

The Jundishapur School: Its History, Structure, and Functions

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Abstract

Located in the region of Alam (modern Khuzistan), Jundishapur was founded by the Sassanid emperor Shapur I in 260. This city was home to the Jundishapur school (*madrasah*), one of the most important science centers in history, that harmonized within itself classical Greek philosophy, Indian culture, and the Persian scientific heritage. This fact becomes clear when one looks at its rich curriculum, which ranges from medical science and pharmacology to philosophy. This complex consisted of several sections, such as a medical school (*bimaristan*), a pharmacology laboratory, a translation bureau, a library, and an observatory. It also had a deep influence on Islamic culture and civilization through its professors, who, in the early years of `Abbasid rule, began to settle in the capital city of Baghdad and eventually established a similar school modeled on their school in Jundishapur. From that point on, these professors made a significant contribution to Muslim medical science and philosophy.

Introduction

The city of Jundishapur was not always the desolate place that it is today. In its prime, it was one of the world's most important science centers. From its earliest days, this institution functioned according to the statement engraved upon its portal: "Knowledge and virtue are superior to sword and biceps." However, its real brilliance only existed during the early days of the `Abbasid dynasty. From the reign of Harun al-Rashid (d. 809) onward, the `Abbasid rulers made it an official policy to bring scholars trained at

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Jundishapur to Baghdad. For instance, Baghdad's *bimaristan* (medical school) and *bayt al-hikmah* (House of Wisdom) were established by Jundishapur's professors and graduates. In this article, we will investigate the Jundishapur school. But before doing so, let's examine the city.

Jundishapur city, founded in 260 by the Sassanid emperor Shahpur I, was located in Khuzistan (called Ahwaz in early Muslim sources). Although it fell outside the geographical borders of Mesopotamia, it was, nonetheless, influenced by Mesopotamian civilization. Shahpur I defeated the Roman army near Edessa (present-day Urfa) and settled the captured Roman soldiers, among them Emperor Valerianus as well as the refugees from Antioch, in this newly founded city.¹

Despite its official name of Wah ez Andu Shahpur, the city was known by its inhabitants as Gunda-Shapur. Ever since its founding, it had been one of the important Sassanid cities. Fifty years later, Shapur II proclaimed it the capital city of the Sassanid Empire.² When Shapur II's successor moved his court to Madain (Ctesiphon), Jundishapur retained its importance and remained the administrative center of the Khuzistan district.³ However, it gradually surrendered this function to Sus, a city located a couple of posts away that, with the passage of time, not only became Khuzistan's administrative center, but also the empire's second capital. Thus, just like the Roman Empire, the Sassanid Empire had two capital cities: Madain for the summer and Sus for the winter.⁴

Even though it was no longer Khuzistan's administrative center, Jundishapur remained a center of science and culture, and was recognized as such by Khusraw I. Its administrative structure was similar to that of modern federal states. For instance, its local governors were elected by the native residents.⁵ Thus, we can say that it provided as much freedom and opportunity for its residents as did Athens, its contemporary, in every field.

The city's population consisted of various ethnic and religious elements, two features to which it owed much of its fame. No doubt, its earliest residents were Roman, for the city originally had been built for the captured Roman emperor Valerianus and many of his defeated soldiers.⁶ After the seizure of Antioch, its residents were removed and settled in Jundishapur.⁷ We do not know the exact number of the exiles or whether they were included in the population figure mentioned above. However, with the people settled by Shahpur II and Khusraw I, we can say that the city had a relatively sizeable population. Among these people were the scholars of the Academy of Athens, who made their way to Jundishapur in 529, right after Emperor Justinian closed their academy.⁸ The city's second largest ethnic

component was the Pahlawis. We have no adequate information about their numbers, but we can estimate that they eventually became the city's largest ethnic group.

Another ethnic group was the Syriacs. We do not know their number, nor do we have any information about exactly when they settled in Jundishapur. But since the war between Shahpur I and Valerianus took place in the densely Syriac-populated region, some of Jundishapur's Syriac population possibly settled there while the city was being built. We believe that a considerable number of them came to Jundishapur in the fifth century AD, because some of the Syriac settlers were medical doctors from Urfa, which was home to the leading medical centers of that time.

The followers of Nestorius (the Nestorian Christians), the bishop of Constantinople, whom the Catholic church branded as heretics at the Council of Ephesus (431), also settled in Edessa. After Emperor Zenon (d. c. 491) expelled them in 489, many of them scattered throughout the Sassanid Empire and settled particularly in Nusaybin,⁹ while some moved on to Jundishapur.¹⁰ The Urfa school was one of the leading Nestorian cultural and intellectual centers. After it was shut down, its heritage was transferred to Jundishapur, an infusion that allowed Jundishapur to achieve a higher intellectual level.

The Syriacs, most of whom were Christian, represented the city's most civilized class after, of course, the Romans.¹¹ They also played a prominent role in the city's cultural history, since most of their families (e.g., the Syriac Buhtishu` family) were engaged in medical science during the late Sassanid times in Iran and during the Umayyad and early `Abbasid periods.¹² In addition, they initiated the first translation projects.

An Indian community also lived in Jundishapur, apparently having settled there during the late Sassanid period. According to the sources, Khusraw I dispatched his vizier Barzawayh to India, from which he returned with the chess game, Baydaba's *Kalima wa Dimna*, some medical books,¹³ and possibly some Indian families.¹⁴ This supposition is supported by the existence of Indian scholars at Jundishapur, such as Mankah, who translated Sanskrit texts into Pahlawi and conducted research on poisons. His *Kitab al-Sumum* (The Book of Poisons) was used as a textbook in the Jundishapur medical school for years to come. Mankah's translations and scholarly writings were later translated into Arabic. Harun al-Rashid once asked him to come to Baghdad, at the request of the Barmaki family. In Baghdad, Mankah translated the famous Indian doctor Sustaka's work into Arabic for Khalid, a member of the Barmaki family. It is related that this

translation was used later by Jundishapur's doctors and professors.¹⁵ The fact that Jundishapur and India were connected by a trade route also suggests that both scholars and traders had settled in Jundishapur.

The Khuzis were another ethnic component of the city. As noted by al-Maqdisi, the population of the Khuzistan region, and especially the residents of Jundishapur, Sus, and Askar, was made up of Khuzis.¹⁶ Supposedly the remnants of the Alamis, the Khuzis are thought to have settled in the city immediately after its founding. Giving their nation's name to their homeland, the Khuzistan region, the Khuzis were considered an independent nation that was distinct from the Arabs, Persians, Jews, and Syriacs, even though there is some dispute over their language.¹⁷ As in the case of Shiryashu` bin Kutrub of Jundishapur, Khuzi scholars used Syriac, instead of their native language, in their scholarly endeavors.¹⁸ This suggests that they adopted Syriac as a literary language because they had no literary language of their own. Perhaps this is why the Khuzi language disappeared soon thereafter.

In our own day, the Persian dialect spoken around Khuzistan contains some loan words from Khuzi, the only remaining traces of that particular language. The Khuzis might have used Syriac because it was the *liturgical* language of the Nestorian church, just as the Muslims, particularly the Persians and Turks, used Arabic as the language of religious literature instead of their native language. The Khuzis, who called Jundishapur "Nilat" or "Nilab,"¹⁹ constituted another intellectual class of the city. Among them, we can mention Shiryashu` bin Kutrub and Shapur bin Sahl.

We know that the Lurians lived in Jundishapur and its neighboring district during the second Islamic century, and that they played a major role in destroying it.²⁰ This fact suggests that the Lurians had settled in Jundishapur and the neighboring district at an earlier time. The region located to the southeast of Dizful and Shushtar, near which Jundishapur's ruins remain, was known as the "Sahara of Lur" during the early Middle Ages.²¹ Though the Lurians had not lived in Jundishapur and the neighboring district, the distance between the region (Luristan) and Jundishapur was only a couple of posts.²² Therefore, we can say that there was a strong socioeconomic and commercial relationship between the two.

Almost all of Jundishapur's residents were multilingual. One also needs to keep in mind that along with Pahlawi, Greek, and Syriac, such languages as Lurian, Hebrew, and Khuzi were spoken in the markets. These multilingual peoples of various ethnic and religious backgrounds managed to coexist in peace, developed good relationships with each other, and pro-

vided history with an enviable example of peaceful and tolerant social interaction. Now, I will examine the famous scientific institution that these people built.

