REVIEW DERLEME

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An Anatomist Şemseddîn-i Itâki in the Seventeenth Century and His Illustrated Handwritten Anatomy Book: Traditional Review

Onyedinci Yüzyılda Bir Anatomist Şemseddîn-i İtâki ve Resimli El Yazması Anatomi Kitabı: Geleneksel Derleme

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ABSTRACT The 17th century was a century of important developments in science and anatomy in Europe. Şemseddîn-i İtâki (1570-1640 A.D.) is an important scientist, anatomist and physician who lived in this century. He was born in Shirvan and later came to İstanbul, Ottoman Empire, where he wrote the anatomy textbook "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân", meaning "Anatomy of the Body and Birth Information for Scholars". The purpose of this review is to introduce Şemseddîn-i İtâki and his book. "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" was the first illustrated and handwritten Turkish anatomy book. The Turkish anatomy terms contained in the work make it interesting in terms of the terminology of anatomy. While some of the figures in the book resemble Ahmed Ibn Mansur's Teşrih-i Ebdan, it is observed that some of them resemble the figures of Andreas Vesalius. It can be stated that he benefited from many scientists in his work, including Aristotle, Galen, Avicenna and Juan Valverde de Amusco. The book also includes some schemas drawn by the author himself. In his work, İtâki pointed out the functional importance of the structures by using the expressions "If it hadn't happened (without)" or "If it had happened". This approach is a precursor to functional anatomy. Almost all of the Eastern and Western literature on anatomy has been read and reviewed and anatomy knowledge has been updated for those dates. We think that Şemseddîn-i İtâki is a scientist who should be known today for his pioneering, knowledge-following and researching characteristics.

Keywords: Şemseddîn-i İtâki; Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân

ÖZET On yedinci yüzyıl, Avrupa'da bilim ve anatomide önemli gelişmelerin yaşandığı bir yüzyıldır. Şemseddîn-i İtâki (M.S. 1570-1640), bu yüzyılda yaşamış önemli bir bilim insanı, anatomist ve hekimdir. İtâki Şirvan'da doğmuştur ve daha sonra Osmanlı İmparatorluğu'nda İstanbul'a gelmiştir ve burada "Âlimler için vücudun anatomisi ve doğum bilgileri" anlamına gelen "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" anatomi ders kitabını yazmıştır. Bu çalışmanın amacı Şemseddîn-i İtâki'yi ve kitabını tanıtmaktır. "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" ilk resimli ve el yazması Türk anatomi kitabıdır. Eserde yer alan Türkçe anatomi terimleri, eseri anatomi terminolojisi açısından ilgi çekici kılmaktadır. Şemseddîn-i İtâki, kitabında İbnü'n Nefîs'in yazdıklarını okuduğunu belirtse de kitabı incelendiğinde genel olarak İbni Sînâ'dan etkilendiği düşünülmektedir. Kitaptaki şekillerin bir kısmı Ahmed ibn Mansur'un Teşrih-i Ebdan'ını andırırken bir kısmının da Andreas Vesalius'un şekillerine benzediği gözlenmektedir. Eserinde Aristoteles, Galen, İbni Sînâ ve Juan Valverde de Amusco'nun da aralarında bulunduğu pek çok bilim insanından yararlandığı belirtilebilir. Eserde ayrıca yazarın bizzat çizdiği bazı şemalar da yer almaktadır. İtâki çalışmasında oluşumlar için "O olmasaydı (olmaksızın)" ya da "Olsaydı" ifadelerini kullanarak yapıların fonksiyonel önemine dikkat çekmiştir. Bu yaklaşım fonksiyonel anatominin öncüsüdür. Anatomi ile ilgili Doğu ve Batı literatürünün neredeyse tamamını okumuş, araştırmış ve o tarihler için anatomi bilgilerini güncellemiştir. Şemseddîn-i İtâki'nin bugün öncü, bilgiyi takip eden ve araştırmacı özellikleriyle tanınması gereken bir bilim insanı olduğunu düşünüyoruz.

