*IOSR Journal Of Humanities And Social Science (IOSR-JHSS)*
*Volume 19, Issue 2, Ver. I (Feb. 2014), PP 49-52*
*e-ISSN: 2279-0837, p-ISSN: 2279-0845.*
*www.iosrjournals.org*

# Persian Illustrated Anatomy from Timurid Iran

Ali Akbar Ziaee

***Abstract:*** *Anatomy and physiology formed an inseparable unit in Islamic medicine. The study of the anatomy and physiology of the human body remained of the greatest interest to Sufis, theologians and philosophers as well as to physicians, and students of most other traditional disciplines acquired some knowledge of it. The greatest concern of Muslims was with the overall functioning of the body and the inter-relation of the organs within the total unity of the body. Islamic Law did not permit the dissection of the human body, although its prohibition has been debated by some of jurists over the ages. As a result, practically no dissections were carried out and Muslims relied heavily upon Galenic anatomy and physiology and its theory of the circulation of the blood and the spirits which are reflected clearly in such famous Islamic texts of anatomy as the Tashrih-i Mansuri by Mansur ibn Ilyas. The oldest text of Islamic anatomy is the al-Mukhtasar fi 'ilm al-Tashrih, by 'Abdu al-Majid al-Bidawi, written in 620 H.. But in Persia he is also known as the author of two other works. One, which is represented by a solitary manuscriptin Calcutta and is called the Ghiyathiyyah or 'The Aid'; the other is his large kifaya-i-Mujahidiyyah, also known as the kifaya-i-Mansuri or 'Sufficiency of Mansur', as opposed to the better-known work of the same name by Rhazes.*
***Keywords****: Anatomy, Islam, Timuri, Persia.*

## I. Biography

Mansur ibn Muhammad ibn Ahmad ibn Yusuf Ibn Ilyas was a late 14th century physician from Shiraz, Timurid Persia. Mansur was from a family of scholars and physicians active for several generations in the city of Shiraz. He dedicated both of his major medical writings, a general medical encyclopedia and a study of anatomy, to rulers of the Persian province of Fars.

## II. *Tashrih-i Badan-i Insan*

The great advance came in the year 1396 when Mansur bin Muhammad bin Ahmad bin Tusuf bin Faqih Ilyas, who came from a Persian family of scholars and physicians working in the city of Shiraz, composed his Persian monograph on anatomy [1]. No anatomical illustrations of the entire human body are preserved from the Islamic world before those which accompany the Persian treatise composed by him. His illustrated treatise, often called Mansur's Anatomy (*Tashrih-i Mansur-i*), was dedicated to the sultan Ziya' al-Din Pir Muhammad Bahadur, in all likelihood referring to Pir Muhammad ibn 'Umar ibn Timur, the ruler of the Persian province of Fars from 1394 to 1409 (797-811 H) and grandson of Timur, known to Europeans as Tamerlane. Persian surgeon Mansur ibn Ilyas produced sophisticated anatomical drawings tracing nerves, veins, arteries, muscles and complex organs like the heart and brain that aided him immensely in conducting effective operations. The fact that anatomical illustrations do not appear in any earlier works is due to another prohibition of Islam-that of the making of reproductions of the human figure.

There is in St. Petersburg a manuscript entitled *Kitab dar 'Ilm-i-Tashrih*, or 'Book of Anatomy' by Isma'il bin Husayn al-Jurjani. There is also a work in British Museum entitled *Mukhtasar dar 'Ilm-i-Tashrih* or 'Compendium of Anatomy' by Abu al-Majd al-Baydawi. This, which is the only known copy of the work, is incompleted and the date of its composition remains doubtful, but there are no illustrations.

Mansur's book is divided up into a dedication, an introduction, five chapters and a conclusion.