The History of the Jundishapur School

There are different views as to when this school was established. While some scholars claim that it was built at the same time as the city, others assert that it was founded during the reign of Shahpur II. Although the existing evidence does not allow us to correlate the date of the school's founding with that of the city, one can easily say that the scholarly activities for which Jundishapur was famous began at a very early time. As stated by Manfred Ulmann, Jundishapur's population contained numerous Antiochan scholars and artisans, among them medical doctors and philosophers, as well as the captured Roman emperor Valerianus. Therefore, we can assume that Jundishapur entered upon a cultural and intellectual flowering, especially in the positive sciences (e.g., physics, chemistry, biology, mathematics), at that time.²³

Although Jundishapur had been acquainted with the positive sciences since its foundation, it only became known for its knowledge of them at a much later date. If we believe Ibn al-Nadim, we can say that the city became famous for medical sciences and philosophy only after Théodoros, the Greek philosopher and medical doctor, moved there.²⁴ Théodoros, who was no ordinary physician, served as a royal doctor to Shahpur II and composed several books on medical sciences, one of which was eventually translated into Arabic. Shahpur II held Théodoros in respect, built a church for him in the city, and assigned some Christian captives to serve him.²⁵

Théodoros' very scholarly pursuits provide grounds for the claim that the Jundishapur school was built at the time of Shahpur II. Among the scholars who share this opinion are the famous Orientalist George Sarton, Muhammad Muhammadi (who relied upon Sarton), and Seyyed Hossein Nasr.²⁶ Nasr claims that Shahpur II not only enlarged and adopted Jundishapur as his capital city, but that he also built therein a large school that included a medical school.²⁷ Likewise, Nakhai claims that it took 7 years to build the school and that it was inaugurated by Shahpur II. Shortly after that event, about 5,000 students from Persia, Rome, Greece, Syria, Arabia, and India enrolled in the school, a development that transformed Jundishapur into an important regional center of medical science.²⁸

Although there is insufficient proof to support the above claims, the fact that the scholars who came from regions to the west during the reign of Khusraw I were settled in Jundishapur suggests that a school already existed in that city. If this were not the case, why would he settle them there? Settling these scholars in Jundishapur and having the city's school rebuilt should have caused Khusraw I to be known as the school's first builder.

Khusraw I's interest in philosophy made him famous in the West. The scholars at the Academy of Athens made their way to Jundishapur after their academy was closed, in 529, by Emperor Justinian. Khusraw I welcomed such celebrated scholars and philosophers as Damascius, Siplicius, Eulamius, Priscianus, Isidore, Hermias, and Diogenes.²⁹ After settling them in Jundishapur, he provided them with whatever they needed to continue their scholarly pursuits and teaching. These scholars reconstructed and revitalized the city's schools and enjoyed great freedom in their studies.³⁰ A champion of scholars, the emperor himself took a great interest in their activities and engaged in philosophical discussions and debates with them. Furthermore, he recorded both these discussions and the philosophers' answers to his questions in many books, one of which was translated into Latin and incomplete translation of which has survived to our own time.³¹

After defeating Justinian, Khusraw I, who followed Neoplatonic philosophy, stipulated in the peace treaty that all of the philosophers living in Jundishapur would be allowed to return to their homelands whenever they wished.³² Just after this agreement, the scholars taking refuge in Jundishapur availed themselves of this chance to go home. However, the students they had educated during their 4-year sojourn in Jundishapur ensured that the school would remain a hallmark of education.

In ancient times, there was no clear-cut distinction between philosophy and medicine. The belief maintained by such philosophers as Galenos [a.k.a. Galen] – that a medical doctor should be a philosopher at the same time – was quite common. Since Khusraw I held the same view, he paid a great deal of attention to the medical sciences and transformed the Jundishapur school into one of the Sassanid Empire's most important medical centers. At least once a year, a medical congress was convoked and led by the school's head doctor (*dorostbed*).³³ One should keep in mind that this congress, in which the emperor himself participated, was attended by doctors from other countries as well. Such an event enabled them to exchange knowledge about medical inventions and methods.

The Jundishapur school was well-known in the East and in the West, as well as among the mostly nomadic Arabs of that time. Students came from the Hijaz to acquire a medical education at Jundishapur and then returned to their homelands to serve their people. One of these men, known during the pre-Islamic period as that land's greatest philosopher and physician, was Harith bin Kalada.³⁴ After him, his son Nadr became one of the Hijaz's most celebrated doctors.³⁵ Jawad `Ali says that Nadr bought some books in Iran, where he acquired his medical education, and read them out to the Quraysh tribe.³⁶ Qifti relates that Nadr had held an important position in Jundishapur, but that he went back to Ta'if because he was so homesick. He eventually became one of the most famous doctors of his time.³⁷

After Khusraw I, the Sassanid Empire experienced several serious setbacks. On the one hand, it was defeated several times by Byzantium, and, on the other, became embroiled in ruthless dynastic struggles. During this period, many institutions were either damaged or destroyed. Surprisingly, the Jundishapur school survived until the empire's collapse. After the Arab Muslims conquered Iran,³⁸ they quickly realized the importance of this educational institution and sought to maintain its previous splendor.³⁹ They preserved all of the city's institutions (e.g., its hospital, library, medical school, and temples) and provided jobs for the doctors who had been educated at Jundishapur. For example, Ibn Isal al-Tabib al-Nasrani served as Mu`awiyah's royal doctor, and Abu Hakam Damascene and Tayazuk were also employed.⁴⁰

The school lost its previous splendor under the `Abbasids, because its doctors migrated to the capital city, Baghdad, where they found jobs in the newly founded institutions. For a while, the Jundishapur school strove to survive by means of its own revolving fund, but eventually could not compete with Baghdad and crumbled.⁴¹

Sections of the Jundishapur School

Having familiarized ourselves with the school, I will now examine its sections: the medical school and hospital (*bimaristan*), the pharmacology laboratory, the translation house, the library, and the observatory.

The Medical School and Hospital

We have no information about the *bimaristan*'s physical structure, nor do we know exactly where it was located in the city, because no archeological

excavation has taken place in the region so far. Therefore, we must be content with explaining how it operated. The archeological research to be performed in Shahabad village, the site of Jundishapur's ruins, will both shed light on the city's design and architecture as well as enable us to describe the school.

The *bimaristan* was directed by a head doctor known as a *dorostbed* or an *Iran dorostbed*. This doctor was not only the director of the school, but also the head of the *bimaristan*. Ibn Muqaffa, who recorded some information about Barzawayh, its famous head doctor, translated the above Persian title into Arabic as *ra's al-atibba' al-fars* (i.e., the head of the Persian physicians).⁴² A *dorostbed* was regarded as the country's wisest and leading physician. At the same time, he was the emperor's personal doctor and the court's head doctor.

A *dorostbed* enjoyed extensive authority in the *bimaristan* and was responsible only to the emperor. He had the absolute authority to use the *bimaristan*'s revolving fund, appoint and dismiss staff members, and to take other actions that he considered necessary. As was seen under the Sassanids (i.e., the case of Barzawayh) and, later on, under the Muslims (i.e., the case of Jabrail), these doctors sometimes intervened in the empire's political affairs.

A considerable degree of specialization is evident in the Jundishapur *bimaristan*. According to the sources, every doctor was authorized to treat the diseases in which he specialized. If a given case required more than one specialist, the doctors applied a method that bears a striking resemblance to the modern medical practice of consultation. This system was applied by Jabrail and other doctors in the Baghdad *bimaristan*, which was patterned after the Jundishapur *bimaristan*.⁴³ The hospital also had dormitories for its patients and offered medical service 24 hours a day. The sources inform us that there was also a sort of rotation system similar to what we see in our hospitals today.⁴⁴ In addition, many doctors of different ethnicities and religions worked together in the hospital.