Anahtar Kelimeler: Şemseddîn-i İtâki; Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân

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In the 17th century, advances in anatomical science and medicine in Europe were rare in history.[1] Until the 17th century, ancient Greek, and Roman medical knowledge and then the books of Arab-Turkish scientists were the most important sources for understanding human anatomy. During this period, Turkish-Islamic scientists, and anatomists such as Şemseddîn-i İtâki (1570-1640 A.D.) continued to advance medical science. His illustrations are highly descriptive and informative when compared to 17th-century medical literature. Şemseddîn-i İtâki is an anatomist who benefited from the Greek-Roman heritage and the works of Arab-Turkish scientists and contributed to the development of the science of anatomy.[2]

Şemseddîn-i İtâki wrote an anatomy book "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân", meaning "Anatomy of the Body and Birth information for Scientists (Scholars)", the first hand-written Turkish illustrated anatomy book. It is accepted that this book was written between 1623-1632.[3] There are 7 original handwritten copies of the book; 3 of these are currently stated in the library which is named Süleymaniye in İstanbul city of Türkiye.[2,3] Esin Kahya's "Şemseddîn-i İtâkî's Illustrated Anatomy Book", which is the translation of Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân from the Old Ottoman Turkish text into the modern Turkish alphabet, was first published in 1996 and later in 2022.[4,5]

İtâki was born in Shirvan, which is in today's Azerbaijani territory. He was educated in subjects such as medicine, fiqh, philosophy, logic, astronomy, and mathematics. He stated in his work that he spent approximately 20 years on his education.[4] İtâki lost many members of his family and experienced enormous difficulties due to the wars and internal turmoil in Shirvan. He had to leave Shirvan after it was captured by Persians in 1604. After leaving his homeland, İtâki traveled around various countries for a long time, but according to his own words, he didn't like these countries. So he decided to live in İstanbul, the capital of the Ottoman Empire during the reign of Sultan Murad the IVth (1623-1640), he practiced medicine in İstanbul and was presented to Grand Vizier Recep Pasha with the help of Ali and İbrahim Efendi. During this period, the title of "Haremeyn" is given to him by Recep Pasha.[2,6] When he was almost 60 years old, he wrote the work "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" in order to put forward the ideas of ancient scholars on anatomy in Turkish and as a dedication by the Sultan of the time. The book was presented to the Sultan of the time in 1632. Although the work was written in the 17th century, it was copied and reproduced in the 18th century. The 7 existing copies show that the work was also used in the 18th century. The reason why the work was written in Turkish is to introduce the existing knowledge about anatomy to Turkish physicians. Since the work is in Turkish, the Turkish anatomy terms it contains make it interesting in terms of the terminology of this branch of science. Generally, Turkish anatomy terms, their Arabic and, rarely Persian versions are also listed. Kidney, intestine, saliva, and cartilage can be given as examples of Turkish anatomy terms provided in the work.[4]

One of the most important points of the work is that, it was written on the subject of anatomy. As it is known, there are very few works written on anatomy in both the Islamic world and in the Ottoman Empire. Generally, the subject of anatomy is discussed as a section in general medical works, and this work is entirely about anatomy.[4]

SCHEMAS AND DRAWINGS IN THE İTÂKI'S "TEŞRÎH-I EBDÂN VE TERCÜMÂN-I KIBÂLE-I FEYLESÛFÂN" BOOK

The schemas and drawings in İtâki's book can generally be divided into 3 categories. The 1st of these resembles early anatomical paintings and pictures are similar to the pictures in Ahmed İbn Mansur's work titled "Kitab-ı Teşrihü'l-Ebdan Min e't-Tıb". The 2nd group of pictures is similar to those in "De Humani Corporis Fabrica Libri Septem" by Andreas Vesalius. Among these, there are schemas of the skull bones and some muscles, as well as schemas of the respiratory, urinary systems, genital systems, and cranial nerves.[7] The drawings in Şemseddîn-i İtâki's book are substantially different from Eastern-style drawings. Although the majority of these paintings do not resemble Renaissance Period art drawings, they are among the Renaissance Period Western drawings in the literature.[8]

Besides these 2 types of schemas, there is a 3rd group, which was probably drawn by the author himself. These are specifically included where some details require explanation; as in the descriptions of the nervous system.[4,9]

CHAPTERS IN THE "TEŞRÎH-I EBDÂN VE TERCÜMÂN-I KIBÂLE-I FEYLESÛFÂN" BOOK

The handwriting book includes chapters on bones, nerves, muscles, vessels, the respiratory system, the brain, internal organs, sensory organs, the heart, breasts, the digestive system, the spleen, the urinary system, the genital system, and embryology.[4] İtâki explained these issues by supporting them with various pictures. These drawings include anatomical structures such as bones, muscles, cranial nerves, spinal nerves, larynx, trachea, bronchi, stomach, intestines, urogenital system, and bladder.[8]

