia gum, areca, berberis, nux vomica, cassia fistula, cubeba, dragonblood, galenga, ginger, jasmin, jujubae, camphor, clove, manna, nutmeg, mace, musk, myrobalanes, oranges, rhubarb, sandal-wood, sarcocolla, senna leaves, refined sugar, tamarind, turbith, zedoaria, etc... This expansion was at least as interesting as the one which occurred after the discovery of America.

Another merit of the Arabs in the field of pharmacy was the development of a number of new drug delivery forms. As artists of life the Arabs succeeded in producing less drastic and less repulsive medicines by designing sirups (the Arabic sirab means potion), pellets, preserves, confections, marmalades. Studies were devoted to

the lessening of the feared drastic action of some medicines. The availability of sugar was quite useful in the preparation of new and more pleasant preparations.

We owe detailed information on this topic from a Nord-Italian, probably a professor of Bologna or Padua, who under the pen-name of Mesues wrote a Grabadin or summary of Arabic pharmacy. He did so under the pen-name of Mesues because this was a prestigious name and this was often done at that time. A famous Mesues, Abū Zakarīya Yūhanna ibn Māsawaih, son of one of the first pharmacists in Jundishapur, had lived in the 9th century. He studied in Bagdad and died in Sāmarrā in 857. He was a Christian and wrote in Syriac and Arabic. He was preceptor of the crown-prince, later to become caliphe Abdallah el-Mamoen, the great promotor and protector of sciences. Mesues translated various Greek works e.g. of Galen and Aristotle into Syriac. Several works have been attributed to him but only his famous work on ophtalmology and his Aphorismi have been preserved.

There is a second Mesues, a certain Māsawaih Al-Mardīnī, who died in Egypt in 1015 and who is very often confused, even by Sarton, with the Pseudo-Mesues we are dealing with here and who has been rightly called "Pharmacopoeorum evangelista", the evangelist of pharmacists.

It is interesting to have a closer look at an Arabic prescription, such as the following one, taken from Al-Kindi's Aqrābādhīn : white eye medicine.

Sarcocol gum	1 dirham (ca. 3.3 g, slightly less than 1 dragm)
Opium	1 dirkham
Tragacanth gum	1 dirkham
Incense	1/2dirkham
White-lead	8 dirkham
Arabic gum	4 dirkham

Knead with white of egg, moisten with water of quince seed and knead all the ingredients. This medecine is very active, with God's help.

The Arabs ended each formula with the wish : with God's help and this is the origin of our Recipe. Many present-day prescribers think that the R which nowadays preceeds the prescription means : Recipe (take). In fact this is the interpretation of the last century. In earlier times the Jupiter sign ♃ was used, which was later hastily transformed into ℞ and still later became ℞. In older pharmaceutical formularies we always find ℞, with a bar through the shaft of R, never R alone. This R corresponded in fact to what the Arabs wrote in full : a prayer, a wish. As some Catholics start their letters or writings with ✝, one used in earlier times the sign of Jupiter, to invoke God's help. Accordingly, the R in the recipe is not Recipe but the wish that the recipe should not contain impurities and should benefit the patient.

Caution is required, however, when describing the merits of the Arabs in the field of pharmacy. The Arabs often stuck the article al or el to a foreign name derived from the cultural heritage of older civilizations. This does not transform, however, a doctrine or substance or apparatus into Arabic inventions.

Let us take a first example : alcohol. Many historians write that the Arabs invented alcohol. It sounds so Arabic ! Even a serious historian as Hermann Schelenz writes in his monumental Geschichte der Pharmazie that the Arabs invented alcohol and called it "brennendes Wasser". How could Schelenz and so many others have been misled ? Alcohol is indeed an Arabic word but it has nothing to do with our spiritus or C_2H_5OH. By alcohol the Arabs mean something extremly fine in solid form or something extremely light and mobile in liquid form. Thus Pseudo-Meseus writes : "Tritura trituratione ultima sicut alcohol", meaning "Rub it extremely fine, as fine as alcohol". Manlius de Bosco, a commentator of Pseudo-Mesues, added the following precision in his Luminare majus : "sicut alcohol id est sicut atomi solares", as sun atoms. At first sight this could be translated in "as fine and small as dust particles in sun rays",but Manlius de Bosco meant here "as fine as fire atoms", which were considered the smallest of atoms, i.e., the smallest particles in which the four elements (fire, water, air and earth) can be divided. Franck's Etymological Dictionnary, according to N. van Wijck, reads under the word alcohol : "Not yet in Kiliaen. International word. Via Spanish

alcohol from Arabic al-kuhl, powder of leaf-sulfur, to spread over the eyelids". This is acceptable especially when knowing that powder to be spread over the eyelids should be extremely soft and fine, but the concept alcohol had a much broader and more general significance.