THE CURRICULUM. Although we have no direct information as to how many years the Jundishapur school's education program lasted, we can make a reasonable guess: approximately 3 years. We base this on the fact that the education program followed by the Nusaybin school,⁴⁵ which is known to have influenced the Jundishapur school, lasted for 3 years. In addition, other schools in the Muslim world that were modeled after the Jundishapur school offered 3-year education programs. The first year of education was

similar to today's preparatory class. Students studied mathematics, geometry,⁴⁶ logic,⁴⁷ and other courses. Mathematics and logic were two basic classes of the first year.⁴⁸ In the later years, students were taught such books as Hippocrates's eleven books, Galenos' nine books, and Discorides' *Kitab al-Hashhashish* (The Book of Hashishes).⁴⁹

The students had to study these three fields because they needed to know how to prepare medicines and, if required, set up their own hospitals. How, it was asked, could a doctor who was ignorant of mathematics establish the correct proportions of the ingredients needed to make the necessary medicine, or a physician who was ignorant of geometry build his own hospital? As for logic, it was considered one of the foundations that would ensure correct and scientific thinking.⁵⁰

In addition to logic, philosophy was also taught, for both the Jundishapur medical school and the other medical schools modeled upon it were deeply influenced by Galenos, who held that a medical doctor should be a philosopher at the same time. Furthermore, his treatise on this issue deeply influenced the doctors of that era and encouraged them to study philosophy.⁵¹ A cursory look at these doctors' biographies will show that all of them were interested in philosophy, and that some of them even established philosophical systems. We ought to note that the school's scholars and students paid so much attention to Hippocrates' works that Jundishapur became known as "the city of Hippocrates."⁵²

THE LANGUAGE OF INSTRUCTION. Researchers disagree as to which language was used as the language of instruction in the Jundishapur school. Some maintain that it was Aramaic or Greek, while others say that it was Pahlawi. For instance, Ahmad `Isa Beg, departing from the city's large Syriac population, asserts that a sizeable number of courses were conducted in Syriac.⁵³ The existence of professors of Greek origin and their teaching, mostly medicine and philosophy, has led some scholars to believe that the language of medical sciences was Greek.⁵⁴ Moreover, the fact that the Persian teachers were mainly interested in pharmacology has led to the claim that this part of the students' education was most likely conducted in Pahlawi.⁵⁵

It is known that Khusraw I's vizier brought some books and scholars from India, and that these scholars taught in Jundishapur's schools. But whether they taught in Sanskrit or Pahlawi is in dispute.⁵⁶ What causes researchers to think that these Indian professors taught in Pahlawi is the fact that the pharmacology books translated into Arabic include Pahlawi terms, rather than Sanskrit or other Indian-language ones. According to the

researchers who support the latter claim, if the Indian professors taught in Sanskrit, it would be logical to expect that some Sanskrit terms would have survived in them.

I think that this debate over the language of instruction can be resolved only by focusing on the courses taught. As mentioned above, teachers in Jundishapur taught such courses as logic, philosophy, medicine, geometry, and pharmacology. In the medical classes, Hippocrates' and Galenos' books were usually taught. Though some of their books were translated into Syriac and Pahlawi, others remained in their original Greek. This fact raises the possibility that students studied the original Greek texts. Many people in Jundishapur knew at least some Greek, because it had been used in the city from the beginning of the Sassanid period. This view is supported by the fact that Greek was used in inscriptions that have been dated to the time of Ardashir, the founder of the Sassanid dynasty.⁵⁷

The city's demography shows that many members of the elite were acquainted with Greek culture and language.⁵⁸ Given this fact, we can say that the Jundishapur medical school's language of instruction was mainly Greek. Besides, the fact that many medical books were translated from Greek into Syriac at the time of Khusraw I – Jundishapur's teachers were also among the translators – demonstrates a serious demand for Syriac-language textbooks. This means that Syriac might have been used in some sections of the school. Most probably, those students who knew Greek studied the above books in the original Greek, while everyone else used the Syriac translations. As for Pahlawi, we can say that it was possibly used mainly in pharmacology, for the books in this field were either composed in or translated into Pahlawi.

In conclusion, the language of instruction at the Jundishapur school seems to have depended upon which field one was studying. For example, medical education was offered largely in Greek but occasionally in Syriac. Relying upon the abundance of Pahlawi words in the later Arabic translations of pharmacological texts, one can safely say that Pahlawi was used especially in pharmacology.⁵⁹

THE STUDENTS. We have no information about the exact identity of Jundishapur's students or of their number and living conditions. However, we do have some information about these matters in the Nusaybin school, a contemporary of Jundishapur. We think that this information can be applied to Jundishapur, because this school was founded by the very teachers who were expelled from Edessa and then settled in Jundishapur.⁶⁰

Hussein Sultanzade informs us that there were about 800 students, that they had to obey certain rules, that they had to obtain permission to go anywhere, that the courses lasted all day, that the students lived in small cells in groups of ten, and, finally, that the program of education lasted for 3 years.⁶¹ Taking this information into account, we can accept Nakhai's claim that the school accommodated approximately 5,000 students from many lands. The fact that the students accompanied their teachers on patient visits⁶² demonstrates that the student dormitories were near, or next to, the *bimaristan* and that they interacted with the patients while pursuing their theoretical studies. Some sources say that the students took care of the patients by turn. Thus, there seems to have been a rotation system similar to the one we see today in modern hospitals. All of this means that the students practiced what they learned in the classroom.

We ought to touch on the claims made by Edward Browne, who uncritically accepts Qifti's information. Relying upon Yuhanna bin Masawayh's dismissal of Hunayn bin Ishaq from the Baghdad *bimaristan*, Browne asserts that Jundishapur's scholars avoided imparting their medical knowledge to foreigners.⁶³ But one can hardly derive such a conclusion from Ibn Abi Usaybi'a's account or the quotation provided by Browne himself. On the contrary, even though Hunayn was from Hira, he was allowed to enter the *bimaristan*, where he worked as a pharmacist and attended Ibn Masawayh's classes. This invalidates the above-mentioned claim.

However, Hunayn was not an ordinary student. His inquisitive character and unceasing questions finally disturbed Yuhanna so much that he told Hunayn to stop studying medical science and, like other Hirans, attach himself to the trade of precious stones. But this should be considered nothing more than an angry statement, for the Jundishapur school trained many foreigners, among them Harith bin Kalada al-Thaqafi. Harith, a pagan Arab from Ta'if, spent many years in Jundishapur studying medical sciences and eventually established himself as a skillful physician. As a result, he was allowed to enter the court of Emperor Khusraw Parwiz.

If the people of Jundishapur had taken a hostile attitude toward foreigners, why would they have allowed Harith to stay with them? In addition, although Hunayn was not originally from Jundishapur, he was a Syriac Christian. It is known that the Syriacs supported each other, as is common with ethnic minorities even today. In addition, Ibn Abi Usaybi'a's words regarding Hunayn's biography that the people of Jundishapur

refused to teach their medical arts especially to the merchants hints that this was a special situation.⁶⁴ In spite of this all, Browne reckons Hunayn to be one of Jundishapur's translators.⁶⁵ This also demonstrates the invalidity of such a claim.

The city's spirit of scientific liberty is also seen in the fact that many Nestorian Christians, Mazdakite Iranians, and Hindu or Buddhist Indians studied together peacefully. This indicates that the students did not study theology, and that their professors treated them equally, regardless of their ethnic or religious background. In this respect, we can say that the Jundishapur school, despite its being 1,500 years old, could compete with modern institutions of education.

EMPLOYMENT OPPORTUNITIES. Those students who completed the 3-year medical program had to take a comprehensive examination before they graduated. Those who passed it were given the certificate that attested to their qualifications to work as physicians throughout the land.⁶⁶ Muhammad says that this qualifying examination was quite difficult and that only the most competent candidates could pass it.⁶⁷ As al-Razi reported, the Jundishapur hospital system was adopted and preserved by other institutions in the Muslim world. According to his accounts, the qualifying examination was twofold. The candidate was first tested on the preliminary sciences (e.g., the importance of surgery and human physiology knowledge, logic [syllogisms in particular], and literature). If he passed this text, he was then tested on the knowledge of the field in which he had specialized.⁶⁸

All physicians who had graduated from the Jundishapur school were well-respected by both the Sassanid rulers and the subsequent Muslim rulers. Given this, they were in high demand by both groups and served mostly as imperial doctors.⁶⁹

The Pharmacology Laboratory

The school also featured a pharmacology laboratory. Ibn Masawayh, one of the school's leading pharmacists, is practically the only person who wrote anything about this section. Under the `Abbasids, he was brought to the Baghdad *bimaristan* to direct its pharmacology laboratory.⁷⁰ The handbooks (*vade mecum*) related to medicine are important proofs of the high level of knowledge and competence attained by the pharmacologists. Composed by the physicians of Jundishapur themselves, these books were known as *akrabazin* in the medical literature of that time. They have been used for

centuries as reference books in the various *bimaristans* and pharmacies in the Muslim world.⁷¹

*Dar al-`Ilm (The House of Knowledge) or
Dar al-Tarjamah (The House of Translation)*

As pointed out above, the Jundishapur school also contained a section that devoted itself to translation. Known as the *dar al-`ilm* in the late sources, it was adjacent to the *bimaristan*. In fact, many translators also were physicians in the *bimaristan*.