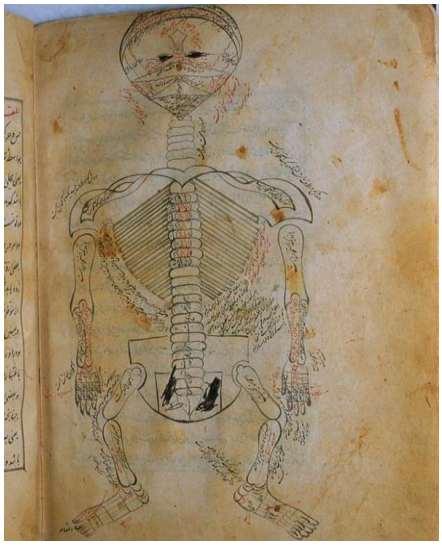
## IIV. Description of Mansuri's Manuscripts in the World

There are three copies of Mansuri's book in British Museum. The first copy of it is entitled *Tashrih bi't taswir*, dated 14th Sha'ban 1083/5th December 1672. This copy is also dated 23 Safar 1088/27 April 1677 by the same scribe [2]. The second is not dated, late 12th/18th century, and the third is in single sheets and not dated too [3].

The treatise consists of a dedication and an introduction followed by five chapters on the five "systems" of the body: bones, nerves, muscles, veins, and arteries - each illustrated with a full-page diagram. The dedication and introduction are long. There is the usual pious discussion of the wisdom of God in His creation of the human race and the argument about which organ is the first to be differentiated *in utero*. With the first chapter the more scientific portion of the book starts. The chapter on the skeleton was also illustrated

with smaller diagrams of the cranial sutures and bones of the upper jaw with the positions of the teeth indicated. The bones are here discussed at consideration length. The total number, exclusive of the sesamoid and the hyoid bones, is said to be 248. It was the generally accepted number by the traditional Islamic anatomists. Later this number was called into question and Ghiyath al-Din of Ispahan in his *Mir'at al-Sahhat* pointed out that it is uncertain how many bones go to form the skull and into how many bones the pelvis should be divided and that the number 248 is therefore only traditional and not scientifically accurate. Elgood attributed the number 200 bones to Shaykh Sa'di Shirazi, the poet. He said: 'Shaykh Sa'di, the poet, gives the number as 200, but I do not think that his figure is to be taken literally. He is only, I imagine, stating a large number which fits his verse [1].' I do not think that Elgood's claim is true, because Sa'di says:

Sa'di said: 200 vertebrae in the vertebral column, not 200 bones in the human body. Actually the number 200 vertebrae is not true, because there are normally thirty-three (33) vertebrae in humans, including the five that are fused to form the sacrum (the others are separated by intervertebral discs) and the four coccygeal bones which form the tailbone.



In the next chapter Mansur deals with the nervous system. The nerves were to the anatomists of those days a structure comparable to the arteries and veins. They were the only three structures which were found distributed throughout the whole body. It followed therefore that their functions were similar. Now, arteries and veins are hollow and convey the spirit, the natural spirit from the liver in the case of the veins, the vital spirit from the heart in the case of arteries. By analogy the nerves must be hollow and convey a spirit. As the nerves issue from the brain, of necessity it is the psychic spirit which they convey from there to the rest of the body. Some nerves, says Mansur, are mere tubes, such as the nerves which form the optic commissure within the brain and whose function is to convey the spirit of vision. Other nerves are not so obviously hollow; but even through these the spirit will make its way as 'water through mud or oil through an almond'. The gross anatomy of the nervous of the nervous system is well described. There are indeed faults, but these only later generations of anatomists were able to put right. Thus, Mansur held that there were only seven cranial nerves, that is, nerves whose origins were from the brain itself. Later anatomists have increased this number to twelve. He further considered the *filum terminale* (terminal thread) to be a single nerve, so that he stated that there were thirty-one pairs of spinal nerves and one odd one.

In the third chapter he deals with muscles, a chapter which is the least satisfactory in the whole book. Muscles were still unnamed in his day. Mansur is content to describe the gross structure of a muscle, the varieties of muscles as they appear to the naked eye, and the number of the muscles.

