THE STUDY OF THE CONTRIBUTION OF GREAT SCIENTISTS TO WORLD CIVILIZATION

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Abstract. *This article demonstrates the utilization of Central Asian scholars' scientific legacies in the natural sciences in education. From ancient times, physics has been widely employed in Central Asia in the fields of physics, astronomy, mathematics, medicine, chemistry, textiles, and architecture.*

Keywords**:** *medieval scientists, physics, astronomy, mathematics, implementation in the learning process.*

We must provide all of the circumstances for our youth, who have the blood of great grandfathers in their veins, to become worthy heirs of our great predecessors, to strive for big objectives and to achieve great achievement.

Sh.M.Mirziyayev

The President of the Republic of Uzbekistan, Shavkat Mirziyoyev, in his "Address to the Oliy Majlis and People of Uzbekistan" dated December 20, 2022, proposed naming 2023 as the "Human Dignity and Quality Education" in our country. Improving the quality of education is the only correct way for the development of New Uzbekistan.

As Yusuf Khos Hajib says, 'Where there is wisdom, there is greatness. Where there is knowledge, there is greatness. As our enlightened ancestors said, "Salvation is in education, salvation is in upbringing, salvation is in knowledge." After all, all good goals are achieved through education and training." We have set ourselves the great goal of establishing the foundations of the Third Renaissance in our country, we must create the environment and conditions that will educate new Khwarazms, Bukharis, Ibn Sinas, Ulugbeks, Navoi and Babur.

Renaissance is a French word meaning 'rebirth', 'awakening'. The content is broad: revival of science, culture, art, and education means progress in science and development of the nation. During the first Renaissance in the 9th-12th centuries and the second Renaissance in the 14th-15th centuries, high peaks were reached in science, culture, literature, and art in Central Asia.

In order to establish the foundations of the third renaissance in our country, specialized presidential schools and specialized classes are being established in secondary schools. An Islamic Civilization Center is being established in Tashkent. The following words of the President are of great importance in building the foundations of the Third Renaissance:
"Undoubtedly, confidence in our own strength and capabilities unites us on the noble goal of creating the foundations of the Third Renaissance, making us stronger and stronger" [1]

It is of great scientific importance to study the names of our great ancestors, whose names have been unified by Central Asian natural scientists in the recent past, and the huge treasures they added to the treasure of world science and culture. In Central Asia, physics, astronomy, mathematics, medicine, chemistry, textiles, architecture, culture, puppetry, philosophy, music, linguistics, literature have been widely developed in Central Asia.

Especially Muhammad Ibn Musa al-Khwarazmi (780-850), Abu Nasr al-Farabi (873-950), Abu-Rayhan Beruni (973-1050), who created in the field of fundamental sciences and became

immortal scholars for us.), Abu Bakr Ar Razi (865-925), Ahmad Farghani (790-865), Abu-Ali Husayn Ibn Sina (980-1037), Omar Khayyam (1048-1123), Mirza Ulughbek (1394-1449), it is permissible to mention great scientists such as Ali Kushchi (1403-1474).

Especially among the famous thinkers, the scientific works of Khorezm naturalist Muhammad Ibn Ahmed Abu Rayhan Beruni in the field of physics are of universal importance. Abu Rayhan Beruni was born in Khorezm in 973 and died in Ghazna in 1048. He wrote more than 200 books and pamphlets.

The notions that bodies expand from heat and shrink from cold have been known since ancient times. Beruni and Ibn Sina explained the special property of water that expands from heat and shrinks from cold and its reasons. Beruni observed that as a result of the freezing of water from the cold, its volume does not shrink, but rather expands.

'If the pitcher had broken inward, then what was said would be true. But the truth is the opposite. I have not observed the bowl break outwards. Thus, he says, it testifies that the volume of the container is not the same as what is inside its' . Beruniy scientifically explains the presence of ice on the water surface due to the fact that the density decreases due to the expansion of the volume of water when it freezes and, consequently, it is lighter compared to the weight of water equal to its volume. Abu Rayhan Beruni invented the globe while measuring the radius, circumference, surface and volume of the Earth in a unique way.

"At the present level of determination, Abu Rayhan Beruni calculated the specific gravity of 18 liquid substances using a customized container comparable to a pycnometer to measure the specific gravity of more than 50 substances." Abu Rayhan Beruni invented various devices for monitoring atmospheric pressure throughout his lifetime, including the automated watering system, which is being used in chicken farms and other locations today. 'If the water is drawn from a reservoir higher than the Earth's level, it gets compressed and shoots up,' adds Beruni. If the reservoir lies beneath the Earth's surface, the water will not rise fully. Sometimes, when the water reservoir is thousands of feet high in the mountains, then the water can be brought to the top of the castles and towers.

Beruni scientifically explains the presence of ice on the surface of water due to the fact that its density decreases due to the expansion of volume when water freezes and, consequently, it is lighter compared to the weight of water equal to its volume. Buruni measured the density of water in five different states in his experiment: spring water - 1, boiling water - 0.959, melting water - 0.965, and sea water -1.14. The dangerousness of the places where rivers flow into the sea for ships depends on the taste of the water in them. For example, (fresh) water cannot lift heavy objects in the same way that salt water can. Thus, Beruni interprets Archimedes' views on the repulsive force of fluids against a submerged body by determining the relative weights of salt and fresh water.

These amazing scientific investigations of Beruni were proven again 600 years later in the experiments of the famous Italian scientist G. Galileo.