The information provided by Ibn al-Nadim confirms that the translation movement begun under the Sassanids was not confined to the scientific activities conducted at Jundishapur – especially in later times. He relates that Ardashir and his son Shahpur I sent officials to India, Byzantium, and Syria to acquire books that would later be translated into Pahlawi. Given that these accounts are accurate, this movement goes back to ancient times.⁷² Al-Mas`udi calls attention to this matter and concludes, as do I, that the views of Aristotle and Plato were popular mainly because of these translations.⁷³

Despite these earlier Pahlawi translations and the exclusive use of Pahlawi in all state correspondence and Mazdakist scriptures until Khusraw I, Pahlawi could not become a language of science. Later on, however, the Nestorian church made a huge contribution to Pahlawi's transformation into a literary language. It seems that the Nestorian church, which had a well-organized network throughout the empire, attached great importance to Pahlawi and tried to make the clergy learn it. Of course, this was part of their investment in Christian missionary activities. Some records from that time prove that Pahlawi developed into the religious language of the Nestorian church, which operated throughout a vast territory that extended into southern India.⁷⁴ Thanks to its efforts, Pahlawi became such a rich and developed language that it could express complex ideas and be used to write scientific books. Arabic also became a language of science due to the Nestorians' efforts. Given this, it should be no surprise that these Christians produced the first Arabic translations of Pahlawi texts. In addition, they were the first ones to coin technical terms and use them in Arabic.

It may be claimed that the Nestorians engaged in this activity to further their missionary prospects. Or, perhaps they did this in an attempt to defend the Christians scattered all over the Muslim world and to ensure an environment in which they were free to live and practice their faith. After the

Sassanid Empire collapsed and Mazdakism was replaced by Islam, Pahlawi, the Sassanid language of religion and science, was replaced by Arabic, the language of Islam and Islamic science. In the Islamic era, nothing was really written in Pahlawi, and Pahlawi texts were seldom preserved. Therefore, only Arabic translations of these texts, which are quite poor, have survived until our own time.

During Pahlawi's period as a language of science, many books were translated into it. Almost every researcher in this field, especially Ulmann, places special emphasis on this issue and says that most of the translations made during Khusraw I's reign were related to medicine and philosophy.⁷⁵ However, they offer no satisfying information about the translators' names. Of these translations, Ulmann cites the following ones: Cassianus Bassus Scholasticus' (sixth century AD) books on agriculture, Vettius Valens' (second century AD) books on astrology, Ptolemy's *Al-Majist*, and Galenos' *Peri Antemballomenon* (*Adab al-Adwiyah* [The Ways of Preparing Medicines]).⁷⁶

Translations from Sanskrit also appeared during this period, among them Shanak's *Kitab al-Sumum* (The Book of Poisons), which was translated into Pahlawi with the aid of Abu Hatim al-Balkhi. Afterwards, the same book was translated into Arabic through the intermediacy of `Abbas bin Sa'id al-Jawhari. This book, which explains medicines and poisons, was published much later as *Kitab al-Shanak fi Sumum wa al-Tiryah* (The Book of Shanak on Poisons and Medicines), together with its German translation (Berlin: 1934).⁷⁷

The Library

According to Sultanzade, the Jundishapur school's library contained thousands of books written in different languages. Both students and teachers used these books,⁷⁸ some of which were brought to the library by the Neoplatonist philosophers who moved from Urfa (Rakha) to Jundishapur after their own academy was closed. Muhammadi notes that some of the translations made at the time of Khusraw I were quoted from these books. In addition, they were used as reference books in education.⁷⁹

In addition to the clerks who maintained and took care of the books, a class of scribes (*koshtah daftaran*) was entrusted with copying books on medicine, astronomy, and philosophy. In his *Mu`jam al-Buldan*, Yaqut al-Hamawi says that the city of Rayshahr was known for its book copiers.⁸⁰ As Muhammadi points out, these scribes most likely had some kind of relationship with the Jundishapur school and its library, because Rayshahr was

located in Khuzistan (viz., near Jundishapur).⁸¹ Rayshahr was probably chosen to perform this task because it produced paper or papyrus.

Finally, we note that many of the library's books were taken to Baghdad after its *bayt al-hikmah* (House of Wisdom) was established, and that the scholars working there relied upon them heavily for their first translations.

The Observatory

The school's observatory⁸² functioned not only as a place for observing astral bodies, but also as a place where astronomy and mathematics were taught.⁸³ Although it was established as a continuation of the *dar al-ta`lim* (House of Education), it fulfilled a greater function and strongly influenced later astronomical research.⁸⁴ For example, *Wajizak*, a book on astronomy that was composed by Bozorgmahr, Emperor Khusraw I's vizier, was available during the Islamic era. Another one of his books, *Kitab fi Masa'il al-Zic* (The Book on the Matters of Zigzag), was used as a textbook in Isfahan's schools even under the Safavids.⁸⁵ But we cannot say the same for research conducted by the Alexandria school.

Above all, the Jundishapur observatory collaborated with the Baghdad observatory, which had been modeled after it, and with the observatory located on top of Mount Qasiyum in Damascus. The zigzags were drawn by relying upon the measurements made in each of these three observatories.⁸⁶ We should add that Abu Ma'shar Muhammad bin Ja'far al-Balkhi, one of the most famous Muslim astrophysicists, drew his zigzags⁸⁷ by relying upon the measurements made in the Jundishapur school.⁸⁸

The Graduates of Jundishapur in Baghdad

The interaction between Baghdad and Jundishapur dates back to the establishment of the `Abbasid dynasty. As related by the sources, in 765 the `Abbasid caliph al-Mansur was afflicted with a stomach illness. He asked Rabi`, his vizier and court secretary, to summon the court physicians. When they failed to cure him, he ordered them to find a more skilled physician. Upon being informed that Curcis, the *dorostbed* of Jundishapur's medical school, was the most skilled doctor of that time, al-Mansur summoned him to Baghdad. At first, this well-known physician did not want to go; however, he could not resist the insistence of Jundishapur's luminaries, including that of the governor and the archbishop.⁸⁹ He eventually went to Baghdad, accompanied by his students Ibrahim and `Isa bin Shahla, who stayed there permanently as court physicians.⁹⁰

This event led to the creation of a strong relationship between Jundishapur and Baghdad, as well as to the transmission of Jundishapur's centuries-long medical tradition to Baghdad. The achievements of Jundishapur's scholars contributed to the dissemination of its fame in Baghdad. For example, in 810, Harun al-Rashid decided to establish a hospital in Baghdad modeled after that of Jundishapur. Jabrail bin Buhtishu', who was then serving as a head doctor in the hospital, was put in charge of this task. In addition to establishing this new hospital,⁹¹ Jabrail imported doctors, teachers, and pharmacologists from Jundishapur and put them to work.⁹² He installed Dahishtak, a professor in Jundishapur's medical school, as manager of Baghdad's medical school. However, Dahishtak resigned after complaining about the hospital's low budget, and was replaced by his brother Mihail.⁹³ But Mihail also resigned shortly thereafter and returned with his elder brother to Jundishapur. Subsequently, Masawayh, father of the famous philosopher Yuhanna bin Masawayh, was appointed head doctor.