GENERAL REVIEW OF CHAPTERS OF İTÂKI'S "TEŞRÎH-I EBDÂN VE TERCÜMÂN-I KIBÂLE-I FEYLESÛFÂN" BOOK

ANATOMY OF THE DAGGER (LARYNX) MUSCLES

In İtâki's own words in his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book: *"The organ of sound is the dagger (larynx). The dagger was created to create sound. It consists of 3 cartilages. One of them is the lumpy cartilage that forms the bottom part of the dagger. It is possible to find it with your fingers. It is curved and resembles a cowhide shield. A cartilage in the neck is located on the inside, opposite of this lump of cartilage (thyroid cartilage). It is attached to the thyroid cartilage, which is called the eponymous cartilage (cricoid cartilage). The 3rd cartilage is covered over these 2, united with the nameless cartilage, and reaches the thyroid cartilage, but does not merge with it. It has 2 pits, and the cricoid cartilage has 2 sharp protrusions. These 2 sharp protrusions enter the pit there and are reinforced. So this cartilage covers the other two cartilages (arytenoid cartilage).*

If the thyroid cartilage moves together with the cricoid cartilage, the throat widens. The Dagger is formed from the union of the thyroid, cricoid and arytenoid cartilages, which are responsible for producing the sound. The epiglottis extends downwards from the beginning of the dagger, and behind it is the red intestine, and that's called the esophagus. The esophagus is for the passage of food and drink. The arytenoid cartilage closes over the thyroid and cricoid cartilages when eating and drinking water. Thus, the food passes over the arytenoid cartilage and through into the esophagus. If a person speaks suddenly while eating, the thyroid cartilage and cricoid cartilage separate from each other and the arytenoid cartilage lifts. A piece of food goes down the dagger. Since there is no way for the food to go below these, naturally the body makes it cough with its repellent power, and with this cough, the food pieces come out of the dagger. The wise god created the arytenoid cartilage, called "mukebbi", to cover the dagger while eating.

A pair of muscles ends at the bottom of the thyroid cartilage and comes to both sides of the cricoid cartilage from the inside; It reaches the right and left sides of the cricoid cartilage. This muscle is very thin and strong. Its benefit is to trap the breath when the odor is low; is to hold the breath. This muscle connects the thyroid cartilage with the cricoid cartilage. There are 2 more muscles under the arytenoid cartilage. These 2 muscles assist the muscle mentioned above".[4]

When compared to today's anatomy information, it is seen that İtâki gives accurate but incomplete information about the larynx and cartilages. He explained that the entrance of the larynx should be closed, that is, its function, especially during swallowing, but stated that the closure process was done by the arytenoid cartilage instead of the correct epiglottis.[10]

TONGUE AND ORAL ANATOMY

İtâki said that in his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book; *"The mouth has to carry food to the body and accompanies the nose in taking in and sending out air. Because every animal breathes through the nose. However, humans breathe through both the nose and mouth. Other animals can not breathe through the mouth. The skin of the lower part of the mouth is attached to the esophagus. The flesh of the tongue is white. That is very thin veins and arteries cover it, and 4 nerves come from around it.*

There is flesh under the tongue and it is like cloth. Doctors call it "muvellid al-lu 'âb" (glandula salivaris). It always makes your mouth water and making it easier to swallow. There are 2 veins under the tongue. Doctors call them "duruvin" (vein under the tongue). Many veins spread from those 2 veins to the tongue".[4]

In this section, İtâki stated that the esophagus is located in the continuation of the mouth, did not mention the phraynx, and correctly mentioned the salivary gland under the tongue and its function in accordance with our current anatomy knowledge.[10]

ANATOMY OF THE THROAT, LUNGS AND PULMONARY TUBES

İtâki said that in his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book; *"The tubes, that is, the cartilage, of the throat are the means by which air comes in and goes out. The human being holds and releases air with the breath. The opening of the throat is wide. It consists of many cartilages; some of these cartilages are full circle; some are half-moon shaped. These cartilages are arranged in a row on top of each other. There is a small slit at the end of each. Each of them is reinforced from these parts with a tie. These cartilages are covered with a curtain. It is covered with another solid and slippery curtain from the inside. This curtain reaches up to the dagger. The esophagus, which is the passage for food, is placed on its back. Vertically and from the sides it is semicircular. The missing half is on the esophagus side. A soft environment completes his apartment. Thus, that covering becomes tangent to the esophagus and allows food and drink to be swallowed. Therefore, when the esophagus expands while eating, the cartilage rings do not prevent it".*[4]

In this section, it is explained accurately and in detail that the tracheal rings are "U" shaped, their back sides are covered with smooth muscle, and this allows the esophagus to expand slightly during the passage of food.[10]

ANATOMY OF THE ESOPHAGUS

İtâki said that in his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book; *"The Esophagus (oesophagus) is the passageway for food and drink; it is the "red intestine". The parts of the esophagus are flesh, membrane and feeding vessels; arteries that give it life and nerves that give it sensation.*

