History of development of Uzbek science

Uzbekistan is a country in whose territory development of science and culture has begun since ancient times. In particular, there were widely developed such science as astronomy, mathematics, medicine, chemistry, history, philosophy, linguistics, literature, and crafts - art of sculpture, weaving, pottery, glass making, etc. At present, scientists of Uzbekistan's are actively exploring scientific heritage left by ancient scholars, enrich science with their new discoveries, making a significant contribution to world science.

Between the 9th and 10th century, Central Asia became one of the largest scientific and cultural centers of the East, where first scientific research institutions were established as well as institutions and scientific communities in the similitude of modern academies.

In the 11th century, Urgench, the capital of Khorezm, was a well-furnished city with high culture. Horezmshah Abul Abbas ibn Ma'mun being a ruler having a keen interest in culture and science, in every possible way supported scientists, poets, musicians, calligraphers, architects and artists. The Palace court of Khorezm in Urgench included such great thinkers of the East as the encyclopedists: physician Ibn Sina (Avicenna) and the representative of the exact sciences Abu Rayhan Biruni, historian Ibn Miskawayh mathematician Abu Nasr ibn Iraq, philosopher Abu Sahl Masihi, physician Ibn Hammar and others. The first scientific academy in the Muslim East – "Baytan-Hikama or Bayt al-Hikma"– was headed by a distinguished mathematician al-Khwarizmi (783-850), who participated in measurements to determine the length of a degree of a terrestrial meridian; his works include that of construction of an astrolabe, the scientific works "Kitab aldzhebr wa-l-mukabala ("The Compendious Book on Calculation by Completion and Balancing"), "one of the world's first sets of "Astronomical Tables ", as well as a number of scientific treatises -" Treatise Concerning the Hindu Art of Reckoning", "Treatise on the Sun-Dial", "Treatise on Music "and others. Al-Khwarizmi was the first to have solved a series of algebraic equations, first introduced in the new series of numbers a "zero" mark, what expanded the theory of numbers and provided an opportunity to turn to negative numbers. For those achievements the new branch of mathematics, "algebra" was named in honor of al-Khwarizmi. In the famous work of al-Khwarizmi's "Kitab al-Jabr wa-l-Muqabala" ("The Compendious Book on Calculation by Completion and Balancing ") algebra for the first time is regarded as an independent branch of mathematics. The fundamental concept of modern cybernetics, one of its indispensable basic elements – "algorithm" is etymologically connected with the name al-Khwarizmi. In Urgench there was organized the "House of Proficient Experts" - a kind of "Academy", which the scholars were carried out research in the field of astronomy, philosophy, mathematics and medicine. However, such an atmosphere failed to survive long in Urgench – only up to 1017, the Conquest of Khorezm by Mahmood Ghaznavi.

Thus, in the East, particularly in Central Asia, the organization of scientific activity in the form of an Academy had become a tradition, and thus institutions like the Academy were established in Urgench even in later centuries. In Samarkand, the Academy was organized by Mirzo Muhammad Taragai Ulughbeg in the 15thcentury. The Academy consisted of an observatory, a numerous library of the time, and a higher educational institution – a madrasah. In the madrasah, along with religious sciences, they taught mathematics, geometry, astronomy, medicine, geography, and other secular sciences. Renowned scientists - Qazizadeh Rumi Giyasiddin Jamshid al-Kashi and Ali Kushchi worked in Ulughbeg Academy, and the scope of the research was highly differentiated, respectively. Ulughbeg Academy in Samarkand has made a significant contribution to the development of such sciences as mathematics, astronomy and geography.

The period between the 9th and 15th centuries saw a rapid development of exact and natural sciences (mathematics, astronomy, geodesy, mineralogy, medicine, pharmacology, etc.). The works of Plato, Aristotle, Hippocrates, Galen, Archimedes, Ptolemy, Euclid and other great thinkers were translated into Arabic. The level of research pursued by Muhammad al-Khwarizmi, Ahmad al-Fergani, Abu Nasr Farabi, Abu Rayhan Beruni, Mahmud of Kashgar, Abu Ali Ibn Sina (Avicenna), Nasriddin Tusi, Qazi-zadeh Rumi,

Jamshid Kashi, Ulughbeg, Ali Kushchi and other scientists of the East was in some areas much higher than the results of work conducted in more recent times by thinkers in other countries. Abu Rayhan Beruni wrote books on history, chronology, pharmacognosy, mineralogy, astronomy, mathematics, he laid theoretical basis and calculated the availability of a new continent on the Earth, and solved a number of other problems that have received worldwide recognition. Many researchers have linked the forming of the Academy of Mamun in Kunya-Urgench (now Khiva) with Abu Rayhan Biruni's arrival in the city, who worked there for a long time.

