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Abulcasis Al-Zahrawi, The Surgeon Of Al-Andalus

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Abstract

Among the many scientists who enriched the scientific panorama in medieval Spain, one of the greatest is without any doubt the Cordovan physician and surgeon Abulcasis Al-Zahrawi (circa 936-circa 1013). This paper is an approach to his figure and work, with special reference to his main writing, the *Kitab al-Tasrif* (Book of the medical arrangement) and analyzes his significance in the history of medicine and surgery.

Keywords: Abulcasis Al-Zahrawi, medieval Arabic science, history of medicine and surgery in Al-Andalus, scientific knowledge of the Middle Ages, *Kitab al-Tasrif*

Introduction

Among the many scientists who enriched the scientific panorama in medieval Spain, one of the greatest is without any doubt the Cordovan physician and surgeon Abulcasis Al-Zahrawi (circa 936-circa 1013) (Al-Dabbi, 1884-1885). His full name is Abu-l-Qasim Khalaf Ibn ‘Abbas Al-Zahrawi (Ibn Abi Usaybi‘a, 1979) and he is known in the Latin tradition by several names, being Abulcasis the most usual of all. He was born in the suburb of Madinat Al-Zahraʾ in Cordova, around 936 and died around 1013 (Ibn Bashkuwal, 1885; Ibn Al-‘Abbar, 1915). He lived in the golden times of the Umayyad Caliphate of Al-Andalus but few data of his biography are known and therefore the available information about him has to be taken with caution since there are many gaps in this regard (Ibn Al-Khattabi, 1988).

The importance of Abulcasis (Tabanelli, 1961), who was simultaneously physician, surgeon, phamacist, ophtalmologist and dentist, is unquestionable (Leclerc, 1876); and this is restricted not only to the history of Arabic science (Mieli, 1966) but also to the history of the universal scientific knowledge due to the influence that his achievements had got all over Europe till late 16th century (Ullmann, 1970).

Abulcasis wrote two works (Sezgin, 1975): a) *Kitab al-tasrif li-man ‘ajiza ‘an al-taʾlif* (Book of the medical arrangement for those who are not

capable of its knowledge by themselves), that is his masterpiece, known as *Kitab al-Tasrif* or simply *Al-Tasrif*; and, b) *Kitab fi-l-tibb li-'amal al-jarrahin* (Book of medicine for the practice of the surgeons), not edited yet and included in the MS Deutsche Staatsbibliothek of Berlin, num.6254, mf.91, which, according to the explanation of Abulcasis made in the introduction of the book, is a summary of surgery written by Al-Zahrawi for his pupils as an appendix of his career of physician and as an abstract of his experience of surgeon; and it probably is a compendium of the 30th treatise from *Al-Tasrif* (Brockelmann, 1937).

The *Kitab al-Tasrif*

The *Kitab al-Tasrif* is an encyclopaedic compendium of theoretical and practical medicine that was written around 1000 (Kahhala, 1988). It is divided into thirty treatises and is contained in six Hebrew manuscripts:

- Ms Bibliothèque Nationale, Paris, num.951,1162,1167,1168 (treatises I-II)
- Ms Bibliothèque Nationale, Paris, num.1163 (treatises XVIII-XXX)
- Ms Bibliothèque Nationale, Paris, num.1165 (treatise XXV)
- Ms Bibliothèque Nationale, Paris, num.1166 (treatise XXX)
- Ms Bibliothèque Nationale, Paris, num.1162 (probably complete)
- Ms Bodleain Library, Oxford, num.414,415 (complete)

Al-Tasrif is also contained partially or completely in thirty-nine Arabic manuscripts distributed worldwide (Arvide Cambra, 1997).

