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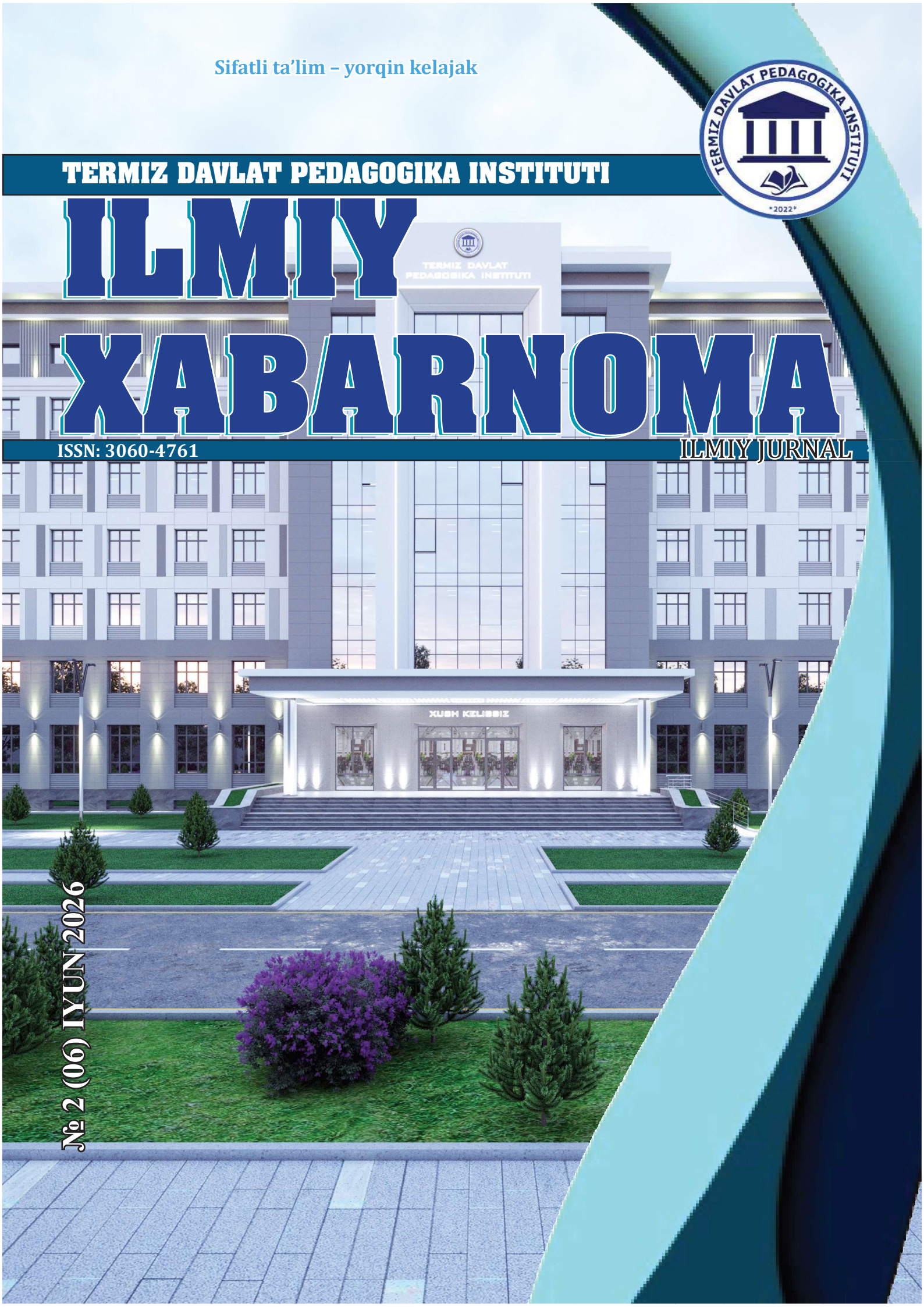
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**ORCID: 0009-0007-9643-4020**

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# SPIRITUAL AND MORAL UPBRINGING AND SCIENTIFIC MATURITY: ON THE EXAMPLE OF ABU ALI IBN SINA AND ABU RAYHON BERUNIY'S ACTIVITY

**ABSTRACT.** This article explores the profound political and social upheavals that shaped the formative yers of two of the greatest scholars of the medieval Islamic world, Ibn Sina (Avicenna) and al-Biruni. Focusing on the period between 992 and 995, the stady examines the collapse of the Samanid dynasty and its far-reaching consequences for Central Asia's intellectual landcape. The analysis highlights how military instability, economic decline, and shifting political allegiances forced both scholars into exile, poverty, and uncertainty. Despite these adversities, Ibn Sina and Beruni demonstrated remarkable intellectual resilience, continuing their scientific, philosophy, and medical pursuits. The articl pays particular attention to al-Biruni experiences in Rayy and his collaboration with the astronomer Abu Mahmud al-Khujandi, as well as Ibn-Sina struggle to sustain his scholarly work amid bureaucratic and economic hardship. By situating their personal trajectories within broader geopolitical transformations, the study underscores the enduring relationship between political instability and the preservation of scientific creativity in medieval Islamic civilization.