What then is the origin of the confusion between the Arabic concept alcohol and our spiritus ? Schelenz probably did not thoroughly study the hundreds of works he referred to. He cites the title and provides a summary, which is already quite an achievement. When scanning the Arabic works he will have been struck by the often returning word alcohol, without knowing its precise meaning. From this he drew the erroneous conclusion that the Arabs did know alcohol. In claiming that the Arabs called alcohol aqua ardens or "brennendes Wasser" he is also mistaken, as Pseudo-Meseus wrote litterally : "aqua ardens id est aqua saponis". Ardere indeed means to burn as well as to shine, which is a characteristic of soap-suds. Only much later will the name aqua ardens or aqua vitae be used for alcohol.

Who then did discover alcohol ? The honor of the discovery belongs to Arnaldus de Villa Nova, born in the neighbourhood of Valencia ca. 1234-1250. He was a physician, astrologer, diplomat, translator of Arabic works into Latin, adviser of several popes and kings, professor in Salerno, but above all alchemist. He left around 80 works, several of which have been condemned by the Inquisition after his death. He died at sea in 1311. As all alchemists. Arnaldus was very active with the alambic or distillery apparatus. The alchemists litterally put everything they laid their hands on into the alambic. Some day, when distilling white and red wine, he was astonished to collect from both a very mobile liquid which in his excitement he called "Id est sicut alcohol", thus giving the liquid its name. The discovery of Arnaldus de Villa Nova was known in our countries as early as the 14th century. It was described in Middle-Dutch under the name Aqua vitae and was advocated as a panacee.

Another discovery, which has been erroneously attributed to the Arabs was the alambic, which there was no need to discover as it already existed. Old pictures show that the Greek and Egyptians

made already use of distillery and used the alambic essentially to prepare perfumes. The Arabs did impose the cooling system, designing a precursor of the present serpentine on which a water stream was brought from superimposed water basins, the water being reused after cooling. It has been suggested by some that the name alambic is derived from the Greek word ambix (vessel, recipient) to which the Arabs stuck their label so that it was wrongly labelled an Arabic invention.

Another product, the discovery of which was wrongly attributed to the Arabs is sugar. Sugar is derived from saccharum, which is derived from the Arabic alzuchar, which in turn is derived from the Indian sakara.

Dioscorides (1st century A.D.) knew already sugar. In chapter 74 of the 2nd book of his De Medica Materia Libri Sex he writes: "Est et aliud concreti mellis genus, quod saccharon nominatur". "There is another kind of honey, named saccharon. It occurs in kinds of cane in India and in happy Arabia. It is compressed as salt. Drunk with water it is beneficial for intestines and stomach. It is remedy for disturbed bladder and kidneys and, when rubbed on the eyelids, dispels the darkness which obstructs sight".

Originally sugar was exclusively derived from sugar cane (Arundo saccharia L., Saccharum officinarum L.) which grew in China and India. The cane was compressed and the condensed sap called sakara. This sakara was a dirty, sweet and unrefined substance which the Romans called Sal Indicum. Dodonaeus writes in his Cruydt-Boeck : "Sal Indicum or Indian salt which is of a sweet taste and which is our actual sugar".

As also Galen and Plinius knew sugar, it were not the Arabs who introduced sugar into medicine. What they did was to realize that this substance could be quite useful for correcting the bad taste of many medicines. They did not want to use it in the dirty form which they had inherited. In order to obtain it in pure form they founded sugar cane refineries in Chuzistan and near Siraf and also laid out sugar cane plantations in Spain and the Mediterranean islands.

Sugar has long been an expensive product which was reserved for pharmacists. For this reason Saladinus of Asculo (15th century) wrote in his book Compendium aromatariorum on the ethic of pharmacy : "Ne praesumat syrupos qui debent esse de zuccharo de melle facere". "The pharmacist shall not prepare with honey sirups which ought to be made with sugar". Now the reverse is practised, honey being adulterated with sugar ! The reason for this is that sugar is no longer exclusively extracted from sugar cane but also, and much more so, from sugar-beets. This we owe to pharmacist Andreas Sigismund Marggraf (1709-1782) and especially to his disciple the pharmacist Carl Achard (1753-1821), who designed a technique for the preparation of sugar from sugar-beets and thus became the founder of the sugar-beet industry. Here again the role of the Arabs was restricted to the lay-out of sugar-beet plantations and the building of sugar refineries.