The subject of every treatise is as follows:

- The treatise I is about physiology, humours, natures and natural elements as well as classification and explanation of the body organs.
- The treatise II is about phatology, the different diseases, symptoms, causes and treatment.
- The treatise III is about recipes of electuaries, stored and preserved.
- The treatise IV is about theriacs and antidotes for poisons.
- The treatise V is about laxatives and their preservation.
- The treatise VI is about purgative drugs.
- The treatise VII is about emetics and enemas.
- The treatise VIII is about laxatives of good taste.
- The treatise IX is about cardiology and beneficial drugs for heart.
- The treatise X is about electuaries, suppositories and purgatives.
- The treatise XI is about composite medicaments called *jawarish* and electuaries prepared with cumin named *kammuniyyat*.
- The treatise XII is about fattening drugs and diuretics.
- The treatise XIII is about syrups.
- The treatise XIV is about boiled musts, vulcanized and macerated remedies, laxatives and not laxatives.

- The treatise XV is about recipes of marmalade electuaries and their preservation.
- The treatise XVI is about medicinal dusts.
- The treatise XVII is about medicinal pills.
- The treatise XVIII is about inhalants, vapours, gargles, gouts and nasal anti-haemorrhagic remedies.
- The treatise XIX is about perfumes, fragrances, remedies for body embellishment and preparation of algalias.
- The treatise XX is about ophtalmology.
- The treatise XXI is about stomatology and odontology.
- The treatise XXII is about remedies for the chest.
- The treatise XXIII is about dressings and bandages.
- The treatise XXIV is about ointments and pomades.
- The treatise XXV is about oils and unguents.
- The treatise XXVI is about the diet in the illness and the health.
- The treatise XXVII is about simple and composite remedies as well as foods.
- The treatise XXVIII is about preparation of simple remedies and their benefits, as well as about the therapeutic application of the combustion of the minerals.
- The treatise XXIX is about the name of the drugs into the differents languages, synonyms and subtitutes, as well as about weights and measures.
- The treatise XXX is about surgery.

Al-Tasrif is one of the most voluminous works made in the Islamic medieval world because it comprises a wide spectre of scientific knowledge prevailing at that time (Lindberg, 1978): medical and surgical science, both in theory and in practice, diets and pharmacopoeia. The book was written by Al-Zahrawi as a training manual for the students of his private school of medicine that he led in Spain with all probability (Savage-Smith, 2002).

There is a facsimile edition of the whole book *Al-Tasrif* made by Fuat Sezgin according to the Arabic manuscript num.502 from the Süleymaniye Umumi Kütüphanesi Library of Istanbul, which was published by the Institute for the History of Arabic-Islamic Science at the Johann Wolfgang Goethe University, Frankfurt am Main (Sezgin, 1986). There are also some partial editions: Treatise XVI (Arvide Cambra, 1994), according to the Arabic manuscript num.5772 from the Bibliothèque Nationale of Paris and the Arabic manuscript num.502 from the Süleymaniye Umumi Kütüphanesi Library of Istanbul; Treatise XVII (Arvide Cambra, 1996); Treatise XVIII (Gil Gangutia, 1995); Treatise XIX, Part II (Arvide Cambra, 2010), facsimile edition according to the Arabic manuscript num.5772 from the Bibliothèque Nationale of Paris; Treatise XX (Arvide Cambra, 2000), according to the

Arabic manuscript num.5772 from the Bibliothèque Nationale of Paris; Treatise XXI (Arvide Cambra, 2003), according to the Arabic manuscript num.5772 from the Bibliothèque Nationale of Paris; Treatise XXV (Hamarneh & Sonnedecker, 1963); and Treatise XXX (Channing, 1778; Pink & Lewis, 1973).