The forth chapter deals with the veins. When reading this chapter it is needless to divest oneself of all ideas of circulation. Venous blood started its journey from the liver, just as arteries blood started its course from the heart. In new anatomy, it is proved that venous blood is blood returning to the heart (in veins). With one exception (the pulmonary vein) this blood is deoxygenated and high in carbon dioxide, having released oxygen and absorbed CO2 in the tissues. It is also typically warmer than arterial blood, has a lower pH, has lower concentrations of glucose and other nutrients, and has higher concentrations of urea and other waste products, and we know that arteries are blood vessels that carry blood away from the heart. All arteries, with the exception of the pulmonary and umbilical arteries, carry oxygenated blood. In his book, the superficial veins had been much studied from the point of phlebotomy; about the internal system his knowledge was not so accurate. All veins both superficial and deep originate in the liver and carry hepatic blood together with the natural spirit. There was one vein which was an exception which the Muslim anatomists called the arterial vein and which the

new anatomy call the pulmonary vein. This must have been a difficulty from the beginning of time. For in the first place the structure was double; there are two pulmonary veins on each side. And in the second place it was generally acknowledged that all blood had to pass from the heart to the lungs and that some had to get from the right side of the heart to the left side. Avicenna, followed by Mansur, held that the pulmonary vessels were double because they had a double function to fulfill. Their first function was to carry blood to the heart and lungs for their nourishment. Nutrition (also called nourishment or aliment) is the provision, to cells and organisms, of the materials necessary (in the form of food) to support life. Their second function was to convey blood to the lungs for aeration. Aeration (also called aerification) is the process by which air is circulated through, mixed with or dissolved in a liquid or substance. The other difficulty was that blood entered the heart from the liver on the right side but was also found on the left side. Avicenna supposed that there was a visible passage connecting the right and left ventricles of the heart. Galen, who presumably had looked at many human hearts, knew that there was no such passage and supposed that there were invisible channels between the two ventricles. It was Ibn Nafis a commentator on the *Canon* of Avicenna who refuted both these fallacies and, 300 years before Europe recognized it, described in his work the lesser or pulmonary circulation. Ibn Nafis in opposition to Galen and Avicenna wrote:

When the blood had been refined in the Right Ventricle, it needs be that it pass to the Left Ventricle where the Vital Spirit is generated. But between these two there exists no passage. For the substance of the heart there is solid and there exists neither a visible passage, as some writers have thought, nor an invisible passage which will permit the flow of blood, as Galen believed. But on the contrary the pores of the heart are shut and its substance there is thick. But this blood after being refined, must of necessity pass along the Pulmonary Artery into the lungs to spread itself out there and to mix with the air until the last drop be purified. It then passes along the Pulmonary Vein to reach the Left Ventricle of the Heart Spirit. The remainder of the blood, less refined, is used in the nutrition of the lungs. That is why there are between these two vessels (i.e. the Pulmonary Arteries and Veins) perceptible passages.

Mansur followed Avicenna in his incorrect theory about the flow of the venous blood within the heart. He also followed him in his statement that the human heart had three ventricles. To the small central ventricle (which actually is non-existent) he gave the name *dehliz*. He also stated that the apex of the heart was strengthened by special bone.

The fifth chapter of his 'Anatomy' deals with the arteries and their branches. It was generally taught in the Baghdad School that although the arteries contained some blood, their main function was the transmission of air and the vital spirit. The pulsation of the arteries was recognized as dependent upon the pulsation of the heart. It was also recognized that the isolated heart was able to beat with a rhythm of its own. It was this doctoring that the primary function of the arteries was to carry air around the body, that held back the discovery of the major circulation of the blood.

The last chapter is devoted to what Mansur calls compound organs. Simple organs he has defined as organs of which the smallest part exactly resembles the whole. Thus, a tiny bone is still a bone and a branch of an artery has still to be called an artery. A compound organ is one which cannot be subdivided. Thus, the heart can be divided up into ventricles and auricles, but none of these alone can still be called a heart. In this chapter, therefore, Mansur deals with what we would call organs as opposed to the systems. Such a distinction is not quite accurate, for Mansur classes as compound organs the various constituent parts of the renal and generative systems.