Undoubtedly, Jundishapur's scholars made a significant contribution to the blossoming of technical and philosophical sciences in the Muslim world. For example, in order to transmit Pahlawi, Indian, and classical Greek scholarship and culture to the Muslim world, they established a *bayt al-hikmah* near the Baghdad hospital and modeled it after Jundishapur's *dar al-'ilm*.⁹⁴

In this institution, many scholars, both professors at Jundishapur and their students, translated works into Arabic. For example, al-Mansur's court physician Curcis translated Pahlawi, Syriac, and Greek books into Arabic.⁹⁵ Max Mayerhof notes that these translations were done not only by those Jundishapur scholars who settled in Baghdad, but also by those who remained in Jundishapur. He further claims that members of the latter group produced the earliest translations.⁹⁶

In addition to translating numerous works, these scholars also taught and trained students. The most important and largest teaching sessions established by Jundishapur's scholars was that of Yuhanna bin Masawayh. Some of his students, among them Thabit bin Qurra, Kusta bin Luka, Hunayn bin Ishaq, Ishaq bin Hunayn, and Hajjaj bin Yusuf bin Matar, later became known as the first Muslim philosophers. Most of these students, who were from Harran, first mastered Greek and Syriac and then started to translate Hippocrates' and Galenos' works into Arabic. No doubt, these translations provided a foundation for the development of Muslim philosophy and medical science.

The scholars of the Jundishapur school established a *bayt al-hikmah* and managed it for many years. They assigned the books to be translated and completed a sizeable amount of the work by themselves. While carrying out this task, they benefited a great deal from the tradition of translation started by Khusraw I, the wise Sassanid ruler. Some of the texts that were to be translated into Arabic had already been translated into Pahlawi and Syriac by Sassanid scholars. The existence of numerous Pahlawi books in the *bayt al-hikmah's* library can be explained by the translation activities led by Khusraw I.⁹⁷ In addition, the fact that the Barmaki family of Daylam, which was seriously interested in Greek philosophy and science, seized control of Baghdad boosted the engagement of Jundishapur's scholars in translating books dealing with the positive sciences into Arabic.⁹⁸

In addition to their services in translating books on medicine, pharmacology, philosophy, and logic, Jundishapur's scholars made a significant contribution to the development of medical sciences by writing innovative medical books. For example, such works as Curcis' *Kitab al-Kunash*, `Isa bin Chaharbakht's *Quwa al-Adwiyah al-Mufradah*, and Shahpur bin Sahl's *Al-Akrabazin* (considered the first encyclopedia of medical science and pharmacology) enjoyed a long usage as reference books in the Muslim world's medical schools and pharmacies. Yuhanna bin Masawayh's *Nawadir al-Tibbiyah* was used as a textbook for centuries.⁹⁹ Moreover, his *Dagha al-`Ayn*, which deals with diseases of the eye, served as a source for later studies.¹⁰⁰ In addition, if they had the economic means to do so, the doctors of Jundishapur hired scholars to translate medical books for them.

Among the active translators and sponsors of translators were the following people:

- Shirashu` bin Kutrub hired translators who worked in Baghdad's *bayt al-hikmah*. For instance, he requested Hunayn bin Ishaq to translate Galenos' *Fi al-Firaq*, a book that discusses the different views about the subject of "genus."¹⁰¹
- Yuhanna bin Masawayh hired Hunayn to translate the following Greek books into Syriac: *Fi al-Izam*,¹⁰² *Fi Nadb*,¹⁰³ *Fi al-Buhran*,¹⁰⁴ *Kitab fi ma Waqa`a min al-Ikhtilaf fi al-Tashrih*,¹⁰⁵ *Kitab fi Tashrih Alat al-Sawt*,¹⁰⁶ *Kitab fi Tashrih al-`Ayn*,¹⁰⁷ *Kitab fi Harakat al-Sadr*,¹⁰⁸ *Kitab fi al-Sawt*,¹⁰⁹ *Kitab fi al-Adwiyah al-Mufradah*,¹¹⁰ and *Kitab fi al-Akhlaq*.¹¹¹
- Yahya bin Masawayh, who translated *Kitab fi Tartib al-Adwiyah*.¹¹²

- Hunayn, who translated Galenos' *Fi al-Istiqsat `ala Ra'i Bukrat* into Syriac at Buhtishu` bin Jabrail's request.¹¹³ He also translated *Fi Quwa al-Tabi`iyah*,¹¹⁴ *Fi `Ilal wa Fi Ta`rif `Ilal al-A`da' al-Batin-iyah*,¹¹⁶ *Fi al-Imtila'*,¹¹⁷ *Kitab fi Marat al-Sawda'*,¹¹⁸ *Kitab fi Afkar Aristotales fi Mudawat al-Amrad*,¹¹⁹ *Kitab fi Tadbir al-Amrad al-Haddat `ala Ra'i al-Bukrat*,¹²⁰ *Kitab fi al-Hillat li Hifz al-Sihha*,¹²¹ *Tafsir Galenos li Kitab al-Fusul*,¹²² *Kitab fi Tajrubah al-Tibbiyah*,¹²³ *Kitab fi Mihnet Afdal al-Atibba'*,¹²⁴ and *Kayfa Yata`arraf al-Insan Dhunubahu wa `Uyubahu*.¹²⁵
- Jabrail bin Buhtishu`, who translated *Fi al-Nadb*,¹²⁶ *Fi Asnaf al-Hamiyat*,¹²⁷ and *Fi `Ilaj al-Tashrih*.¹²⁸
- Yuhanna bin Buhtishu`: Of these translations, Hunayn mentions *Kitab fi Adwiyat al-Muqabilat li al-Adwa'*.¹²⁹

As pointed out earlier, the Jundishapur school consisted of several sections. Likewise, Baghdad's *bayt al-hikmah* complex, which was built on the Jundishapur model, also consisted of several sections. Most likely, the medical section was included in the complex.¹³⁰ The fact that the *bayt al-hikmah* and the Baghdad hospital were administered by Jundishapur-trained scholars makes this assumption quite likely. Likewise, Jabrail and Yuhanna were the managers of both the *bayt al-hikmah* and the hospital. So, we can infer that although these two institutions were not the same, they were built within close proximity of each other.

The teachers at the Jundishapur school were well compensated by the `Abbasid rulers. For instance, Jabrail bin Buhtishu` was paid 10,000 dirhams per month, was provided with paper and cloth, and was given a considerable amount of good-quality textiles. In addition, he received an additional 50,000 dirhams per year at the beginning of Lent and was given special gifts on Christian holy days.¹³¹

In his article, which seems to have been written without seeing Ibn Abi Usaybi`a's *Uyun al-Anba'* (one of the most important reference books in the history of Islamic medical science), A. Habib Khan notes that the `Abbasid caliphs invested huge amounts of money in the medical sciences. However, he states that the head doctors received a salary of only 1,000 dinars per year.¹³² Yet, as stated above, Ibn Abi Usaybi`a relates that the doctors, especially the head doctors, were paid far more than that. In addition, although the title of Khan's article is "Early Hospitals in [the] Muslim World," the author provides no information about the first medical school that the Jundishapur doctors set up during the reign of Harun al-Rashid,

and only traces Muslim medical science back to the early years of Islam.¹³³ In contrast to this claim, the sources are almost in complete agreement that if the hospital set up by Walid in Damascus is exempted, the earliest Muslim medical school was founded in Baghdad by the famous doctor Jabrail bin Buhtishu` at the request of Harun al-Rashid.

Conclusion

To sum up, the story of Jundishapur began with the battle in which the Sasanids defeated the Romans and captured Valerianus, the Roman emperor, and many of his soldiers. The founder of Jundishapur, Shahpur I, settled them, along with Antiochan migrants and refugees, in Jundishapur. This marks the beginning of the city's intellectual flourishing. The Neoplatonist philosophers who came later revived and reconstructed Jundishapur's education and research institutions and made an important contribution to its becoming a regional intellectual center.

Consisting of five sections (viz., a hospital, a house of translation, a library, a pharmacology laboratory, and an observatory), the Jundishapur school preferred knowledge and virtue over everything else. As a result, it fulfilled an important mission by extending and developing scientific knowledge, which is part of humanity's shared heritage. Even after Baghdad's establishment, its teachers continued to settle in Baghdad. Although their continued immigration led to Jundishapur's decline and eventual disappearance, its accumulated knowledge and experience continued to flourish in Baghdad. In addition, this brain drain from Jundishapur boosted the rise and development of Muslim philosophy.