One of its membranes is on the inside and the other is on the outside. The fibers of the membrane inside are longitudinal. It gives pulling force to the esophagus. The fibers of the outer membrane are transverse. The exorcism function occurs with it and there are 2 covers for swallowing food; vomiting occurs only with the outer membrane. Therefore, vomiting is difficult. The esophagus descended next to the cervical vertebrae. Two nerves coming out of the brain follow along with it. When it reaches the level of the 4th vertebra in the back, it leans slightly to the right. In order not to cause any trouble to the vein coming from the heart, it descends to the level of the 8th vertebra in this way. After passing through the diaphragm, it inclines to the left as much as it inclines to the right. It reaches the level of the 10th and 11th vertebrae and passes through the diaphragm at that level and joins the mouth of the stomach (cardia)".[4]

In this section, the vagus nerve on both sides of the oesophagus are explained correctly.[10]

ANATOMY OF THE STOMACH

İtâki said that in his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book; *"There is a passage at the end of the stomach; it opens into the duodenum. They call this passage "bevvâb" (pylorus). The pylorus is narrower than the esophagus. Because undigested food passes through the esophagus. Digested food passes through the pylorus. The mouth of the pylorus is closed until the food is digested in the stomach. When the time comes after digestion, its mouth opens. The place where food enters the stomach from the esophagus is called "femm-i stomach" (mouth of the stomach) (cardia). This place is at the end of the breastbones. It is under the breastbone, which they call the muscle (sternum). If you have heart palpitations, your chest will hurt. Again, when bile is poured into the stomach; "imtila" (too full abdomen) occurs. Thus, it is understood where the mouth of the stomach (cardia) is located".*[4]

In this section, İtâki accurately defined the cardia, the entrance part of the stomach, and the pylorus, the exit part, according to today's knowledge.[10]

ANATOMY OF THE INTESTINES

İtâki said that in his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book; *"The intestines are for excreting excess; They are 6 in number; each has its benefits. The 1st intestine is "aseri (duodenum)", the 2nd is "saim (jejunum)", the 3rd is "mea-i dekaik (ileum)", the 4th is "a'ver (caecum)", the 5th is "colon", the 6th is "meâ-i müstakim (straight intestines, rectum)". The duodenum has reached its mouth (pylorus) at the bottom of the stomach; the part of it that reaches the mouth of the stomach is called "bevvab" (pylorus). This is the mouth below the stomach called "bevvab". The upper mouth of the stomach is the esophagus. The lower mouth of the stomach (pylorus) is narrower than the upper mouth (cardia). Because undigested food goes down the esophagus, its path must be wide. Therefore, the upper mouth of the stomach is wider. The reason why the first intestine is called the duodenum is that, in every person it is as long as his own finger and duodenum. The shaim intestine is called saim (fasting) because it is always empty like the 2nd intestine (jejunum). The mesenteric vessels that reach the other intestines tend to reach the duodenum and jejunum. The mesenteric veins take everything useful for nutrition to the liver, and nothing is left in it. At the same time, bile, which descends from the gallbladder to the intestines and washes away excess in the intestines, comes to the jejunum.*

In case of disease of the jejunum, blood balance is disturbed. The 3rd intestine is the ileum; it is united with the jejunum. This is a long intestine; wrapped and pure. The reason why it is long and pure is this. Food comes to ileum. It stays with ileum for a while. Thus, if there is a nutritional substance in the feces, the mesenteric vessels take it. A 2nd benefit of it is that it keeps the feces for a while and prevents it from being expelled quickly. The 4th intestine has one eye (caecum). That's why they call it "a'ver" (blind) intestine. It has a hole; the feces come out from where it enters him; it is like a purse, narrow on the right side and slightly inclined towards the back. It has 2 benefits. First is this: feces wait in it. The 2nd benefit is that this intestine is like a stomach compared to other intestines; just as food needs to stay in the stomach and be digested, substances with nutritional value are stopped and absorbed here too. This intestine is connected by ligaments. Therefore, when a person has a hernia, this intestine descends into the testicle.

The 5th intestine is the colon; it starts from the caecum and courses close to the liver. From there it came back to the left, descended from the side of the spleen, and reaches the left groin. The benefit of this intestine is that when food comes here, it is digested with heat and from here the mesenteric vessels pull them and take them to the liver. The 6th intestine is "me'â-i müstakim" (rectum), that is, the straight intestine; united with the column. This intestine is large and its fibers are attraction fibers. Thus, it attracts the feces in the colon to itself. It is larger than the other intestines because when it is necessary to expel feces, it expels it quickly. This intestine is assigned to expel feces. These last 3 intestines have suet on them; so they retain heat. In the upper 3 intestines, instead of this inner fat, there is sticky phlegm on the inside. All intestines are attached to the vertebrae at the back with ligaments. The intestines are 2 layers; If one layer of them is damaged, the other layers will remain intact. These last 3 intestines are called "me'â-i galize", meaning these intestines are thick".[4]

