
The influence of Islamic medicine on the development of medieval Portugal and Spain

Nurlan Namatov, Mirlan Namatov

Abstract: *For Europeans, Avicenna is a product of Hellenism and a pioneer of the Renaissance. In the Islamic countries, Aristotle was very honored, translated and commented on. Avicenna absorbed all the best of ancient culture and philosophy. He helped restore antiquity to Christian civilization. He read the Koran and the writings of Aristotle with equal ecstasy, and his life is full of amazing events. Avicenna's laboratories wandered from library to library, translated and gave food for thought. Muslim and Christian thinkers were inspired by his ideas and discoveries. The great poet of the East Omar Khayyam was read by the poetry of Avicenna, and Michelangelo admired his anatomical knowledge. He was an intellectual miracle of the Islamic world. This was the time when Muslim countries were more educated and more cultured than the European West. The Muslim culture had been flourishing and gratefully absorbing everything that Hellenistic wisdom could give. It was through the Arabic translations that the great Avicenna came to medieval Europe to become a teacher of the West.*

Keywords: Avicenna, Al-Beruni, the Islamic Science and Medicine, Bukhara, Caliphate of Córdoba.

“The Arab-Muslim presence on the Iberian Peninsula lasted several centuries and influenced the Portuguese civilization in the decisive period in which its cultural being was defined”

(Antonio Diaz Farinha¹, 1986)

¹ Professor Antonio Diaz Farinha has been Professor of Islamic History of the Faculty of Letters and Director of the Institute of Arab and Islamic Studies of the University of Lisbon. Member of the Academies: Sciences of Lisbon, Portuguese History and Navy; the Brazilian Historical and Geographical Institute; the “Real Academia de la Historia” (Spain) and the Societé Asiatique (France). Awards and Praises: Pfizer 1978 Medicine Award (in colab); Two Calouste Gulbenkian research awards “Presence of Portugal in the World”; History Award of the Portuguese Committee on Military History; ALECSO Arab Culture Gold Medal, Arab League Educational, Cultural, and Scientific Organization; First Class Naval Cross; Commander of the National Order of Prince Henry. Some books and articles published: Portugal and Morocco in the 15th century. 3 volumes. Lisbon, 1990; The Portuguese in the Persian Gulf (1507-1538). Documentary and critical contribution to its history. Lisbon, 1991; Chronicle of Almançor sultan of Morocco. Chronique d'Al-Mansour

Islam is inextricably linked with philosophy. The subject of philosophy is inextricably linked with the mind, as well as with the study of the Quran and the Sunnah. The basis of Islam is a firm understanding of truth, based on logic and reason, given to man as the supreme good of the Most High. Discussion of Muslim science is an extremely fascinating subject. This is a history of passion for knowledge that has made important achievements in the world and at all levels and from which we are benefiting to this day. Despite the fact that it is a historical fact that the Muslim civilization contributed to the civilized world of the Middle Ages and modern civilization, there is very little research on the scientific achievements of Muslims.

But since the 7th century, with the advent of Islam, the century of great expansion and perfection of the Arabic language began, the expansion of knowledge began. Together with geographical expansion during this period, Muslims come into contact with Greek, Indian, Chinese, Byzantine and Persian cultures. Thanks to the above-mentioned civilizations, Muslims get acquainted with ancient manuscripts and translate them into Arabic, improving the technique of translation and dissemination of knowledge. At that time, there is a great process of exchange between different cultures, and the Muslims were not only great spreaders, but also catalysts for subsequent scientific transformations.

Since the 8th century, the early Abbasid caliphs stimulated knowledge of existing texts from translations. Al Mansour¹ was the first who financed translations of scientific works of ancient Indians and Greek philosophers. His successors continued and expanded this practice, which led to the creation of “the House of Knowledge”, which hosted the best scientists of the time and became the first scientific center. Among the manuscripts translated into Arabic were the texts of Ptolemy, Euclid, Galen and many other scientists from the ancient sciences.

sultan du Maroc (1578-1603). Lisbon CEHCA1997. Translations into French and Arabic; The Portuguese in Morocco. Lisbon: Instituto Camões, 1999. Collection Lazúli. Portuguese and Arabic edition. 2^a ed. [Al-Burtugálfun fil Magrib (in Arabic)]. "The Changing Face of Islam in Europe and on Its Periphery. The Case of the Iberian Peninsula". Center for Strategic and International Studies, Washington, D.C., 2002- "The Modern Political Evolution of Islam". In September 11 A Decade Later. Lisbon: Luso-American Foundation Almedina, 2011. Influence of Arab Medicine on Medieval Europe Lisbon: Instituto Camões, 1999.

¹one of the greatest rulers of the Arab Caliphate, who stood at the origins of the Abbasid state, the founder and builder of Baghdad, the largest city in the medieval world. Rules in the years 754-775. Known for its honorary title - al-Mansour ("Victorious").

These sages were largely under the patronage of prominent people of great possessions who were interested in creative knowledge. The violent development of ideas and knowledge, wealth and viability of the development of translation activity preceded a period of unceasing search for knowledge, curiosity, practice of debate ideas and what became characteristic of the sages of that time.

Beginning with the 9th century begins a new period of the science of Muslims. They translated Greek and Indian treatises and improved science. Between the centuries 10th and 13th there is a true apogee of Muslim science and its teaching in higher schools. In the 10th century, one of the largest human libraries was created in the House of Wisdom in Baghdad.

For four centuries, a vast intellectual stimulation environment prevailed and expanded, and it was during this period that innumerable discoveries took place, among which the following are distinguished: Mathematics and algebra - with the development of figures, the concept of zero and the decimal system, the practice of calculus, algebra, trigonometric equations and arithmetic. Among the great sages are Al-Kvarassi¹ (from which the word algebra comes), Ibn al-Haytam², al-Biruni ³ and others.