Endnotes

1. For further information on the foundation of Jundishapur and its first inhabitants, see Mehmet Mahfuz Söylemez, *Bilimin Yitik Sehri Cündisapur* (Jundishapur: The Lost City of Science) (Ankara: Arastirma Yayinlari, 2003), 24-28, 43-55.
2. Edward G. Browne, *Tibb-i Islami*, trans. into Farsi by Mas`ud Rajabniya (Tehran: 1351 AH), 53; Mahmud Najmabadi, *Ta'rikh-i Tib der Islam – pes ez – (al-Zuhur-i Islam ta Hamlah Moghol)* (Tehran: Tehran University Press, 1375 AH), 50; Muhammad Muhammadi, *Farhang-i Irani pish az Islam wa Athar-i an dar Tamaddun-i Islami wa Adabiyyat-i `Arabi* (Tehran: 1374 AH), 231; Badiullah Debirnejad, "Jundishapur der celesat-i munazare-i danishmendan," *Honer ve Mardum* (Tehran: 1351/1972), 119-20:8.

3. Ali Sami, "Gundashapur," *Honer ve Mardum* (Tehran: 1349/1970), 90:10; Husayn Karacanlu, "Jundishapur," *Dairetu'l-Ma'arfi-i Tashayu'* (Tehran: 1375 AH): 5:474.
4. See Muhammed Yahya Hashimi, "Davru Jundishapur fi sakafat al-`Arabiyah," *Al-Dirasat al-Adabiyah* (Beirut) 2, no. 2 (spring 1960): 190.
5. See Hussein `Ali Mumtahir, "Nahdat-i `Ilmi wa Adabiyyi Irani dar Ruzigar-i Kusraw Anushirwan," *Barrasihay-i Ta'rikhi* (Tehran) 10, no. 56 (Farwardin-Ordibahisht 1354 AH): 136.
6. See Hussein Nakhai, "Pishine-i Ta'rikh-i Shahr-i Gondi Shapur," *Berresiha-i Ta'rikhi* (Tehran) 16, no. 2 (June-July 1978): 1. Al-Tabari claims that Shahpur besieged and conquered Antioch shortly after Nusaybin and took the Roman emperor captive there. Afterwards, he took the emperor and the other captives to the newly founded city of Jundishapur and settled them there. However, al-Tabari does not relate the number of prisoners. Consult Al-Tabari, *Ta'rikh al-Rusul wa al-Muluk* (Beirut: 1987), 2:140.
7. Ibn Athir relates that when Shahpur conquered Antioch, the Roman emperor was there and taken captive. Then, he and most of the city's residents were deported to Jundishapur. See Ibn Athir, *Al-Kamil fi Ta'rikh*, translated into Turkish by Ahmet Agirakça (Istanbul: 1991), 1:351. However, in fact, Valerianus was captured during the battle that took place near Urfa. So, Antioch was conquered by Shapur I after Valerianus had been taken prisoner.
8. See Muhammad Muhammedi, "The University of Jundishapur," *Journal of the Regional Cultural Institute* (Beirut) 2, no. 3 (1969): 157.
9. See Henry Corbin, *Islam Felsefesi Tarihi – Baslangıçtan Ibn Rüşd'ün Ölümüne Kadar*, trans. into Turkish and notes added by Hüseyin Hatemi (Istanbul: 1994), 51.
10. See Max Mayerhof, *Islam Medeniyeti Tarihinde Fen ve Tıp*, trans. into Turkish by Ömer Rıza Doğrul (Istanbul: 1935), 7-8; Sami, "Gundashapur," 7; Muhammedi, "The University of Jundishapur," 157.
11. See Hashimi, "Davru Jundishapur," 189.
12. Najmabadi, *Ta'rikh-i Tib*, 66.
13. For more information, see Muhammedi, "The University of Jundishapur," 154; Seyyed Hussein Nasr, *Science and Civilization in Islam* (Cambridge: 1987), 189.
14. See Najmabadi, *Ta'rikh-i Tib*, 66.
15. Ibid., 70; Sami, "Gundashapur," 8.
16. Ibn al-Bashari al-Maqdisi, *Ahsan al-Ta'asim*, ed. by Muhammad Mahzumi (Beirut: 1987), 310.
17. See Ibn Hawqal, *Surat al-Ard* (Beirut: n.d.), 230.
18. See Ibn Abi Usaybi`a (d. 668/1268), *Uyun al-Anba' fi Tabaqat al-Atibba'*, ed. by Nizar Rida (Beirut: n.d.), 283.
19. See Dinawari, *Akhbar al-Tiwal* (Cairo: 1960), 46.
20. See Nakhai, "Pishine-i Ta'rikh-i," 140.

21. See G. Le Strange, *Cografya al-Tarikhi serzeminhayi khilafati tarikhi*, trans. into Farsi by Mahmud Irfan (Tehran: 1337/1959), 258.
22. Al-Maqdisi, *Ahsan al-Taqasim*, 321.
23. See Manfred Ulmann, *Islamic Surveys II* (Edinburgh: 1978), 17.
24. Ibn al-Nadim, *Fihrist* (Egypt: n.d.), 422; Dhabihullah Safa', *Ta'rikh-i 'Ulum-i 'Aqli der Tamaddun-i Islami* (Tehran: 1329 AH), 22; Najmabadi, *Ta'rikh-i Tib*, 72.
25. For further information, see Ibn al-Nadim, *Fihrist*, 421; Najmabadi, *Ta'rikh-i Tib*, 72.
26. Sarton bases his claim on the information that the famous Greek doctor of Shahpur II, Théodosius, taught medical sciences in Jundishapur. See Muhammedi, "The University of Jundishapur," 154.
27. See Nasr, *Science and Civilization*, 189.
28. See Nakhai, "Pishine-i Ta'rikh-i," 143.
29. Mehmet Bayraktar says that these scholars left Athens for Jundishapur in 529 and returned to Athens in 533. Thus, they spent around 4 years in Jundishapur. See Mehmet Bayraktar, *Islam Felsefesine Giris* (Introduction to Islamic Philosophy) (Ankara: 1988), 40.
30. One of Damascius' works, which he composed during his stay in the East, has survived until today. See Mumtahir, "Anushirwan," 139.
31. This book was translated into Latin as *Prician Philosophi Solutions corum de quibus dubitavit chostrotres persarum* at an unknown date. A copy of this translation is recorded under number 1314, found among the Latin collections in the Paris Saint-German Library. This work was also published as *Dubitationes et Solutiones* (Paris: 1890).
32. Najmabadi, *Ta'rikh-i Tib*, 74.
33. Hussein Sultanzade, *Ta'rikh-i Madaris-i Iran ez Ahda Bastan ta Ta'sis-i Dar al-Funun* (Tehran: 1364 AH), 31; Muhammad Muhammadi, *Farhang-i Irani pish az Islam wa Athar-i an dar Tamaddun-i Islami wa Adabiyyat-i 'Arabi* (Tehran: 1374 AH), 234. This custom was preserved in the Baghdad *bimaristan*, which periodically held medical and philosophical conferences. Nahide Bozkurt says that these conferences were held once a week during Ma'mun's reign. See Nahide Bozkurt, *Mutezile'nin Altin Çagi – Me'mun Dönemi* (The Golden Age of the Mutazilites: The Period of al-Ma'mun) (Ankara: 2002), 121.
34. For more information on Nadr bin Harith, see Ibn Qutayba, *Al-Ma'arif*, ed. by Tharwat 'Uqqasha (Egypt: 1992), 288; Ibn Abi Usaybi'a, *'Uyun al-Anba'*, 161.
35. See Ibn Abi Usaybi'a, *'Uyun al-Anba'*, 167; Browne, *Tibb-i Islami*, 43; Ahmad 'Isa Beg, *Ta'rikh Bimaristanat fi al-Islam* (Dar al-Ra'id al-'Arabi), (Beirut: 1981), 63.
36. See Jawad 'Ali, *Al-Mufasssal fi Ta'rikh al-'Arab qabla al-Islam*, vols. 1-9 (Baghdad: 1993), 8:320.