It is known from historical sources that, among other things, in Beruni's works, he scientifically substantiated his ideas about the attraction of heavy and light bodies to the earth five centuries before the creation of the "Law of Universal Gravitation". Beruni's ideas about the heliocentric system made a great contribution to the development of science. He scientifically proved the fallacy of the idea that the Earth is the center of the universe and does not move, and that celestial bodies revolve around the Earth. [2]

Umar Khayyam, a follower of Beruni, expressed a number of philosophical ideas about the universe and developed a very accurate solar calendar.

In this calendar, which was later named the Omar Khayyam calendar, the leap year was accepted as 8 years in 33 years (32 years in the Roman calendar), the first 7 years in the fourth year, and the last 8 years in the fifth year. In other words, the 4th, 8th, 12th, 16th, 20th, 24th, 28th, and 33rd years of the 33-year period were counted as leap years and had 366 days, and the remaining 25 years had 365 days.

The average length of the year in Omar Khayyam's calendar was 365–365.2 days, which was only 0.000022 days, that is, 19.5 seconds more than the actual length of the tropical year. This error was so small that it would add up to only 1 day after 4500 years. It takes 3300 years for the error in the Gregorian calendar we use to reach one day. This calendar of Omar Khayyam forms the basis of the Jalali calendar currently used in Iran. Beruni's viewpoint is supported by the discoveries of N. Copernicus, J. Bruno, G. Galileo, and others.

Abu Ali Ibn Sina, encyclopedist, thinker, philosopher, and poet, was born in 980 in the village of Afshana near Bukhara and died in 1037 in Isfahan. The number of his works exceeds 280. More than 40 of them are related to medicine; about 30 treatises are on various natural sciences; 3 are on music; and 185 are on philosophy, logic, ethics, theology, social, and political issues. But only about 160 of his works have reached us. Beruni, Abu Ali Ibn Sina, and Ar-Razi's structure of matter (atomistic theory); Farabi and Ibn Sina's thermal phenomena; Beruni, Abu Ali Ibn Sina, and Chagnini's causes of rain, snow, and hail; Beruni, Abu Ali Ibn Sina's sounds and materials on natural-scientific issues such as light level were included in textbooks with the honor of independence.

Beruni and Ibn Sina explained that the reason for the different weather conditions in different climates of the earth is that due to the round shape of the earth, i.e., the sunlight falls vertically or horizontally.

In addition, Beruni, Ibn Sina, and Chagmini explain that at different heights of the atmosphere (for example, on the top of a mountain), due to the decrease in temperature, the water vapor in the atmosphere changes its volume differently due to the effect of coldness and different temperatures, and that it will turn into snow and hail.

According to Ibn Sina in his book "Physics", the water vapor rising from the ground turns into clouds due to the coldness, and due to the low temperature on the mountain tops, the snow condenses and turns into rain and hail, which leads to high and low temperatures. came to the conclusion that there is a connection. Ibn Sina mentions that hail is more common in the spring and autumn.

Ibn Sina wrote about the phenomenon of lightning and thunder: 'Actually, lightning and thunder are formed at the same time. But we first see the lightning and then hear the thunder. It is like hearing the sound of a distant person burning wood. It is known that the sound is created when an ax hits wood. He explains that we first see the ax hitting the wood and then hear the sound.

Ibn Sina's words about sound are even more important. 'When it comes to hearing, there is no doubt that no body can produce sound by itself. The sound can be heard through the ear. When two objects touch each other, the air moves and vibrates, creating sound. Sound waves travel very fast. When they reach the ear, they reach the auditory nerves and affect them. [3]

Farabi, Beruni, and Ibn Sina conducted numerous experiments to determine the speed of sound and light.Another one of the great representatives of Eastern scholars, Abu Abdullah Abdul Abbas Ahmed Ibn Muhammad Ibn Kashr al-Farghani, was also engaged in the sciences of astronomy, geography, and mathematics.

Fergani predicted a solar eclipse. He scientifically proved that the earth is spherical, calculated the length of the meridian, made an instrument for measuring the flow of the Nile, and wrote treatises on it. His encyclopedic work, entitled "Compendium of Stars and Celestial Movements," has been translated into many languages.
Mirzo Ulugbek founded the Samarkand Academy in the 15th century and created the largest astronomy school in the world. The Samarkand Academy had a well-equipped observatory, a rich library, and a higher educational institution called a madrasah.

Muhammad Taragai Ulugbek left behind a great scientific and cultural heritage. One of them is "Zizhi Table Koragony". This book consists of an introduction and four parts. In the "Introduction" part, there are tables compiled based on observations made at the observatory. The first, second, and third parts of the book are devoted to eras and various calendars, mathematics, spherical astronomy, and trigonometric tables. In trigonometric tables, sines and tangents differ from their predecessors in that they are calculated with an accuracy of ten units.

Issues such as the inclination of the ecliptic relative to the equator, identifying the coordinates of celestial bodies, and measuring the distances between stars and planets are discussed in detail in the third book's part devoted to practical astronomy. Furthermore, the movement of the planets in the celestial sphere, two distinct ways of predicting the eclipse of the Sun and Moon, and the placement of 1018 stars according to the constellations are calculated in the book. The fourth section of the book is devoted to "Astrological Science," which predicts people's fortunes and futures based on the location of the planets. He and his pupils developed a list of over a thousand celebrities. [4]

In conclusion, our forefathers blazed the sun with their scientific discoveries; they left a tremendous enlightenment and a vast cultural and spiritual inheritance for future generations, which is still valuable today.

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