As an independent discipline, spherical trigonometry was formed in the works of medieval mathematicians of the countries of Islam. The greatest contribution to its development in this era was made by such scholars as

¹ Kamal al-Din Hasan ibn Ali ibn Hasan al-Farisi or Abu Hasan Muhammad ibn Hasan (1267– 12 January 1319) was a Persian Muslim scientist. He made two major contributions to science, one on optics, the other on number theory. Farisi was a pupil of the astronomer and mathematician Qutb al-Din al-Shirazi, who in turn was a pupil of Nasir al-Din Tusi.

² Ibn Hajar al-Haytami is an Islamic theologian, muhaddis, faqih, imam of the Shafiites of his time. He was known for his magnificent memory. He was a specialist in the interpretation of the Quran (tafsir), hadithology, kalame, fiqh, usul, furu'e, sufism, as well as in mathematics, grammar, morphology, logic, bayan, etc.

³ a medieval Persian scientist, encyclopedist and thinker, the author of numerous capital works on history, geography, philology, astronomy, mathematics, mechanics, geodesy, mineralogy, pharmacology, geology, etc. Biruni possessed almost all the sciences of his time. His scientific works were written in Arabic and Persian

Thābit ibn Qurra¹, Abu Nasr Mansur², Kushyar Gilani³, Abu al-Wafa 'Buzjani,⁴ al-Biruni, Jabir ibn Aflakh⁵, Ibn Mu'ādh al-Jayyānī⁶, Nasir ad-Din al-Tusi⁷.

¹ Abul-Hasan Sabit ibn Kurra al-Harrani (836, Harran - February 18, 901, Baghdad) is an astronomer, mathematician, mechanic and doctor of the 9th century. In medieval Europe it was called Thebit. He was a pupil of the famous mathematicians of the brothers Banu Musa, worked in the House of Wisdom in Baghdad. At present, manuscripts of 44 Sabit tracts on mathematics, mechanics, physics, astronomy, geography, music theory and philosophy are known. In addition, the manuscripts of 17 Sabit tracts on medicine and veterinary medicine are known. Sabit's great merit was his translations from the Greek works of Archimedes, Apollonius, Euclid, Ptolemy and other ancient authors.

² Abu Nasri Mansur ibn Ali ibn Iraq (960 – 1036) was a Persian Muslim mathematician and astronomer. He is well known for his work with the spherical sine law. Abu Nasr Mansur was born in Gilan, Persia, to the ruling family of Khwarezm, the Afrighids. He was thus a prince within the political sphere. He was a student of Abu'l-Wafa and a teacher of and also an important colleague of the mathematician, Al-Biruni. Together, they were responsible for great discoveries in mathematics and dedicated many works to one another. Most of Abu Nasri's work focused on math, but some of his writings were on astronomy. In mathematics, he had many important writings on trigonometry, which were developed from the writings of Ptolemy. He also preserved the writings of Menelaus of Alexandria and reworked many of the Greeks theorems.

³ Abu-l-Hasan Kushyar ibn Laban ibn Bashahri al-Gili (Gilyan, 971 - Baghdad, 1029) is a Gaznevidian mathematician, astronomer and astrologer. His disciple was an-Nasavi. In the treatise "On the beginnings of Indian arithmetic" we consider arithmetic operations with ordinary decimal numbers, as well as with numbers written in a pure sexagesimal system. The extraction of square and cubic roots in the sexagesimal system is analyzed in detail.

⁴ Abul-Wafa Muhammad ibn Muhammad al-Buzdzhani (Buzgan, June 10, 940 - Baghdad, 998) is a Persian scholar of the 10th century, one of the greatest mathematicians and astronomers of the medieval East. Teacher Abu-l-Hasan ibn Yunis.

⁵ A Western Arabian mathematician and astronomer, a native of Seville. In medieval Western Europe was known as Geber Hispalensis. Compiled "Improvement of Almagest" and "Treatise on the figure of secants". These Jabir treatises, translated into Latin by Gerard Cremona, had a noticeable influence on the development of trigonometry in Western Europe, up to Regiomontanus and Nicolaus Copernicus.³

⁶ a West Arab mathematician, astronomer and lawyer. In 1012-1016 he lived in Egypt. Later he was a judge and a vizier in Seville. In Europe it was known as Abhomadi Malfegeyr.

⁷ Nasir ad-Din Abu Jafar Muhammad ibn Muhammad Tusi (Tus, February 18, 1201 - Maraga, June 26, 1274) is a Persian mathematician, mechanic and astronomer of the 13th century, a disciple of Kamal ad-Din ibn Yunis, an extremely versatile scholar, author of works on philosophy, geography, music, optics, medicine, mineralogy. He was an expert in Greek science, commented on the works of Euclid, Archimedes, Autolycus, Theodosius, Menelaus, Apollonius, Aristarchus, Gipsicles, Ptolemies. There are about 150 treatises and letters by Nasir al-Din al-Tusi, of which twenty-five are written in Persian and the rest in Arabic. There is even a treatise on geomancy, which Tusi wrote in Arabic, Persian and Turkic, demonstrating his mastery in all three languages. It is noted that Tusi knew Greek.

Thanks to the Muslims, knowledge in astronomy is restored - knowledge of the ancient Greeks and elaborated complex methods and instruments of guidance (astrolabe and observatory), time determination and planetary models; in Geography - knowledge of human geography and cartography; in physics - the development of hydrostatics, optics, mechanics; in architecture and decorative art - the development of structures and geometric elements of great complexity. Chemistry is developing - soap, cosmetic elements, such as rose water (from distillation technology) and vinegar (from fermentation methods) have been developed from practical experiments. Because of the ongoing search for the elixir of life, a wonderful medicine that could cure all evil, research in medicine and pharmacology continues.