37. See Qifti, Jamal al-Din Abu al-Hassan `Ali bin al-Qadi Yusuf, *Kitab Akhbar al-`Ulama' bi Akhbar al-Hukama'* (Egypt: 1326 AH), 111; Ibn Abi Usaybi`a, *Uyun al-Anba'*, 161.
38. The actual conquest of Jundishapur is an interesting story: After conquering Sus, Abu Sabra led his army toward Jundishapur and surrounded the city. During the barricade, the city gates were suddenly opened and the people of the city, as if nothing extraordinary was happening, went about their daily activities. The people soon informed the bewildered Muslim soldiers that they had been given protection. But the army's commanders told the people that they did not give such protection. The people then brought to the commanders an arrow, which had been shot to the city from the Muslim front, upon which was written that they had been given protection. The commanders denied any knowledge of this arrow and avoided giving them protection, despite the people's insistence upon the truth of their story. After an investigation, the Muslim commanders discovered that the arrow had been shot by Mukaththaf, a Muslim slave. They then claimed that any protection given by a slave was meaningless. However, the people insisted that they had had no knowledge of whether the arrow had been shot by a slave or a master. Moreover, since the Muslims had extended their protection, they had to honor their promise. After discussing the problem, the Muslim commanders decided to inform Caliph `Umar of the situation. Upon being informed of this event, the caliph ruled: "The slaves of the Muslims are included in themselves." This established that protection, even if given by a slave, binds all Muslims. For more information, see Ibn al-Jawzi, *Al-Muntazam fi Tawarikh al-Muluk wa al-Umam*, 12 vols., ed. by Suhayl Zakkar (Beirut: 1995), 147; Ibn al-Athir, *Al-Kamil fi al-Ta'rikh* (trans. into Turkish by Ahmet Agiracka) (Istanbul, 1991): 2:505-06; Yaqut, *Mu`jam al-Buldan*, 2:171; Himyari, 173-74.
39. See T. J. De Boer, *The History of Philosophy in Islam*, trans. into English by Edward R. Jones (New Delhi: 1983).
40. For further information, see `Isa Beg, *Ta'rikh Bimaristanat*, 63.
41. For more information on the scholars from Jundishapur who worked in Baghdad, see Söylemez, *Bilimin Yitik*, 108-28.
42. See Muhammedi, "The University of Jundishapur," 154.
43. Najmabadi relates that these doctors always came together to discuss diseases. See Najmabadi, *Ta'rikh-i Tib*, 90.
44. See Nurullah Kisai, "Adab wa Amuzash-i Pazashki der Iran-i Islami," *Majalla-i Maqalat wa Barrasihayi Danishgah-i Tehran Danishgada-i Ilahiyat wa Ma`arif-i Islami* (Tehran), nos. 49-50 (1369/1411): 103.
45. See Sultanzade, *Ta'rikh-i Madaris-i Iran*, 33.
46. In geometry, the main textbook was Euclid's book, which was later translated into Arabic as *Usul al-Handasah*.
47. In the logic class, principally Aristotelian logic was taught. Aristotle's book of logic was translated into Pahlawi during the Sassanid period, and the first Arabic translation was made from this Pahlawi translation.

48. See Nicholas Rescher, *The Development of Arabic Logic* (Pittsburgh: University of Pittsburgh Press, 1964), 16-17.
49. See Suleiman Kataya, "Al-Ta`lim al-Tibbi `inda al-`Arab," *Al-Bahith* (Paris), nos. 4-5 (1979): 118.
50. Ibn Sina', who was also a physician, says the following about logic: "That is because logic is a tool that prevents our mind from falling into error while attaining the true conviction (*i`tiqad-i haqq*) by giving the reasons and methods in our conceptions and confirmations. ... Except being supported by God, human nature cannot dispense with the help of this tool in making progress." Ibn Sina', *Al-Najat*, 3 and 5; Mesut Okumus, *Kur'an'in Felsefi Okunusu: Ibn Sina Örneği* (The Philosophical Reading of the Qur'an: The Case of Ibn Sina'), (unpublished study, Çorum [2003], 30).
51. This treatise, considered to be very important, was translated into Arabic several times during the early `Abbasid period. First, Ayyub al-Rakhawi translated it into Syriac, and then Hunayn bin Ishaq retranslated it into Syriac for his son. Later on, he translated it into Arabic for Ishaq bin Sulayman. At roughly the same time, `Isa bin Yahya also translated it into Arabic. More recently, Mahdi al-Muhaqqaq translated it into modern Farsi and published it as *Mutum wa Maqalat der Pazashkiyi Islami* (Tehran: 1995). For Galenos' views on this subject, see Nübahat Türker-Küyel, "Bilimin Felsefeye Dayandığı görüşü ve Galenos" ("Galenos and the View That Science Relies upon Philosophy"), *Türkiye I: Felsefe, Mantik, Bilim Tarihi Sempozyumu Bildirileri*, ed. by Kenan Gürsoy-Alparslan Açıkgenç (Istanbul: 1991), 301.
52. Browne, *Tibb-i Islami*, 56; Najmabadi, *Ta'rih-i Tib*, 73.
53. See `Isa Beg, *Ta'rih-i Bimaristanat*, 62.
54. See `Ali Sami, "Gundashapur," *Hunar wa Mardum* (Tehran), no. 90, (1349/1970): 7.
55. Najmabadi, *Ta'rih-i Tib*, 73.
56. Sami, "Gundashapur," 7.
57. For more information on these inscriptions, see Söylemez, *Bilimin Yitik*, 25-28.
58. Jundishapur did not have a homogenous population, a feature that eventually made it famous. Almost all of its inhabitants were multilingual. In addition to Pahlawi (the official language), Greek and Syriac were used as literary languages. We should also mention Lurian, Hebrew, and Khuzian. The city's polyglot population coexisted and interacted peacefully, and made their city a unique center of culture and science. See Söylemez, *Bilimin Yitik*, 43ff.
59. See Browne, *Tibb-i Islami*, 55
60. See Sami, "Gundashapur," 7.
61. See Sultanzade, *Ta'rih-i Madaris-i Iran*, 33.
62. See Kisai, "Adab wa Amuzash-i Pazashki," 107.
63. See Browne, *Tibb-i Islami*, 57. Qifti is the source of this information, used by Browne, for Qifti said that the doctors of Jundishapur reveal their knowledge to no one who is not one of them.

64. For further information, see Ibn Juljul, Abu Dawud Suleiman bin Hassan al-Andalusi (d. 377), *Tabaqat al-Atibba' wa al-Hukama'* (together with Ishaq bin Hunayn's *Ta'rikh al-Atibba' wa al-Falasifah*), ed. by Fuad Seyyed (Beirut: 1985), 54; Ibn Abi Usaybi'a, *'Uyun al-Anba'*, 258.
65. See Browne, *Tibb-i Islami*, 59; Bernard Lewis also considers Hunayn to be a Christian doctor of Jundishapur. See his *Tarih-te Araplar*, trans. into Turkish by Hakki Dursun Yildiz (Istanbul: 2000), 184.
66. See Sultanzade, *Ta'rikh-i Madaris-i Iran*, 32.
67. See Muhammadi, *Farhang*, 233.
68. For further information, see Kataye, "Al-Ta'lim al-Tibbi," 120.
69. The doctors of Jundishapur enjoyed great prestige, particularly under the `Abbasid dynasty. For example, see al-Jahiz, *Al-Bukhala'*, ed. by Taha al-Hajiri (Cairo: n.d.), 102.
70. See Söylemez, *Bilimin Yitik*, 119.
71. Ibid., 118-19.
72. Ibn al-Nadim, *Fihrist*, 333-34; and see Ismail Hakki Izmirli, *Islam'da Felsefe Akimlari* (Istanbul: 1995), 62; Safa, *'Ulum-i 'Aqli*, 17; Bozkurt, *Mutezile'nin Altin Çagi*, 116; Nurullah Kisai, "Iran," *Diyanet Islam Ansiklopedisi (DIA)* (Istanbul: 2000), 22:427-28.
73. See Mesudi, Abu al-Hasan Ali bin al-Hasan bin Ali (d. 346/957), *Murucu'z-zehab ve me'adinu al-cevher*, 4 vols. (Qom: 1984), 1:210.
74. For more information on these records, see `Ali Asghar Hikmat, *Naqsh-i Parsi ber Ahjar-i Hind*, 9-10; Muhammed Muhammedi "How The Pre-Islamic Literature Passed to the Arabs," *Berresihayi Tarih* 27, no. 1 (Tehran 1396): 6.
75. For further information, see Ullman, *Islamic Surveys II*, 17.
76. Ibid., 17.
77. See Sami, "Gundashapur," 9-10.
78. See Sultanzade, *Ta'rikh-i Madaris-i Iran*, 32.
79. See Muhammadi, *Farhang*, pp. 232-3.
80. See Yaqut al-Hamawi, Shihabuddin Abi `Abdillah bin `Abdillah (626/1229), *Mu`jam al-Buldan*, 5 vols. (Beirut: 1979), 3:112-13.
81. See Muhammadi, *Farhang*, 238.
82. Noting that the measurement was made in the Jundishapur observatory, Philip Hitti implies that this institution was not very developed. See Hitti, *Islam Tarihi*, 1:572.
83. See Reynold A. Nicholson, *A Literary History of the Arabs* (Cambridge: 1965), 17; Muhammadi, "The Universty of Jundishapur," 158.
84. Mumtahin, "Anushirwan," 154.
85. Ibid., 156.
86. See Sigrid Hunke, *Avrupa'nin Üzerine Dogan Islam Günesi*, trans. into Turkish by Servet Sezgin, (Istanbul: 1972), 98-99.
87. *Zij*, the Arabized version of the Pahlawi word *zik*, means "zigzag." See Hitti, *Islam Tarihi*, 1:570.