The anatomy of the intestines is currently examined in 6 sections. The first 3 parts are the small intestines (duodenum, jejunum, ileum), the next part is the large intestines (caecum, colon, rectum). This classification is also found by İtâki. Another aspect accurately described in İtâki is the function of absorbing nutrients from the mesenterium and the vessels within the mesentery and it reaches the liver.[10]

ABOUT THE NERVOUS SYSTEM

İtâki said that in his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book; *"Humans have sensory and movement functions. The beginning of sensation and movement is the brain. The spinal cord acts as an intermediary between the nerve and the brain. If all the nerves came from the brain, the head would have to be very large; the neck could not bear this weight. At the same time, the efficiency (effectiveness) of the nerves would weaken until they disperse throughout the body. In case of fracture, there is a hole in the middle of the vertebrae and the spinal cord*

descends from here. "The spinal cord is like the fountain of the brain, the vertebrae are like an arc, the spinal cord is like water leaving the fountain, and the nerves are like many rivers that branch out from that arch to all directions and irrigate the body area" (Figure 1).[4]

İtâki wrote that there were 7 cranial nerves, describing each nerve separately. He defined the head, neck, and internal organs as innervation areas of the cranial nerves. He did not describe the exit points of the cranial nerves in detail but wrote that they exit directly from the brain.[5]

İtâki said that in his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book; *"Some of the nerves only receive sensation: like the taste nerves. Some nerves express only movement; like the nerves in the tongue. These nerves rotate the tongue in all directions. Some nerves are related to both sensation and movement; like the nerves in the foot muscles"*.[4]

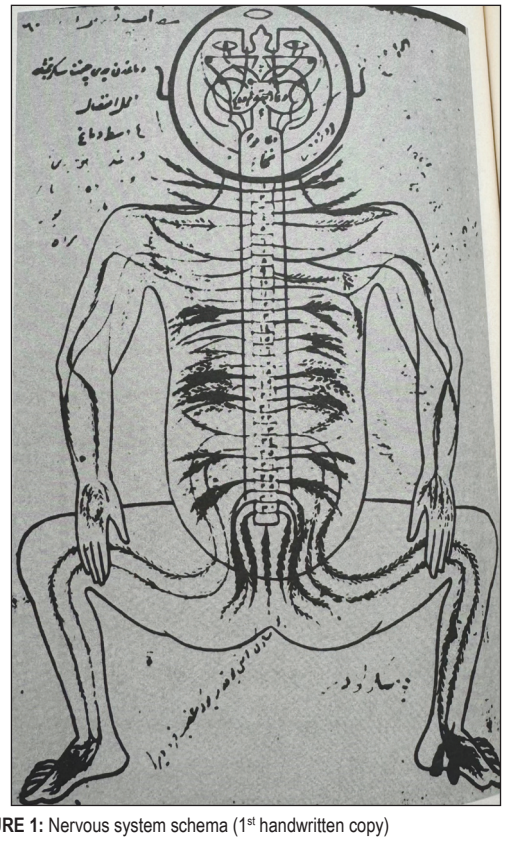

FIGURE 1: Nervous system schema (1st handwritten copy)
This figure is taken from Esin Kâhya's "Şemseddîn-i İtâkî's Illustrated Anatomy Book", reference number 4, with permission from the Republic of Türkiye Atatürk Higher Institution of Culture, Language, and History, Atatürk Cultural Center Presidency.[4]

ABOUT SPINAL NERVES

In İtâki's "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book, spinal nerves are classified as nerves emerging from the vertebral column from the neck, back, sacrum, and coccyx.[6]

İtâki said that in his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book; *"There are 8 pairs of nerves coming out of the cervical vertebrae. There are 12 pairs of nerves coming from the back vertebrae. There are 5 pairs of nerves coming out of the lumbar region. There are 6 pairs of nerves coming out of the sacrum and coccyx vertebrae"*.[4]

ABOUT THE BRAIN

According to İtâki, the brain was the source of the thinking power that humans needed. After providing information about the brain, İtâki explained the meninges, ventricles, and the channels between the ventricles, respectively. Important activities such as hearing, memory, and seeing take place in the brain. The human brain is divided into 2 parts. Those 2 parts were combined with membranes and spaces. In his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book, İtâki explained in detail the membranes of the brain, ventricles, and optic chiasm (Figure 2).[4] İtâki showed the optic chiasm in his schema. The nervous system schema is relatively complete and well described.[3]