Medicine: From the rich heritage obtained from the treatises of Hippocrates and Galen, Muslim medicine was introduced into all aspects and became a high-level medicine developed in the great scientific centers of that time. It was because of the big cities that the Muslims had to develop the concept of the hospital, the places where the specialists dedicated to the treatment of patients, practice and teaching of medicine met. In these places, pharmacies were also developed, where a variety of medical products were found. Thanks to advances in chemical research and the search for a healing elixir, Muslims were pioneers in pharmacology. They developed the pharmacological elements, described in detail their appearance, reception and therapeutic use.

Advances in chemistry have also allowed not only to treat illnesses but also chemical drugs to achieve balance and well-being. At this time, significant changes in the field of medicine were possible, and many diseases were studied and described diseases such as smallpox, asthma and allergies. A lot of knowledge was acquired in the field of anatomy and physiology, among them: the anatomy and physiology of women, fetal development and pregnancy. At that time, surgical instruments and complicated surgical methods of operation were also developed. It should be noted that before the Muslim operations in Europe were conducted by hairdressers and Muslims were the first to introduce the practice developed and taught in medical schools¹.

¹ Antonio Diaz Farinha Influence of Arab Medicine on Medieval Europe Lisbon: Instituto Camões, 1999. s.34 Nurlan Namatov Sufism-bridge between Islam, Buddhism and Christianity Sholar Press Saarland Germany 2014
The Impact o the Mongol Invasion on the Medieval Islamic Civilization. Kyrgyz-Russian Slavic University 2017 Bishkek

There are many other wise philosophers and doctors, such as Ibn al-Nafis¹, who described what is now known in anatomy as "small circulation", which treats the venous circulation in the pulmonary arteries before their oxygenation through the heart. In the study, development and compilation of drugs was the sage Ibn al-Baytar², who described more than 1,400 medicines and Muslim doctors prepared important knowledge for the well-being of mankind as knowledge about hygiene and nutrition and mainly on the description of mental and psychological processes. Avicenna and Al-Razi³ advocated the use of psychological methods of treatment of diseases, and we can say that they are pioneers for the study of psychology. In fact, Muslims were the first to describe experimental psychology, central nervous system disorders, sleep disorders and memory impairments. We can say that together with the methods of neurosurgery developed by Al-Zahravi, all this knowledge can be considered the forerunner of one of the most interesting and developed sciences of our time, neurobiology.

Al-Farabi (872-951) also known as al-Mu'allim al-Sani which means the second teacher after Aristotle, one of the greatest representatives of medieval eastern philosophy. His contribution to the philosophy of Aristotle and Plato is invaluable. The modern world owes this Central Asian scholar, who not only preserved, but also perfected Greek philosophy. He made an invaluable contribution to philosophy, mathematics, music and metaphysics, especially his work in political philosophy. His most important work was a book on political philosophy "Treatise on the opinions of the inhabitants of a virtuous city". In his work, Farabi creates a

¹ Ibn al-Nafis, an outstanding physician and a multifaceted scholar of the Mamluk Sultanate of Egypt from Syria.

ibn Nafis became famous for his activities in the field of medicine. He is called the head of the healers of his time. ... Another work of Ibn Nafis is "Al-mosaeb-fel-kahel" . It contains information on ophthalmology. This book was widely used by the followers of the great scientist

² He was one of the greatest scholars of Muslim Spain and was the greatest botanist and pharmacist of the Middle Ages. He was born in the Spanish city of Malakya (Malaga) in the late 12th century. He studied botany from Abu al-Abbas al-Nabati, a learned botanist, with whom he began to collect plants in the whole of Al-Andalus

³ Persian scientist, encyclopedist, physician, alchemist and philosopher. Many of the works of Ar-Razi were later translated into Latin and became widely known and recognized among Western European doctors and alchemists. In Europe it is known under the Latinized names Rhesus . Most of Al-Razi's works were translated into Latin and published many times. Most works were published in Venice in 1509 and in Paris in 1528 and 1548. Courses in medical schools and universities in Europe have always relied on his work; along with the works of Ibn Sina, they were the basis of the teaching in Louvain until the seventeenth century.

theory of social structure. Based on Plato's ideas, the philosopher developed the concept of a “virtuous city” based on justice. At the head of virtuous cities are the rulers-philosophers, who are also the religious leaders of their society. In virtuous cities they strive to achieve true happiness for all inhabitants, good and justice prevail, injustice and evil are condemned. Farabi contrasts ignoble cities with ignorant cities, rulers and inhabitants of which have no idea of true happiness and do not aspire to it, but pay attention only to bodily health, pleasures and riches. Perhaps, Farabi is the first Muslim scientist who in a clear form has provided the advantages of a democratic regime. For those who doubt the compatibility of Islam and democracy, one should read Farabi's views on democracy.