On the other hand, there are Medieval and Renaissance partial translations from Arabic: Treatises I-II, tanslated into Hebrew by Chem Tobb, and by Mechoulan; and translated into Latin with the title of *Liber theoricae nec non practicae Alsaharavii in prisco Arabum medicorum conuentu facile principis, qui vulgo acararius dicitur. Alzahaavii compendium artis*, which was published at Augsburg in 1490; Treatise XXVII, translated into Hebrew by Chem Tobb according to the Hebrew manuscript num.1163 from the Bibliothèque Nationale of Paris; Treatise XXVIII, *Liber servitoris*, translated into Latin by Simon of Genova and Abraham Judeus of Tortosa and printed by Nicola Jenson Gallicum at Venice in 1471; Treatise XXIX, Part V, *Explicatio ponderum et mensurarum in libris medicis accurrentium*, translated according to the Arabic manuscript num.42 from the Bodleian Library in Oxford; and Treatise XXX, translated into latin by Gerard of Cremona with the title of *Albucasis methodus medendi cum instrumentis ad omnes fere morbis depictes* and printed at Venice in 1497, 1499 and 1500, and many other editions.

There are also partial translations into French, English and Spanish of contemporay times: a) French translations: Treatise XXIX, Part V (Sauvaire, 1884); and Treatise XXX (Leclerc, 1861); b) English translations: Treatise XXV (Hamarneh & Sonnedecker, 1963); and Treatise XXX (Pink & Lewis, 1973); c) Spanish translations: Treatise XVI (Arvide Cambra, 1994); Treatise XVII (Arvide Cambra, 1996); Treatise XVIII (Gil Gangutia, 1995); Treatise XIX, Part II (Arvide Cambra, 2010); Treatise XX (Arvide Cambra, 2000); and Treatise XXI (Arvide Cambra, 2003).

The *Kitab al-Tasrif* was used until the 16th century as a reference manual and textbook by the specialists in East and also, thanks to the Latin translations, in West in Christian world. This medical compendium contains a lot of mentions to other works and to Ancient and Islamic authors such as, for example, Dioscorides, Paulos of Egina, Erasistratos of Keos, Archigenes of Apamea, Galen, Yuhanna Ibn Masawayh, Al-Razi, Hunayn Ibn Ishaq, Ibn Al-Jazzar, Al-Hajjaj, Ishaq Ibn ‘Imran, Ibn Juljul and Ibn Haytham, etc. All this is a testimony of the high scientific knowledge that Abulcasis reached.

The treatise XXX on surgery was translated into Latin by Gerard of Cremona (d.1187) and was considered during five centuries as the manual of surgery in the medical school of Salerno in Italy, that of Montpellier in France and other important European schools of medicine. It contains the most ancient surgical instruments in history and about two-hundred of these

instruments are described together with many diagrams and illustrations as well as with the appropiate instructions for their correct use. These illustrations are the earliest known to be intended for teaching. These instruments had a great influence in all the later Arab authors, supported the surgical basis of Europe and left an important mark on the Christian surgeons in the Middle Ages and the Renaissance, such as Roger Frugard, Roland of Parma, Ferrari, Lanfranc, Guy de Chauliac and Walther Hermann Ryff (Campbell, 1974).

In pharmacology, *Al-Tasrif* due to its contributions exceeded the *Materia Medica* of Dioscorides which Abulcasis had known thanks to Istifan Basil's Arabic version corrected by Hunayn Ibn Ishaq in the 9th century. In addition, Al-Zahrawi discussed in the pages of the book about the preparation of some drugs and described in detail the application of a few techniques such as sublimation and decantation. Abulcasis is certainly along with Al-Ghafiqi (d.1165) and Ibn Al-Baytar (d.1248) one of the most outstanding personages of Islamic science for his contributions to the history of medieval pharmacopoeia (Levey, 1973).

In medicine, among the most remarkable achievements of Abulcasis, we have, fo instance:

1) In *Al-Tasrif* s treatises I and II Abulcasis described in detail for first time and with accuracy the disease called today haemophilia as "a haemorrhagic illness transmitted to the male children by women who are not infected", as well as classified three-hundred twenty five diseases and discusses their symptomatology and treatment.