Alchemy has also been wrongly attributed to the Arabs. According to some the word is derived from the Egyptian kimia, which means something as black magic. Homer Dubs, professor of Chinese at Oxford University, suggests that alchemy, as well as elixir, notwithstanding the Arabic article al or el, is of Chinese origin. It is almost certain that the Chinese, who have a god of alchemy, Huien-Huien, are the discoverers of alchemy. The Arabs took this science over via the Indians, stuck as usual an Arabic label on it, as a consequence of which alchemy has been regarded as an Arabic science.

The most difficult chapter in the history of sciences is undoubtedly the chapter on alchemy.

When discussing alchemy one should immediately distinguish between true alchemists and charlatans, who, under the cloak of being capable to make gold, pulled a people's leg and deprived the concept alchemy of its philosophical-religious and mystic meaning and gave it its unfavourable connotation.

True alchemists were well-meaning and honest people who by their mostly absurd experiments rendered an invaluable service to mankind as they made chemistry possible.

The idea underlying alchemy is a philosophical one : the striving of the imperfect to the perfect. Man is mortal and thus imperfect. The principle of alchemy is to make man perfect, to immoralize him. Practical alchemy then corresponds with the striving to immortalization.

The alchemists were convinced that in the end an Elixir longaevitatis or Elixir of Life could be discovered which would bring to man long, even eternal life. Looked upon in this way, medicine actually still practices alchemy : we are still searching for a panacea to get rid of diseases as quickly as possible and for gerontological remedies to keep people young and to reach the age of 2000 years ! Alchemy is a phenomenon of all times.

To prepare this Elixir of Life the alchemists needed the Lapis Philosophicus, the Stone of the Wise, the Magnum Magisterium or Stone of Egypt. How then could one know whether one had found the Lapis Philosophicus ? When the stone or substance, added to base metals (lead, copper, tin, mercury, etc...) transformed these imperfect metals into noble ones (gold, silver) by a process called transmutation. This quite clearly shows that transmutation of base metals into gold was not a goal by itself but only a step in the preparation of the Elixir of Life.

The idea to make gold from worthless substances appealed of course too much to less noble characters to not adopt it. These then were the scum and not the pure idealistic alchemists, who indeed were also philosophers whith a special vision of life. They knew they were only then to obtain the Lapis Philosophicus when their conduct pleased the God (or God in later times). For this reason every alchemist laboratory also had an oratorium, a place of prayers, where they could reflect, meditate and pray. Laboratorium is derived from labor and oratorium. This also explains why so many monks also practised alchemy.

Up to now everything is clear : the alchemist searched for the catalyzer, which would transform metals into noble ones, by performing sensible as well as the most absurd experiments. They built all kinds of apparatus, each of them having its own name as an expression of their craving for mysteriousness. They thus were using the sphere, the spion, the tomb, the philosophical egg, the chicken-

house, the brides'room and the womb, or living beings e.g. the hydra, the twins, etc. Their oven was called athanor; they knew three kinds of heat : the moist fire or balneum mariae (the water bath, deformation of balneum maris), the supernatural fire which they obtained by adding oxygen, and the natural fire. Their sublimating apparatus was called aludel, but their apparatus par excellence was the alambic, the distillery apparatus.

The alchemists worked day and night, they thought and prayed, cooked, distilled, squandered time and money but were not enclined to inform all the world and his wife about their experience. For this reason they had designed a crytic language which was accessible to the adepts only, turning alchemy into an esoteric science, i.e., a science full of mysteries, destined to the intitiated only.

In the evolution of alchemy the Arabs played their usual role: to inherit and to transmit to the West. This does not mean that the Arabs did not practise alchemy. On the contrary, there were a great number of Arabic alchemists, which is best illustrated by the fact that 3000 works on alchemy have been attributed to Geber (Djabir). It is true, however, that alchemy, no more than alcohol, alambic and sugar, was an Arabic invention.

It is useful to fight against these heresies, for the merits of the Arabs, particularly in the field of pharmacy, is so great that it is unnecessary to exaggerate their importance.