According to Farabi, free societies have the potential to become virtuous societies, since good people in a free society have a desire for good. The works of the more mature Ghazali¹ are especially interesting. After the scientist experienced an intellectual crisis and a subsequent spiritual awakening, in which he is similar to Shaykh Rabbani from India, who brought sharia and tariqas (law and mysticism) into balance (balanced). In book “Kitab al-Munshikh min al-Dalal”, in which he expresses intellectual and spiritual doubts and calls into question the concept of truth. Ibn Rushd (1126-1198) Ibn Rushd - better known as Averroes, rather influenced more Western religion and philosophy than Islamic thought. Some Muslim historians describe the modern enlightened west as the imagination of Averroes. In Western European medieval philosophy, there was a direction whose supporters continued the interpretation of Aristotle's teachings, begun by Ibn Rushd. The direction was called Averroism. The most important of Ibn Rushd's independent works is *Fasl al-Makal*. At the beginning of the work, a number of verses are cited, encouraging the study of the surrounding world in search of the sign of the Most High. In the work put forward the idea of philosophizing as a duty of a Muslim and the need

¹ Al-Ghazali (1058-1111) is one of the greatest scholars of Islamic thought. Ghazali is a philosopher, theologian, jurist, one of the most authoritative teachers who are among the founders of Sufism. For most Muslims, Ghazali is an example of Mujaddid, the innovator of Islam. Appearing at a time when there was a lot of disagreement between philosophers and theologians, rationalists and traditionalists, mystical and orthodox, he tried to unite these views into one. The main work of al-Ghazali is the treatise “Resurrection of Religious Sciences”, which reveals the issues of religious practices, socially significant customs, pernicious traits and traits leading to salvation. In this treatise, al-Ghazali defines the basic Sufi values and ideals - patience, love, poverty and asceticism.

to study the works of ancient philosophers (although they are pagans), as they pursue the same goals as the Koran calls for.

Among the great medical scientists we can mention Avicenna, also known as Avicenna, who developed a medical treatise called “The Canon of Medicine Science”. A monumental work in which he described several pathologies and their possible methods of treatment that were used in practice and in medical education before the 18th century. Among the diseases described by Avicenna, we can describe several major diseases, such as mania, hallucinations, nightmares, dementia, epilepsy, stroke, paralysis, tremors and even sexual disorders. Avicenna described several anatomical structures, areas of the brain, whose names are still used in neuroanatomy and modern neurophysiology. He was the first scientist who connected the brain regions with certain functions of the body, which is still an object of research in the field of neurophysiology and neuroscience. In addition, he believed and often used psychological methods to treat his patients. Avicenna is one of the greatest scientists of Central Asia, who have enriched world science with achievements of paramount importance. The works of Avicenna and his great contemporary Abu Rayhan Beruni¹ marked the highest stage of the development of science in the medieval East.

Avicenna's father, Abdullah, was from Balkh. During the reign of the Samanid emperor Nuh ibn Mansoor ²(976-997), Abdallah moved to Bukhara, where he was appointed head of tax collection from the village of Khurmitan, near the city of Bukhara. Then he lived for some time in the village of Avshan, where he married a girl named Sitara. At the beginning of the month Safar 370 (the second half of August 980) they had a son Hussein (this is the proper name of Avicenna). Hussein was about 5 years old when the family moved to the capital city Bukhara was then one of the largest centers of the East. The boy was sent to school.

From early childhood Avicenna learned Koran and adab (this included grammar, stylistics and poetics) to 10 years of life in both areas reached

¹ Abu Reyhan Muhammad ibn Ahmed al-Biruni October 4, 973, the city of Kyat, Khorezm, the Samanid state - December 9, 1048, Ghazni, Sovrem. Afghanistan) is a medieval Persian scholar, encyclopedist and thinker, the author of numerous capital works on history, geography, philology, astronomy, mathematics, mechanics, geodesy, mineralogy, pharmacology, geology, etc. Biruni possessed almost all the sciences of his time. His scientific works were written in Arabic and Persian.

² Antonio Diaz Farinha Influence of Arab Medicine on Medieval Europe Lisbon: Instituto Camões, 1999. s.45

Nurlan Namatov Sufism-bridge between Islam, Buddhism and Christianity Sholar Press Saarland Germany 2014

The Impact o the Mongol Invasion on the Medieval Islamic Civilization. Kyrgyz-Russian Slavic University 2017 Bishkek

perfection. In addition, he studied arithmetic and algebra, and then, under the guidance of his home teacher, Abu Abdallah al-Natili began to study logic, Euclidean geometry and Ptolemy's *Almagest*. However, soon An-Natili had to admit that he had exhausted his teaching material and was no longer able to satisfy the cognitive interest of the boy, and Avicenna himself continued his teaching on his own. He enthusiastically engaged in the study of natural sciences, and above all medicine. At the same time I was engaged in medical practice - I treated patients for free. At the age of 17, Avicenna, as a doctor, enjoyed such fame in Bukhara that he was invited to the court of Noah ibn Mansur, who had been ill for a long time, and the court doctors who treated him could not help him. Avicenna managed to cure the ruler in a short time and in gratitude for this the young scientist received permission to use the palace library, which was one of the best and richest libraries in the entire Middle East.

As a result, he expanded his scientific knowledge to a grand scale. Having thoroughly mastered the logic, science, medicine and other sciences, Avicenna proceeded to metaphysics, which was then considered one of the main sections of philosophy. The conquest of Bukhara by the Karakhanids, the fall of the Samanid dynasty (999) and the feudal internecine ensuing after these events did not allow Avicenna to continue her scientific studies in Bukhara. In 1002 his father died. All this prompted Avicenna to leave his native city and go to Khorezm, in Urgench, where the political situation was more favorable. The cruel ruler Ghasni Sultan Mahmud (998-1030), who relied on the reactionary clergy in his policy and suppressed any manifestation of scientific free-thinking, sought to enclose the rich lands of Khorezm in his state

Not wishing to be subordinate to this ruler, Avicenna arrived in Gurgan, a feudal principality on the southeast coast of the Caspian Sea. Here, Avicenna met Abu Ubeid Juzdzhani, who became his faithful disciple who accompanied him to the end of his life. Juzdzhani recorded from the words of Avicenna his autobiography, brought to the arrival of the scientist in Gurgan. He left us a description of the most profound events in the life of his teacher. Thanks to this, we have reliable information about the life and activities of Avicenna. In Gurgan, Avicenna resumed his scientific work and medical practice. He started the First Book of his main work on medicine – “The Canon of Medical Science” and other works.