At the same period, another great Central Asian scholar Abu Ali Ibn Sina worked there. Ibn Sina is a truly encyclopedic scholar-naturalist, philosopher, physician, astronomer, mathematician, musician, writer, and poet. He was also known as Avicenna. A phrase that characterizes the work of Ibn Sina - " Madadi Sino " - in the adapted form was introduced into European languages as a trend in science – "Medicine". A renowned scholar of the eighteenth century naturalist Carl Linnaeus praised the achievements of Ibn Sina in botany, and gave his name to one of rare evergreen plant species. Ibn Sina wrote over 400 works, 240 of them have survived. The Institute of Oriental Studies named after Abu Rayhan Beruni of the Uzbek Academy of Sciences contains over 50 works of the scientist and a number of comments to them. Among these works are the five-volume "Al-Qanun-fi l-Tibb" ("The Canon of Medicine"), which is the crown of his creative activities and scholarly writings. This work had raised the incredibly high level of medical science of that time, a hundred years after the death of Ibn Sina it was widely recognized in Western Europe. In the 12thcentury, "The Canon of Medicine" was translated into Latin and circulated in manuscript format. In 1493, this book was published in a Latin translation in Venice, and within a century, it was reprinted 16 times. Medical science was taught on the basis of this work in all reputable educational institutions in Asia and Europe for 500 years. This invaluable canon of medicine even now has not lost its scientific significance.

Mathematician and astronomer, Qazi Zadeh Rumi (Salahiddin Musa ibn Muhammad ibn Mahmud, ca. 1360-1437) was a mentor of Ulughbeg. Do not underestimate the important contribution made by them in the creation of the school of Ulughbeg. For his achievements in science, Rumi was called "Aflotuni Zamon" (Plato of His Time). An outstanding mathematician and astronomer al-Kashi (Giyasiddin Jamshid Kashi) first introduced the decimal numbers on the positioning basis in mathematics and theoretically proved that, with an accuracy calculated the values of sin 1 ° and of the π (pi) character up to the 17th number sign in the decimal system. A number of his outstanding works are in the field of astronomy. Together with Qazi Zadeh Rumi, al-Kashi supervised the construction of an observatory of Ulughbeg.

Muhammad Taragai Ulughbeg (1394-1449) left a great scientific and cultural heritage, "Zij-i jadidi Guragoniy" ("New Guragan's Astronomical Tables") - the world-famous work "Ulughbeg's Zij"of a great scientist. Ulughbeg built an observatory and madrasah in Samarkand and established his own academy. Together with his students, he studied and made a list of more than a thousand of stars – a "star map". In the Academy of Ulughbeg, the scientists conducted research not only in astronomy but also in mathematics, philosophy, history and other sciences. The famous astronomer Ali Kushchi (Mawlana Alauddin Ali bin Mohammed Kushchi, 1403-1474), who worked at the Academy of Ulughbeg wrote world famous scientific works on mathematics and astronomy. He believed that the change of seasons was the result of approximation of the Earth to the Sun and the corresponding effects of sunlight on the surface temperature of the Earth, from a scientific point of view, correctly identified the process of the eclipse of the sun. Ali Kushchi's works greatly influenced the development of astronomical and mathematical science and the Middle East in the 16th and 17th centuries.

Mirzo Ulughbeg, al-Kashi, and Ali Kushchi made a significant contribution to the theory of numbers, and raised to a higher level the knowledge of their time on observational astronomy. In 1428-29 he built a unique astronomical observatory with the main instrument - a quadrant, with a radius of 40 meters that was unmatched in size. A unique catalog of 1018 stars compiled in Samarkand on the basis of 30-year observations, for many years remained the best one in the world. Achievements of Ulughbeg's

Astronomical school had a great influence on the development of science of the West and East. His scholarly works were translated into many languages, and were widely used in Europe and the USA. The name of Mirzo Ulughbeg in the history of world science stands in the same row with the names of Tycho Brahe, Johannes Kepler, Copernicus and Galileo Galilei. A portrait of Mirzo Ulughbeg, an outstanding scientist of the Middle Ages, takes a worthy place In the Great Hall of Moscow State University in the memorable historical gallery of the great scientists of all times. Sculptural monuments to Mirzo Ulughbeg were established in several cities of Uzbekistan and in Belgium, ancient Samarkand observatory is named after him, as well as several universities, including the National University of Uzbekistan, yet the schools, urban areas and the residential settlement of nuclear physicists in Uzbekistan.

The first scientific institution in Uzbekistan in the 19th century. - Tashkent Physical and Astronomical Observatory (today Astronomical Institute of AS RUz) was established in 1873. Initially, the observatory was engaged in organizing expeditions, what resulted in the exact coordinates determined for over a thousand locations in the region, and only by the 1930s, the observatory began to tackle research problems of fundamental astronomy.