ABOUT BONES

In the bone chapter of his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book, İtâki first explains the skull bones and mentions the sutures between them. In the schemas he gives information on this subject, he uses schemas similar to some of the skull schemas that we see in Vesalius. İtâki examines the thoracic bones in 2 groups: sternum and ribs. He showed the clavicle among the upper bones. Clavicle schemas are similar to Vesalius' schemas, and both have the same number of clavicle schemas. The schemas of the humerus, forearm bones, and wrist bones are also similar to Vesalius' schemas. In addition, we see that the pisiform bone, which is not found in classical anatomists' work but is found in Vesalius's book and is also depicted in İtâki's statements (Figure 3).[4] The vertebra numbers of the neck,

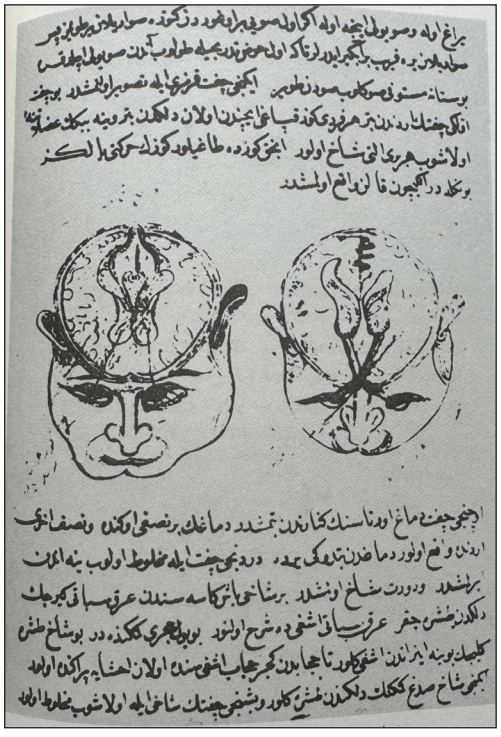

FIGURE 2: Brain section, lateral ventricles, and optic chiasm (3rd handwritten copy) This figure is taken from Esin Kâhya's "Şemseddîn-i İtâḳî's Illustrated Anatomy Book", reference number 4, with permission from the Republic of Türkiye Atatürk Higher Institution of Culture, Language, and History, Atatürk Cultural Center Presidency.[4]

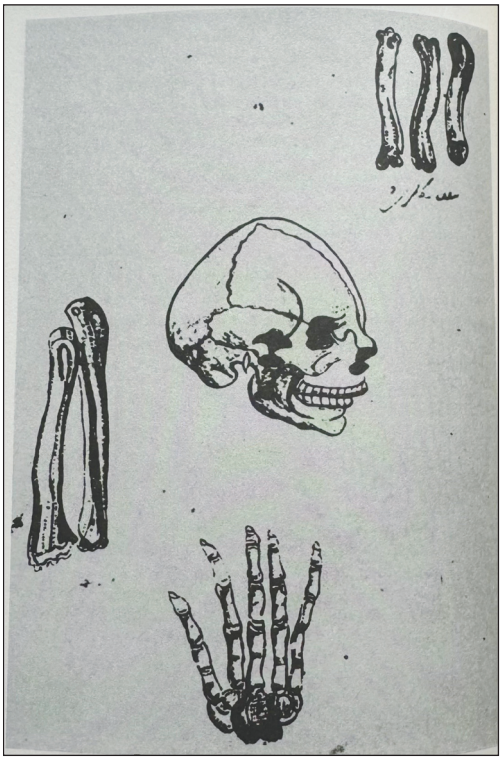

FIGURE 3: Skull, forearm bones, hand bones, and clavicle (1st handwritten copy) This figure are taken from Esin Kâhya's "Şemseddîn-i İtâḳî's Illustrated Anatomy Book", reference number 4, with permission from Republic of Türkiye Atatürk Higher Institution of Culture, Language and History, Atatürk Cultural Center Presidency.[4]

thoracic, and lumbar vertebrae are given correctly (as 7, 12, and 5), and the sacrum and os coccyx are correctly defined.[10]

ABOUT VESSELS ANATOMY

İtâki said that in his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book; *"2 vessels come up from the left cavity of the heart, one of them is large and is the artery (İtâki calls this shiryan). The feature of the artery is that it has 2 walls. The large artery is the vessel that Aristotle called the Aorta and comes out of the heart. This vessel divides into 2 branches, which surround the heart. After these 2 branches, it divides into 2 more branches, one of which goes up (ascending aorta) and the other branch goes down (descending aorta)"* (Figure 4).[4]

Following this chapter, İtâki gave information about the branches of the internal carotid artery. The arteries going to the brain (here İtâki uses the term arteries that form the brain network), the branches of the descending aorta going to the internal organs, and the branches reaching the lower extremities.