In 1014, Avicenna left Gurgan and lived for some time in Rhea and Qazvin. Then he arrives in Hamadan and enlists in the service of Sha'ds al-Daule (997-1021) from the beginning as the court physician, and then the vizier. Here he wrote many of his works, began work on the multi-volume philosophical encyclopedia “Kitab ash-shifa” (“The Book of Healing”). In

1023, Avicenna moved to Isfahan and completed "Kitab ash-shifa" there, creating other works including his short philosophical encyclopedia in Persian "Danish-name" ("The Book of Knowledge").

Almost continuous wanderings through the cities of Maverannahr and Iran, constant hard work, sleepless nights and undue imprisonment broke the scientist's body. He suffered from colitis, from which he died in Ramazan 428 (in June 1037) at the age of 57 years. Avicenna was buried in Hamadan his grave has survived to this day.

According to Avicenna cancer, or al-Saratan in Arabic, was a cold tumor, developing at the outset without inflammation and painless¹. At the last stages, some of its species became painful and incurable. He compared this disease with the crab growing from the center, in honor of which the disease was named. Patients might not have known about the onset of the disease and were able to live long enough, despite accompanying pain. Surgical intervention was only "limited cancer". In this case, the incision had to be so perfect as to remove the entire tumor. However, the operation was not always the only and final, because the cancer could recur. Avicenna warned against the removal of the female breast, because it provoked metastases of cancer.

He stressed that the use of copper oxide or lead, despite the inability to cure the disease, can be effective in preventing its further spread. Ibn Sina, like Az-Zahrawi, discussed various topics. He gave the following explanations for the acute retention of urination: "If the patient is put on his back, lift his buttocks and shake, the stones will be removed from the urethra ... the urine will begin to flow, it may be easy to repel stones by inserting a finger into the rectum ... If this does not help, use a catheter to move the stone back ... If difficulties arise, do not push too hard. " This method is quite similar to what modern urologists use in acute urinary retention due to obstruction of the urinary tract. They push the stone back with a catheter or endoscopic instruments. According to Ibn al-Kuff's opinion, the treatment of large bladder stones is easier than small stones, as they either get stuck in the urethra or in the bladder cavity, where they are easier to find.²

¹ Antonio Diaz Farinha Influence of Arab Medicine on Medieval Europe Lisbon: Instituto Camões, 1999. s.45

Nurlan Namatov Sufism-bridge between Islam, Buddhism and Christianity Sholar Press Saarland Germany 2014

The Impact o the Mongol Invasion on the Medieval Islamic Civilization. Kyrgyz-Russian Slavic University 2017 Bishkek

² Antonio Diaz Farinha Influence of Arab Medicine on Medieval Europe Lisbon: Instituto Camões, 1999. s.23

As a genuine scientist Avicenna with great success worked in almost all fields of knowledge. More than 450 titles of his works are mentioned in the sources, and the number of works that have reached us is about 240. They cover such fields of science as philosophy, medicine, logic, psychology, physics (i.e., natural science), astronomy, mathematics, music, chemistry, ethics, literature, linguistics, etc. However, Avicenna became famous mainly due to his works on philosophy and medicine.

Among the philosophical works of the scientist that have survived, we mention:

1. "The Book of Healing" ("Kitab al-Shifa"),
2. "The Book of Salvation" ("Kitab an-nadzhat"),
3. "The Book of Directives and Remarks" ("Al-Isharat wa-t-tanbihat")
4. "The Book of Knowledge" ("Danish-Name").

Avicenna used all a valuable that was worked out by his predecessors in the field of natural science and philosophy and created a philosophy that became the pinnacle of the development of theoretical thought in the countries of the Middle and Near East in the era of the early medieval ages. Despite the contradictory nature of certain provisions, the philosophical teaching of Avicenna in the conditions of feudalism played a progressive role. It clearly shows the materialistic tendency, the desire to oppose religion scientific knowledge based on experience and logical evidence.

Of particular interest are the works of Avicenna on psychology. In this matter, he made a great step towards materialism, for the first time he tried to link certain types of mental activity of man with certain parts of the brain. The socio-political views of the great philosopher indicate that in this area he also adhered to progressive ideals. Avicenna advocated an ideal state, whose population should consist of rulers, producers and troops, and everyone should engage in useful work. Avicenna successfully studied other sciences. He had extensive knowledge of chemistry for his time, and several chemical works were attributed to him.

Avicenna contributed greatly to the subsequent development of chemistry, mainly due to criticism of the basic principle of alchemy, namely, the possibility of converting non-noble metals into noble metals. In

Nurlan Namatov *Sufism-bridge between Islam, Buddhism and Christianity* Sholar Press Saarland Germany 2014

The Impact o the Mongol Invasion on the Medieval Islamic Civilization. Kyrgyz-Russian Slavic University 2017 Bishkek

the field of geology, he expressed an original view of mountain building, which is close to modern scientific theory. In his opinion, the mountains were formed as a result of two factors: 1) elevation of the earth's crust during strong earthquakes, 2 - the action of the flow of water, which, in search of the path, makes large depressions in the valleys and thereby causes the formation of high elevations.