88. For further information, see Mumtahir, "Anushirwan," 154-55.
89. Ibn Abi Usaybi`a, *Uyun al-Anba'*, 183; Sami, "Gundashapur," 8; Najmabadi, *Ta'rikh-i Tib*, 52-53.
90. Ibn Abi Usaybi`a, *Uyun al-Anba'*, 184
91. See Ziya Kazici, *Islam Müesseseleri Tarihi* (Istanbul: 1991), 243 and 257; Arslan Terzioglu, "Bimaristan," *DIA* (Istanbul) 6 (1992): 164.
92. Najmabadi, *Ta'rikh-i Tib*, 94.
93. Muhammedi, "The Universty of Jundishapur," 156-57.
94. *Bayt al-Hikmah* was designed after the model of the Jundishapur school. See Bozkurt, *Mutezile'nin Altin Çagi*, 121.
95. See Safa, *Ta'rikhi Ulum-i Aqli*, 22-23; Muhammedi, "The University of Jundishapur," 156.
96. See Mayerhof, *Islam Medeniyeti*, 11.
97. See Abdullhusayn Zerinkub, *Tarikh-i Iran ba`d az islam* (Tehram: 1343 AH), 516.
98. For further information, see Hashimi, "Davru Jundishapur," 191.
99. See Muhammedi, "The University of Jundishapur," 162.
100. *Ibid.*, 163.
101. This work was translated into Syriac by Ibn Shuhada', a translator from Karkh, before Hunayn. However, because it was a very poor translation, Hunayn compared the Greek copies of the text and then translated it into Syriac (at the request of Shirashu`) and then into Arabic (at the request of Abu Ja`far Muhammad bin Musa). Hunayn bin Ishaq, *Risala-i Hunayn*, 217-18.
102. Sergios had already translated this work into Syriac. Hunayn rendered it into Syriac along with his own notes and explanations. Hunayn also translated it into Arabic for Abu Ja`far Muhammad bin Musa. *Ibid.*, 220.
103. Ayyub al-Rahawi had already translated part of this book for Jabrail bin Buhtishu`. Hunayn translated the full text into Syriac at the request of Yuhanna bin Masawayh. Afterwards, Hunayn translated the first chapter into Arabic for Muhammad bin Musa. Later on, Hubaysh completed the Arabic translation drawing upon Hunayn's Syriac translation. *Ibid.*, 224.
104. This book was first translated by Sergios into Syriac and then Hunayn revised it at the request of Yuhanna. Afterwards, he translated it into Arabic at the request of Muhammad bin Musa. *Ibid.*, 225.
105. At the request of Yuhanna, this work was translated into Syriac and then summarized by Hunayn. Afterwards, Hubaysh (one of Hunayn's students), translated it into Arabic. *Ibid.*, 227.
106. This work was translated into Syriac in the pre-Islamic period. Afterwards, at the request of Yuhanna, the translation was either revised or completely redone. *Ibid.*, 230.
107. Ayyub al-Rahawi had already translated this book into Syriac. However, Yuhanna requested that it be retranslated into Syriac. *Ibid.*, 230.

108. Istaf bin Busayl translated Galenos' work from its original Greek into Arabic. Afterwards, at the request of Muhammad bin Musa, Hunayn revised the Arabic text. Then, Yuhanna bin Masawayh asked Hubaysh to translate it from Arabic into Syriac. *Ibid.*, 231.
109. Vizier Muhammad bin `Abd al-Malik had this work translated from its original Greek into Arabic. Later on, Yuhanna requested Hubaysh to translate it into Syriac by relying upon his teacher's Arabic translation. *Ibid.*, 231.
110. Yusuf al-Khuzi translated the first chapter of this work into Syriac. Afterwards, Ayyub al-Rahawi translated the full text. Hunayn then summarized and translated it for Salamawayh. Then, at Yuhanna's request, he revised the text's second chapter. Ahmad bin Musa asked him to translate the whole text into Arabic. *Ibid.*, 234.
111. Hunayn translated this work into Arabic at the request of Muhammad bin Musa. Afterwards, Yuhanna had it translated into Syriac, while relying upon Hunayn's translation. *Ibid.*, 252.
112. Sergios had already translated this work into Syriac. Afterwards, Hunayn translated it into Syriac for Yahya bin Masawayh during the reign of Caliph Mutawakkil. Afterwards, Hubaysh translated it into Arabic for Muhammad bin Yahya. *Ibid.*, 242.
113. *Ibid.*, 221.
114. Hunayn relates that he translated this from its original Greek when he was 17 years old and that this was his second translation. *Ibid.*, 222.
115. Being translated twice into Syriac by Sergios, Hunayn translated it during his youth for Buhtishu`. Afterwards, Abu al-Hasan `Ali bin Yahya had it translated into Arabic. *Ibid.*, 222.
116. Sergios had already translated this work into Syriac twice, once for Teyador, the archbishop of Karkh, and once for Yasu`. However, Hunayn retranslated it because the earlier translations were so poor. Then, Hubaysh translated it into Arabic. *Ibid.*, 223.
117. Hunayn translated this work into Syriac for Buhtishu`. Later on, Stephanos translated it into Arabic. *Ibid.*, 234.
118. Ayyub al-Rahawi translated it from Greek into Syriac for Buhtishu`. Then, Stefanos translated it into Arabic for Muhammad bin Musa. *Ibid.*, 238.
119. Ishaq bin Hunayn bin Ishaq translated this book, as well as Aristotle's views on medicine, into Syriac for Buhtishu`. *Ibid.*, 241.
120. Hunayn translated this work into Syriac for Buhtishu` and into Arabic for Muhammad bin Musa. *Ibid.*, 241.
121. Yusuf al-Rahawi first translated this work into Syriac. Hunayn states that this book was retranslated due to the poor quality of the previous translation. Afterwards, it was translated twice into Arabic, once by Hubaysh for Muhammad bin Musa, and once by Ishaq bin Hunayn for `Ali bin Yahya. *Ibid.*, 243.
122. Ayyub al-Rahawi translated this work, then Hunayn, at the request of Buhtishu`, revised it. *Ibid.*, 244.

123. Ibid., 249.
124. Ibid.
125. At the request of Buhtishu`, Hunayn commissioned Tuma al-Rahawi to translate this work, after which he revised the text. Ibid., 251.
126. Ayyub al-Rahawi translated the first several chapters of Galenos' book for Jabrail bin Buhtishu`. Ibid., 224.
127. Having been previously translated by Sergios, Hunayn then translated it into Syriac for Buhtishu`. Hunayn relates that this was the first translation he had done, and that he was still a child at this time. Later on, he revised and perfected it. Afterwards, he translated it into Arabic for Muhammad bin Musa. Ibid., 224-25.
128. Ayyub al-Rahawi translated this work for Buhtishu`, and Hunayn revised the translation for Yuhanna bin Masawayh. Ibid., 227.
129. Ibid., 243.
130. See Aydin Sayili, "The Emergence of the Prototype of the Modern Hospital in Medieval Islam," *Studies in the History of Medicine* 4, no. 2 (New Delhi: 1980): 114-15. Narrated by Aydin Sayili, this information was repeated verbatim by Nowsheravi in his article. Ibid, 55-56.
131. For more information, see Ibn Abi Usaybi`a, *'Uyun al-Anba'*, 198-99.
132. See A. Habib Khan, "Early Hospitals in the Muslim World," *Studies in the History of Medicine* 7, nos. 3-4 (New Delhi: 1983): 198.
133. For further information, consult *ibid.*, 197-208.