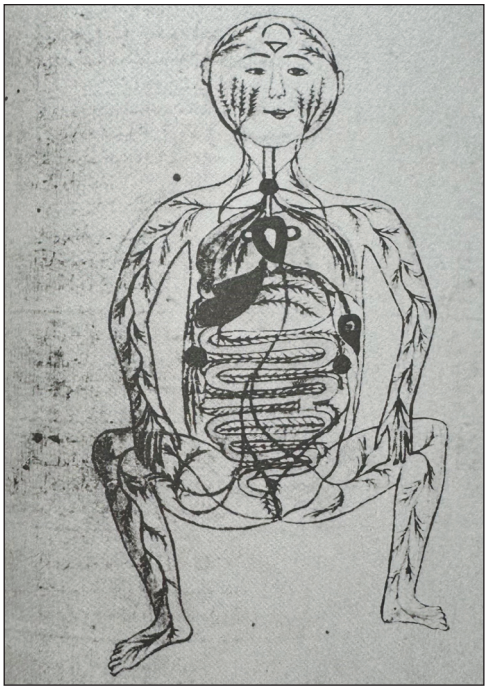

FIGURE 4: Blood vessels and internal organs (male) (3rd handwritten copy) This figure is taken from Esin Kâhya's "Şemseddîn-i İtâḳî's Illustrated Anatomy Book", reference number 4, with permission from Republic of Türkiye Atatürk Higher Institution of Culture, Language and History, Atatürk Cultural Center Presidency.[4]

İtâki said that in his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book; *"The vessels that do not move are called veins. They all come from the liver. Create a vein on the inside of the liver called the vein (vena porta). This vein first divides into 5 branches inside the liver and is spread around the inside of the liver like a tree so that its roots are everywhere. Some of its 5 main branches go to the gallbladder (gall bladder). The liver attracts all nutrients through the vena porta"*.[4]

In this section, the formation of the vena porta and the fact that nutrients are brought to the liver through the vena porta for processing are mentioned correctly with today's information.[10]

ABOUT UROGENITAL SYSTEM

İtâki started this section of his "Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân" book by explaining the kidneys, the flow of blood to the kidneys, and kidney functions. *"The kidneys separate the water from the blood and send it to the bladder, where it is expelled with expelling force. If it were not for the power of separating and repelling this force, man would always suffer from the disease of "istiska" (strong feeling of need for water). İtâki then gives information about the bladder, testicles (he defines it as the organ that produces semen) and penis. Regarding semen, it is written that, according to Galen's book and some doctors, the semen of men and women are different in terms of content and consistency"*.[4]

After this chapter, İtâki writes about uterine anatomy, menstruation, fertilization in the female body, the formation and growth of the fetus in the uterus, and the stages of birth (Figure 5, Figure 6).[4]

GENERAL EVALUATION OF İTÂKI AND HIS "TEŞRÎH-I EBDÂN VE TERCÜMÂN-I KIBÂLE-I FEYLESÛFÂN" BOOK

Although he stated that he read the book of İbn Nefis, İtâki generally followed Avicenna. Although some of its figures and schemas resemble those of Ahmed İbn Mansur's "Kitab-ı Teşrihü'l-Ebdan Min e't-Tıb", some of them resemble typical European paintings of that period and the figures of Andreas Vesalius's book "De Humani Corporis Fabrica Libri Septem".

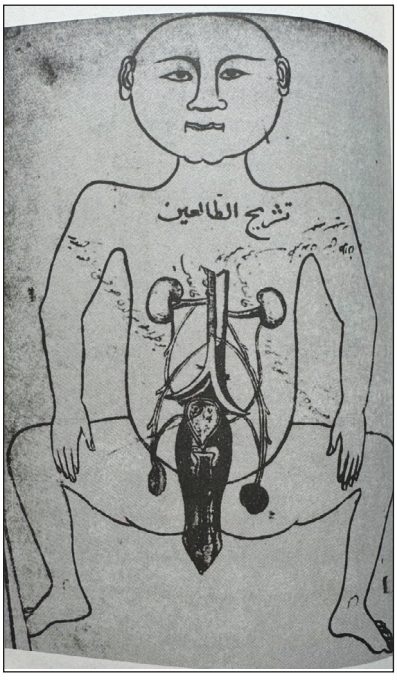

FIGURE 5: Urogenital system (male) (1st handwritten copy)
This figure is taken from Esin Kâhya's "Şemseddîn-i İtâḳî's Illustrated Anatomy Book", reference number 4, with permission from Republic of Türkiye Atatürk Higher Institution of Culture, Language and History, Atatürk Cultural Center Presidency.[4]