Avicenna¹ also dealt with botany questions, because as a doctor, he could not but pay due attention to the study of plants that have medicinal properties. Karl Linnaeus (1707-1778), considering the merits of Avicenna in the field of this science, called the evergreen tropical plant by his name - Avicennia. He left a significant mark in the field of poetry. Many of his scientific treatises he wrote in verse in the form of *rajaz*. In addition, he wrote several works that had a noticeable impact on the subsequent Persian-language literature. There is a connection between the message of Avicenna "At-Tayr" ("The Bird") and the famous poem "Faridaddin Attar (12th century) "Mantik at-tayr" ("The conversation of birds"). There are several more whales and gazelles around 40 quatrains of Avicenna in Persian. The merits of Avicenna in the field of medicine are especially great. He is rightly considered one of the greatest medical scientists in the history of mankind. According to various sources, the total number of medical works of Avicenna reaches 50, but of them about 30 in degree 8 remained. According to their content, they can be divided into three groups (with the exception of "the Canon"):

- 1) The works of a general nature in which illuminate certain sections of medicine and some of its theoretical questions;
- 2) The works on the diseases of any one organ or one particular disease, for example, about heart diseases and the means of its treatment, about the disease of the colon, about the disorders of the function of the genital organs, and
- 3) The work on medicines.

However, the main medical work of Avicenna, which brought him centuries-old glory in the entire cultural world, is "the Canon of Medical Science". This is a genuinely medical encyclopedia in which everything that relates to the prevention and treatment of diseases is set out with logical harmony. In "the Canon of Medical Science", as well as in a number of

¹ Cruz Hernández, Miguel. *La metafísica de Avicena*. Granada: Publicaciones de la Universidad, 1949

The Cambridge Companion to Arabic Philosophy, edited by P. Adamson and R. Taylor, Cambridge: Cambridge University Press, 2005

special works on medicines (“The book on medicines for heart diseases”, “On the properties of chicory”, “On the properties of vinegar – lead”, etc.). Avicenna not only unified the scattered experience of the past and supplemented it with the results of his own observations, but also formed a number of fundamental provisions of the rational formation.

Modern surgery is the result of amazing innovations made by people dedicated to their healing work. Already a thousand years ago, the ethic of saving human life led the center of Muslim Spain, where vascular, general and orthopedic operations were performed. The most famous surgeon of the time was Abul Kasim Khalaf ibn al-Abbas al-Zahrawi,¹ known in the west as Abulkasis, who lived in Cordoba during the peak of the development of Islamic civilization. He observed, meditated, practiced and treated every patient, giving him all his skill and skill. He was recognized during his lifetime as an outstanding surgeon and served as the court physician of the Caliph Al-Mansur, the ruler of Al-Andalus. Az-Zahrawi revolutionized the surgery by introducing new procedures, more than two hundred surgical instruments and detailing the dental, pharmaceutical and surgical practices of his time.

His work “Al-Tasrif” established the rules of practice in medicine, dividing everything into “it is possible” and “impossible” for almost every medical problem described by him. With the name of Az-Zahrawi, there are many innovations which make his track record quite impressive. In the list of new procedures introduced by him was the use of catgut for the application of internal seams and still used in simple and complex operations. Catgut is probably the only natural substance that dissolves independently within the body and is not rejected by the human body. Despite the fact that Az-Zahrawi used catgut for the first time, Ar-Razi became the first animal (lamb) gut to use as a suture material. Az-Zahrawi also used twisted strings of musical instruments for operations, replacement of an absent tooth with bone; attachment of healthy teeth with the help of

¹ Abul-Qasim Khalaf ibn Abbas az-Zahrawi, or Albukasis (القاسم أبو الزهراوي; 936, Madina az-zahra-1013, Madina az-zahra) is an Arab physician and scholar from Andalusia (in the territory of modern Spain). He was the court physician of the caliph of Cordoba Al Hakam II. Abuqasis wrote a 30-volume work “at-Tasrif” with chapters dedicated to surgery, medicine, ophthalmology, orthopedics, pharmacology, odontology, nutrition, etc. In the 12th century, “at-Tasrif” was translated into Latin and illustrated by Gerard Cremona. In the 14th century, the French physician Guy de Scholiak quoted Abuquasis more than 200 times. Albukasis has invented a special instrument for examining the urethra, for extracting foreign bodies from the esophagus, for examining the ear.

gold or silver wire; surgical intervention in a mammary gland; first use of cotton to stop bleeding, use of casts; tracheotomy; the use of a thin surgical drill for insertion into the urethra with urolithiasis.

He also described in detail how the instrument, which he himself made, to remove the stones in the bladder after their grinding. Az-Zahrawi also talked about easy surgical interventions, like removing the polyp in the nose, and about complex procedures, for example, like extracting a dead embryo with the help of the forceps he made. He mentions cauterization of the skin to relieve pain and how to correct a shoulder dislocation.

With all the innovations introduced by him, Az-Zahrawi always thought about his patients: in order not to frighten them during the operation, he invented a secret knife for opening abscesses. During the tonsillectomy, he held the tongue with the help of the tongue then removed the inflamed tonsil, holding it with a hook and cutting off with a tool similar to a scissors. He had slanting blades with which he cut the glands and removed them from the throat so that the patient would not suffocate. With all the innovations introduced by him, Az-Zahrawi always thought about his patients: in order not to frighten them during the operation, he, for example, invented a secret knife for opening abscesses. Az-Zahrawi, like all other Muslim surgeons, understanding the discomfort that the patient was experiencing, behaved rationally and humanely, slowly taking the most risky and complex operations. This was a decisive breakthrough in the system of relations between the surgeon and the patient. The book "On Surgery" was one of thirty, making "At-Tasrif". He described the operation to remove the stones of the bladder ("Small operation" or "Apparatus minor", as it was called in the middle Ages). A similar surgical intervention is mentioned in the Indian medical treatise "Sushruta Samhita."¹ Both surgeons, Ar-Razi and Al-Zahrawi, always stressed that the internal incision should be smaller than the outer incision, to prevent the flow of urine. The stones should be removed using forceps, but not wrenched, before removing large stones they must be broken and removed one by one. This approach is a demonstration of concern about the prevention of tissue damage, excessive bleeding and the formation of the urinary fistula. Az-Zahrawi also said that all stones should be removed, in the opposite case, even one of its pieces, left inside, will increase in size. His advice is significant in modern medicine. Az-Zahrawi, like other Muslim surgeons, was a pioneer in the

¹ Arvide Cambra, L. M. (1994), *Un tratado de polvos medicinales en Al-Zahrawi*, Servicio de Publicaciones de la Universidad de Almería.

field of gynecology. He developed instructions for training midwives on how to take birth with complications and to remove the placenta¹.