In 1918, special institutions for training of personnel to be engaged in various sectors of economy and culture were opened in Turkestan. One of them is Turkestan People's University opened on 21 April 1918. Its branches were opened a little later in Andizhan, Kokand, Samarkand, Ferghana, Dzhizak and other cities. In 1919, the Research Institute of Physical Therapy was established in Tashkent. In the 1920s there were opened a number of research institutes in the field of history, medicine, science, etc. In 1920 there was established Turkestan State University (since 1923 - Central Asian State University, in 1960 renamed as Tashkent State University, at the present time - National University of Uzbekistan). Subsequently, in order to study and use natural resources in the region, several higher educational institutions and a number of research establishments in various fields of science were opened in Uzbekistan on the basis of the University.

In 1940. on the basis of the Scientific Committee formed in Tashkent in 1932, a branch of the USSR Academy of Sciences was established in Uzbekistan, and since that time, this branch has become the main research center in Uzbekistan. At that time, it consisted of institutes of geology, botany, chemistry, and problems of water resources (from 1941 – the Institute of Energy Industry and Power Engineering), history, language and literature; soil science sector, zoology, physics, and mathematics (together with helio-technological laboratory); Tashkent Astronomical Observatory (together with the Kitab Latitudinal Station), Bureau of Economic Research and Cartography. In 1940, the scientific and teaching staff in research institutes and higher educational institutions of Uzbekistan amounted to over three thousand people. During the Great Patriotic War (1941-1945.) in the country, there were more than 40 research institutes and higher educational establishments.

In 1943, the Branch of the USSR Academy of Sciences in Uzbekistan was reorganized into the Academy of Sciences of the Uzbek Soviet Socialist Republic (UzSSR), which included operated at that time 10 research institutions, among them those, created in 1943: the Institutes of Physics and Technology, History, Oriental Studies and Economics. The Members of the Academy became 11 academicians-founders, 18 corresponding members, and 3 honorary members. In the institutions of the Academy, there were 210 scientific staff members, including 28 Doctors and 80 Candidates of Sciences. In the second half of the 1940s, the efforts of scientists of the republic were mainly focused on the development of post-war economy, culture, medicine and other industries.

In 1958, nuclear reactor was constructed in the suburbs of Tashkent, which became the basis for the development of nuclear physics and its application. In the 1960s-70s, all the activities of scientific institutions of Uzbekistan operating in natural and social sciences were completely focused on the priorities of economic and cultural development of the country. Particular attention was paid to the development of comprehensive research in the field of cotton-growing, irrigation, power generation sector,

ferrous metallurgy and other industries. In 1987, in the Parkent district of the Tashkent oblast (province) there was finished the construction of a unique scientific and experimental facility – a "Big solar furnace", a bimirror optical helio-energy system was put into service.

Significantly contributed to the further development of science in the country the Decree of the President of the Republic of Uzbekistan Islam Karimov dated July 8, 1992 and the Resolution of the Cabinet of Ministers "On measures on state support for science and innovation" adopted within the frame of implementation of that Decree.

The Cabinet of Ministers passed the Resolution "On Celebrating the 1000th Anniversary of Khorezm Mamun Academy" dated November 9, 2004, ¹ 532, and the Resolution "On Improvement of the Khorezm Academy of Mamun Activities and Additional Measures for Celebrating Its 1000th Anniversary," dated November 1, 2005, ¹ 240. Thus, the Khorezm Mamun Academy was revived in the form of the respective Regional Branch of the AS RUz.

Academy of Sciences of RUz jointly with the Ministry of Foreign Affairs and the National Commission of the Republic of Uzbekistan for UNESCO in the period from 20 September to 12 October 2006 organized in the UNESCO Headquarters (Paris) an exhibition and held a scientific conference dedicated to the 1000th Anniversary of the Khorezm Mamun Academy. Several foreign embassies in Uzbekistan with the participation of scientists of the AS RUz arranged celebration events in honor of the Khorezm Mamun Academy, the conferences were also held by the Research Centre of Faisal Shah of Saudi Arabia in conjunction with the Kyunghee University of Korea.

Of particular importance to the revitalization of the Academy of Sciences was the Decree of the President of Uzbekistan I.A. Karimov of 07.08.2006 “On Measures to Improve Coordination and Management of the Development of Science and Technology” and establishment of the Committee for Coordination of Science and Technology at the Cabinet of Ministers of RUz.

Academy of Sciences of RUz pays great attention to fundamental, applied and innovative research studies pursued by research institutions in terms of transition to a market economy. The new ways are currently defined and implemented to use practically important scientific results, to widespread introduction of high technology products and services of research institutions, the mechanism of activities of scientific departments of the Academy of Sciences of RU is constantly improved.