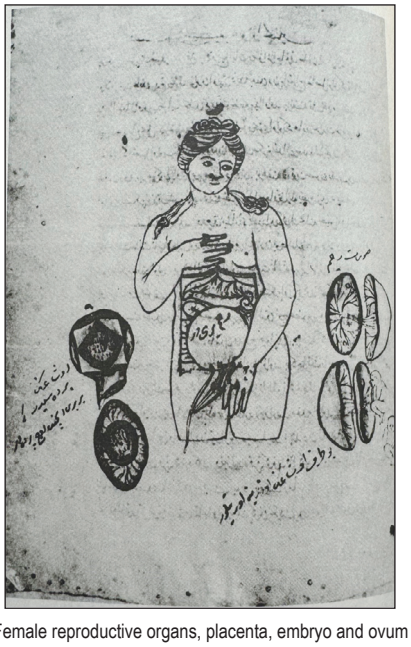

FIGURE 6: Female reproductive organs, placenta, embryo and ovum (3rd handwritten copy)
This figure is taken from Esin Kâhya's "Şemseddîn-i İtâḳî's Illustrated Anatomy Book", reference number 4, with permission from Republic of Türkiye Atatürk Higher Institution of Culture, Language and History, Atatürk Cultural Center Presidency).[4]

The work also includes some schemas drawn by the author himself.[4] These schemas are seen particularly where some details need to be explained, for example in sections on the nervous system. Many systems are explained accurately and in detail in the work, for example respiratory system.[3,11] It is understood that the author had read anatomy books written in the East and West of that period. In addition to Arabic and a few Persian terms, İtâki used many Turkish terms and in this respect, he is the pioneer of Turkish anatomy terms.[3]

Positive aspects of Şemseddîn-i İtâki's Teşrîh-i Ebdân ve Tercümân-ı Kıbâle-i Feylesûfân book are as follows:

1. The functional importance of structures (formations) is pointed out by using the expressions "If it hadn't happened (without)" or "If it had happened". This approach can be considered as the predecessor of today's functional anatomy.

2. Almost all of the Eastern and Western literature on anatomy has been read and reviewed. It is as if the anatomy information was up to date for those dates.

3. The fact that the work was written in Turkish, and the Turkish equivalents of some terms were used and were very useful for Turkish anatomists and physicians. In this respect, it was ensured that anatomy information could be understood by the next generation of anatomists. İtâki was not just a compiler, he was also a pioneering anatomist.[2,3]

4. Şemseddîn-i İtâki contributed to the development of the science of anatomy and played an important role in transferring the anatomy knowledge that came from Greece and Rome and later from the works of Arab-Turkish scientists to the West.[2]

5. He predicted that anatomy information would be useful to use in medicine, and he included anatomy information that doctors would use in his book.

6. İtâki draws the profile of a curious, versatile scientist who follows and researches knowledge.

7. İtâki added observations of his own to the anatomical and medical knowledge inherited from Aristotle (384-322 B.C.), the famous Roman physician Galen (130-200 A.D.), Avicenna (980-1037 A.D.), Al-Rhazes (864-930 A.D.), Haly Abbas (also known as Ali İbn al-Abbas, Persian physician) (982-994 A.D.), the Spanish physician and anatomists Juan Valverde de Amusco (or "de Hamusco") (1525-1588 A.D.), Da'ud al-Antaki (famous physician in the Ottoman Empire) (1541?-1599), and celebrated anatomist Andreas Vesalius (1514-1564 A.D.).[2,4,5,12]

8. The book had a significant impact on the development of anatomical science in the Ottoman Empire and was widely used in medical education.[6]

Negative aspects of Şemseddîn-i İtâki's book that need to be criticized are as follows:

1. It was written without dissection.

2. As a continuation of the above article, since dissection was not performed, the mistakes seen in previous authors have been copied exactly. For example, the right kidney depicted higher in Vesalius is repeated in this work as well.

CONCLUSION

Overall, science develops by mastering and advancing previous knowledge. It is understood that Şemseddîn-i İtâki had read important books written on anatomy before his period, studied them in detail, and had a good command of the general literature. He contributed to the science of anatomy with his original schemas and drawings. Again, he revealed the structure-function relationship, drew attention to the understanding of the subject and the functional importance of the formations with explanations such as "what would happen if it did not exist?", and became one of the guides of today's functional anatomy. His inability to perform dissection due to the conditions of the period caused him to be unable to produce a more accurate and detailed work. However, it should be emphasized that our current anatomy knowledge is probably based on pioneer scientists such as Şemseddîn-i İtâki.

Şemseddîn-i İtâki was a great physician and anatomist for his time. He made great efforts and wrote an important anatomy book containing very detailed information, while anatomy was still being developed by the European scientists of that period, and

he also drew the figures himself, without being a professional painter.

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