2) Moreover, in his work Abulcasis described the hydatid cysts, the lachrymal fistula and the ear polyps; he made an interesting explanation about a case of hydrocephalus, resulting from a congenital defect caused by a blocked drainage in the patient's cerebral fluid; he introduced what is known now as the Walcher position in obstetrics and devised new obstetrical forceps.

3) Abulcasis insisted on the usefulness of teaching anatomy and physiology and the need for training in surgery, etc.

Physiology and surgery in Islam and Christendom during the Middle Ages had very few competent guarantors and this was largely due to the taboo existing on human dissection. The surgeons educated in that time were never considered less important that other specialists but only a few of them practised surgery because of the risks, difficulties and doubts that were supposed in this science. The first basis in the development of this science was the translation of the ancient texts on anatomy and surgery, especially the Greek tradition's ones; this labour was principally made by Hunayn Ibn Ishaq in the 9th century. The Indian, Persian, Egyptian, Roman and Chinese surgery also had influence upon the Arabic one. Ibn Masawayh

(d.857) emphasized its importance and Al-Majusi (d.994) wrote about the transcedence of surgery applied on fractures and treatment of wounds. But, Al-Zahrawi was the first who devoted to surgery an entire treatise, the treatise XXX of the *Kitab al-Tasrif*, which includes cauterizations, removal of stones from the kidney and the bladder, bloodletting, scarifications, adjustment of bones and joints, extraction of stinging instruments, extirpation of polyps, dissection of animals, midwifery, obstetrics and use of surgical material, treatment of fractures, breaks, incisions, perforations and wounds, use of several types of sewing thread in surgical operations and methods for stopping the haemohrrages as well as surgery of eyes, ear and throat, and many others.

Among the contributions to surgery from Abulcasis, we can underline that he was the first in recommending surgical removal of a broken patella and the first in practicing on women the lithotomy. Abulcasis also made some original descriptions of manufacture and use of probes, surgical knives and scalpels of diverse shapes and designs; he invented several types of surgical scissors and forceps, and was the first in describing accurately aural polyps and lithotomy using special lancets; he described the lachrymal fistula and other operations of the eyes in which he used pointed blades and speculums; he made ligatures of arteries and recommended several types of threads in suturing; he appied plasters and bandages fractures; etc

In addition, he increased the rank of surgery until the same level as medicine thanks to his ability and his capacity of remark as well as his careful practice. He perfected some delicate surgical operations, including removal of dead foetus and amputation of limbs. He introduced new ideas on cauterization of wounds and insisted upon the need of techniques for vivisection and dissection. He was the inventor of some instruments, for example: an instrument for internal examination of ear, an instrument for internal inspection of the urethra (Otero Tejero & alii, 2007), an instrument for removal of spines, bones and other sharp elements from the throat, some obstetrical forceps and several types of scissors, etc.

Abulcasis was also an expert in dentistry and his masterpiece, the *Kitab al-Tasrif*, contains sketches of various instruments used in this scientific field, in addition to a descripction of some important operations. He discussed the problem of unaligned or deformed teeth and how to correct these defects, and for that reason he is considered as a precursor of the modern orthodoncy. Moreover he developed the technique of preparing artificial teeth and replacing defective teeth. The odontological texts included in the treatises XXI and XXX from *Al-Tasrif* contain among other things, for example, extraction and filling of teeth as well as dental prosthesis besides many advises for a correct oral health and hygiene, etc.

The methods employed by Abulcasis eclipsed those of Galen and maintained a dominant position in the European medicine for longer than five centuries by means of the Latin translations. And for that reason, Abulcasis is without any doubt one of the most prominent scienticists in history and his work one of the most important and representative of the scientific literature.

Conclusion

Abulcasis Al-Zahrawi is an example of the high scientific level reached by Arab and Islamic medicine in the Middle Ages. He was the first surgeon of Muslim world and increased the rank of surgery to the same level as medicine. The *Kitab al-Tasrif* is part of the important cultural and scientific legacy brought by the Arabs and, for this reason, his author is set in a very outstanding place in history of universal science.

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