If Al-Zahravi pointed to favorable conditions for checking the action in the hospital, Avicenna offers a system for testing them, including monitoring their action at the patient's bedside, setting up animal experiments and even some kind of clinical trial. At the same time Avicenna considers the experimental way of testing the action of medicines to be the most reliable and offers "conditions" that ensure "the purity of the experiment". "The Canon of Medical Science" contains indications of the need to identify the side effect of drugs, the existence of mutual reinforcement of them and the mutual weakening of the effect of medicines when they are jointly appointed. Avicenna associated the development of rational pharmacy with the use of drugs obtained chemically.

This idea, which was shared by some Arab and Central Asian scientists and doctors (Geber², Razes,³ Al-Biruni, etc.), was further developed by the alchemists of medieval Europe, as well as physicians of the Renaissance and New Age. Avicenna described many new medicinal products of vegetable, animal and mineral origin. In particular, his first name is associated with the first application of mercury, which in the 10th century was extracted in the vicinity of Bukhara, for the treatment of syphilis. They also described the mercury side effect of mercury stomatitis.

Being the product of an ancient highly developed culture, Central Asian medicine largely predetermined the level and originality of medicine in the Arab East. Generalizing the encyclopedic works of Central Asian doctors in many ways contributed to the preservation and development of the achievements of ancient medicine (ancient, Hellenistic, Indian, Iranian, Central Asian), comprehension and synthesis of their rich practical

¹ Antonio Diaz Farinha Influence of Arab Medicine on Medieval Europe Lisbon: Instituto Camões, 1999. s.32

² Abu Abdallah Jabir ibn Hayyan al-Azdi al-Sufi (Arabic يحيان بن جابر; Tus, circa 721, - Al-Kufah, circa 815) is an Arabic alchemist, doctor, pharmacist, mathematician and astronomer. He was born in Tus, in the family of the pharmacist Hyan Al-Azdi, who came from Yemen. In medieval Europe was known under the Latinized name Geber. Jabir ibn Hayyan made comments on the "Elements" of Euclid and on the "Almagest" of Ptolemy. He owns the "Book on the construction of astrolabe", "The Book of the Position of the Luminaries", "The Book of Mirrors." As a famous physician, he wrote the "Book of Poisons and Antidotes" and "The Book of Mercy".

³ Abu Bakr Muhammad ibn Zakariya ar-Razi (about 865, Rey - around 925, in the same place) is a Persian scientist, encyclopedist, physician, alchemist and philosopher. Many of the works of Ar-Razi were later translated into Latin and became widely known and recognized among Western European doctors and alchemists. In Europe it is known under the Latinized names of Razes (Rhazes) and Abubater.

experience and theoretical concepts. Similar to the general works of Arab doctors, some Central Asian medicine. Encyclopedic works were translated into European languages and played an important role in the development of medicine in Europe. This primarily refers to “the Canon of Medical Science” by Avicenna, undoubtedly, the most popular of the medicine books created in the East. For several centuries, “Canon” served as the main teaching aid in European universities, having had a huge impact on the level of special knowledge of doctors in medieval Europe.

The advanced Central Asian scientists – philosophers and doctors were the herald of a number of new ideas, which were recognized and developed only a few centuries later. These include attempts to introduce the experimental method into pathology and drug science, the statement of the natural scientific nature of medicine as a field of scientific and practical activity, the idea of the connection between medicine and chemistry, the relationship of the organism with the environment and the role of this environment in pathology, the inseparable connection between the mental and the physical, Avicenna about invisible creatures that can cause feverish diseases and spread through air, water and soil, etc.

Advanced doctors and scientists of Central Asia actively opposed the prevailing in medieval medicine, they superstition rejected astral representations magical healing properties of precious stones, charms, amulets, opposing rational diagnostics, therapy and care. However, all their efforts remained mainly “with a voice crying in the desert”. Most representatives of medicine professions willingly used and sometimes preferred magic and mystical techniques to methods of rational diagnosis and therapy, mostly providing the fate of their patients to the will of Allah. As for the new ideas, they found few adherents.

Of course, those Central Asian doctors and scientists who were the pride of the medicine of Central Asia-Biruni, Masihi, Ibn Sina, al-Jurjani (about 1080-1141), Fakhraddin Razi¹, Umar Chagmini² and others-could not completely overcome the stumbling influence of the feudal world

¹ Fakhr al-Dīn al-Rāzī or Fakhraddin Razi was an Iranian. Sunni Muslim theologian and philosopher[8][9] He was born in 1149 in Rey (in modern-day Iran), and died in 1209 in Herat (in modern-day Afghanistan). He also wrote on medicine, physics, astronomy, literature, history and law. He left a very rich corpus of philosophical and theological works that reveals influence from the works of Ibn Sīnā, Abu'l-Barakāt al-Baghdādī and al-Ghazali. Two of his works titled *Mabāhith al-mashriqiyya fī 'ilm al-ilāhiyyāt wa-'l-tabī'iyyāt* (Eastern Studies in Metaphysics and Physics) and *al-Matālib al-'Aliya* (The Higher Issues) are usually regarded as his most important philosophical works.