The book is further enlarged by a terminal chapter upon pregnancy and embryology. The subject of embryology was an extremely complicated one for physicians of those days. It was generally held that there was both a male and a female semen. Although the sexual cycle in woman was a doctrine still unborn. Others denied that the vaginal fluid was a true semen and claimed that woman made no contribution at the moment of conception. Mansur rebuts this latter school by pointing out that a woman is just as much under an obligation to perform the major ablution after a nocturnal emission as is a man and that the major ablution would not be ordered unless there was an exit of semen [1].

A concluding chapter on compound organs, such as the heart and brain, and on the formation of the fetus, was illustrated with a diagram showing a pregnant woman.

Emilie Savage-Smith says: 'Most of the illustrations that Mansur ibn Ilyas used to illustrate his treatise were not original with him. The origin of the anatomical series of full-length figures remains a puzzle, but it clearly predates the Persian treatise by Mansur ibn Ilyas written at the end of the 14th century. Historians have noted the similarity between the first five full-length illustrations and certain early Latin sets of anatomical diagrams. This similarity is particularly evident in the diagram of the skeleton which in both the Latin and Persian versions is viewed from behind, with the head hyperextended so that the face looks upward and with the palms of the hands facing towards the observer -a posture, some have noted, suggestive of a dissection table. All the figures are in a distinctive squatting posture. The earliest Latin version dates from the 12th century, yet the earliest Islamic version is represented by the NLM manuscript produced in 1488. We do not know in what form,

nor by what means, these full-length anatomical diagrams of the five systems were available to Mansur ibn Ilyas. The sixth figure in the series of full-page illustrations, the pregnant woman, was possibly a contribution by Ibn Ilyas himself, who was particularly concerned in his treatise with Aristotelian and Galenic embryological theories and their interaction with the tradition of Prophetic medicine. It was constructed from the arterial figure, with the labels removed and superimposed with an oval gravid uterus having the foetus in a breech or transverse position. The accompanying text of Mansur ibn Ilyas's treatise, however, gives no evidence for or against the suggestion that the sixth figure was his invention, for in the text itself the figure of a pregnant woman is never mentioned. The only reference in Mansur ibn Ilyas's treatise to an illustration occurs in the chapter on the nervous system, where it is mentioned that pairs of nerves are to be designated by certain colors. Nowhere else in the treatise does Mansur ibn Ilyas even mention illustrations accompanying his treatise'[4].

I think that Similarity between the images does not reduce the value of Ibn Ilyas's book. The full-length illustrations (with the exception of the pregnant woman) have numerous labels in a mixture of Arabic and Persian. One of the two copies now at the National Library of Medicine is the earliest dated copy of Mansur ibn Ilyas's illustrated anatomy.

It (MS P 18) was completed on 8 December 1488 (4 Muharram 894 H) by a scribe named Hasan ibn Ahmad working in Isfahan. Whether the scribe also executed the illustrations as well as copying the accompanying text is unknown. The second copy at NLM (MS P 19) is undated and unsigned, but the nature of the paper, ink, and script suggests that it was executed in the late 15th or very early 16th century, also in Iran. These and other classic works in the Islamic medical collection link back to librarian Harold W. Jones, who took a chance in 1940 when he authorized the beginning of the collection that is now one of the great treasures at the National Library of Medicine.

## Sources:

[1] Elgood, Cyril, *Safavid Medical Practice*, translated into Persian by: Muhsin Javidan. (Tehran University, 1978).
[2] French, Roger, *Ancients and Moderns in the Medical Sciences*. (Burlington USA: Ashgate, 2002).
[3] Nasr, Seyyed Hossein, *Science and Technology in Islam*. (London: Science Museum, 1976).
[4] Savage-Smith, Emilie, "The History of Arabic Science", edited by: Roshdi Rashed, in: *Encyclopedia of Medicine*. (London: Routledge, 1996).