² Mahmud ibn Muhammad ibn Umar al-Chagmini or al-Jagmini (died 1221) is a native of Khorezm, a mathematician, an astronomer and a doctor. His “Summary of Astronomy” was very popular in Central Asia and Iran

outlook. The works of the ancients, with the exception of some particulars, they revered as the supreme authority. None of them doubted the validity of the natural philosophy of the four juices. All adhered to the anatomical and physiological views of Galen¹. None of them was engaged in anatomy, without the development of which it was inconceivable to build a rational physiology and pathology.

The reasons that prevented the doctors of the Muslim East from studying the human anatomy are well known, and the concepts containing elements of dialectics and a materialistic, though eclectic, explanation of vital activity and mechanisms of the development of pathological processes are immeasurably more progressive than „medicine of the prophet”. The era did not allow them to step over themselves. And if for the history of medicine the most outstanding achievements of the largest doctors of Central Asia are, first of all, their invaluable new ideas, far ahead of their time, for their contemporaries and immediate descendants the most significant and significant were their achievements in the field of practical medicine, diagnostics and hygiene.

Conclusion

Creativity of Avicenna holds a special place in the history of culture. The largest doctor and thinker of his time, he was recognized as a contemporary, and the honorific title “sheikh-ar-rais” (mentor of scientists), appropriated to him during his lifetime, accompanied his name for many centuries. The philosophical and natural scientific works of Avicenna enjoyed wide popularity in the countries of the East and Western Europe, despite the fact that his main philosophical work “The Book of Healing” was declared heretical and burned in Baghdad in 1160. Immortalized by his name “The Canon of the Medical science” has been translated into many European languages many times, about 30 times it was published in Latin and for more than 500 years it served as an obligatory guide to medicine for

¹ Galen (129 or 131 years - about 200 or 217 years) is an ancient Roman physician, surgeon and philosopher of Greek origin. Galen made a significant contribution to the understanding of many scientific disciplines, including anatomy, physiology, pathology, pharmacology and neurology, as well as philosophy and logic. His theory that the brain controls movement with the help of the nervous system is still relevant today. Many of his legacies were preserved through translations into Syrian, Arabic, Hebrew, Latin and Old Armenian. The works of Galen became the main textbooks for physicians along with the work of Avicenna “The Canon of Medical Science”, which was also based on the writings of Galen. Unlike pagan Rome in Christian Europe, there was no universal ban on the opening of the human body, and such studies were conducted regularly, at least since the XIII century. Nevertheless, the influence of Galen in Europe, as in the Arab world, was so strong that, if there were discrepancies with Galen's anatomy at the dissections, the doctors often tried to explain them in the framework of the Galenic doctrine.

European universities and medical schools of the Arab East. Of the 274 works of Avicenna, only 20 are devoted to medicine. Nevertheless, it is generally accepted that of all the fields of knowledge that Avicenna was engaged in, the greatest contribution to them has been made in medicine. First of all, “the Canon of Medical Science” brought him worldwide fame and immortality. Each book, in turn, is divided into parts (fan), departments (jumla), articles (makala) and paragraphs (fasl). A century after the death of the author, “Canon” becomes known in the West. Already in the 12th century it was translated from Arabic into Latin by Gerard of Cremona¹ (1114-1187), in the 13th century to the Hebrew and dispersed in a variety of manuscripts.

After the invention of the book printing in the 15th century among the first editions was the “Canon”. It is noteworthy that his first publication appeared in 1473 in Strasbourg, one of the centers of Renaissance humanism. Then, according to the frequency of publications, he competed with the Bible only in the last 27 years of the 15th century. The Canon survived 16 editions, and in all it was published about 40 times completely and countless times in extracts. For five centuries, “Canon” served as a reference book for doctors from many countries in Asia and Europe. In all the oldest institutions of Europe until the middle of the 12th century the study and teaching of medicine was based on the work of Avicenna. Analyzing all these studies, we find that much remains to be explored in the light of the knowledge gained from the Muslims and that they are more relevant than we imagine. Moreover, one must always remember that when knowledge and science flourished among Muslims, Europe lived in obscurantism. Thanks to Muslims, most of the knowledge was preserved and improved, and later was handed over to Europeans and the West, which allowed a new awakening of humanity and the so-called civilized world. From one center of civilization to another, from one century to the next, up to the present time were the knowledge acquired and developed by Muslims, and then taken by Europeans, who expanded knowledge that surpassed times, borders and languages. To Muslims, we owe most of our

¹ Gerard of Cremona (Latin: Gerardus Cremonensis; c. 1114 – 1187) was an Italian translator of scientific books from Arabic into Latin. He worked in Toledo, Kingdom of Castile and obtained the Arabic books in the libraries at Toledo. Some of the books had been originally written in Greek and were unavailable in Greek or Latin in Europe at the time. Gerard of Cremona is the most important translator among the Toledo School of Translators who invigorated medieval Europe in the twelfth century by transmitting the Arab's and ancient Greek's knowledge in astronomy, medicine and other sciences, by making the knowledge available in the Latin language. One of Gerard's most famous translations is of Ptolemy's Almagest from Arabic texts found in Toledo. Confusingly there appear to have been two translators of Arabic text into Latin known as Gerard of Cremona, one active in the 12th century who concentrated on astronomy and other scientific works, the other active in the 13th century who concentrated on medical works.

Nurlan Namatov, Mirlan Namatov

current science, and the knowledge of Muslims should occupy an important place in the history of the development of science. This universal and humanistic heritage is all scientific knowledge generated by Muslims. This is a story that we must always remember.