**KEYWORDS:** *Ibn Sina (Avicenna), al-Biruni, Samanid dynasty, Central Asia, political instability, intellectual history, medieval science, astronomy, philosophy, Islamic civilization*

# MA'NAVIY-AXLOQIY TARBIYA VA ILMIY BARKAMOLLIK: ABU ALI IBN SINO HAMDA ABU RAYHON BERUNIY FAOLIYATI MISOLIDA

**ANNOTATSIYA:** Ushbu maqolada o'rta asr Islom olamining ikki buyuk allomasi–Ibn Sino (Avisenna) va al-Beruniy hayotiga ta'sir ko'rsatgan chuqur siyosiy va ijtimoiy o'zgarishlar tahlil qilinadi. Tadqiqot 992-995 yillar oralig'ida Somoniylar davlati tanazzuli va uning Maqkaziy Osiyo intellectual muhitiga ko'rsatgan keng qamrovli ta'sirini o'rganadi. Tahlil natijalari siyosiy beqarorlik, iqtisodiy inqiroz va hokimiyatlar o'rtasidagi o'zgaruvchan munosabatlar olimlarni muhojirlikka duchor etganini ko'rsatadi. Shu bilan birga, Ibn Sino va al-Beruniy ushbu qiyinchiliklarga qaramasdan, ilmiy, falsafiy va tibbiy izlanishlarini davom ettirib, yuksak intellectual bardosh namunasini namoyon etganlar. Maqolada, ayniqsa, al-Beruniyning Ray shahridagi faoliyati, astronom Abu Mahmud al-Xo'jandiy bilan hamkorligi, shuningdek, Ibn Sinoning byurokratik va iqtisodiy murakkabliklar sharoitida ilmiy faoliyatini saqlab qolish uchun olib brogan kurashiga alohida e'tibor qaratilgan. Ularning shaxsiy hayot yo'llarini kengroq geosiyosiy jarayonlar bilan bog'lagan holda, tadqiqot siyosiy beqarorlik va o'rta asr Islom sivilizatsiyasida ilmiy ijodkorlikni saqlab qolish o'rtasidagi uzviy bog'liqlikni ochib beradi.

**KALIT SO'ZLAR:** *Ibn Sino, Beruniy, Somoniylar, Markaziy Osiyo, ma'naviy tarbiya, siyosat, tarixiy salohiyat, astronomiya, falsafa, Islom sivilizatsiyasi.*

# ДУХОВНО-НРАВСТВЕННОЕ ВОСПИТАНИЕ И НАУЧНАЯ ЗРЕЛОСТЬ: НА ПРИМЕРЕ ДЕЯТЕЛЬНОСТИ АБУ АЛИ ИБН СИНЫ И АБУ РАЙХАНА БЕРУНИ

**АННОТАЦИЯ:** В данной статье рассматриваются глубокие политические и социальные потрясения, повлиявшие на судьбы двух выдающихся учёных средневекового исламского мира - Ибн Сина (Авиценны) и аль-Бируни Исследование посвящено периоду 992 - 995 годов и анализирует распад государства Саманидов, а также его масштабные последствия для интеллектуальной жизни Центральной Азии. Анализ показывает, что политическая нестабильность, экономический упадок и изменение политических союзов привели учёных к изгнанию, бедности и состаянию неопределённости. Несмотря на эти трудности, Ибн Сина и аль-Бируни проявили выдающуюся интеллектуальную стойкость, продолжая свои научные, философские и медицинские исследования. В статье особое внимание уделяется деятельности аль-Беруни в городе Рей, его сотрудничеству с астрономом Абу Махмудом аль-Худжанди, а также борьбе Ибн Сины за сохранение научной деятельности в условиях бюрократических и экономических трудностей. Рассматривая их жизненный путь в контексте более широких геополитических преобразований, исследование подчёркивает устойчивую взаимосвязь между политической нестабильностью и сохранением научного творчества в средневековой исламской цивилизации.

**КЛЮЧЕВЫЕ СЛОВА:** *Ибн Сина (Авиценна), аль-Бируни, династия Саманидов, Центральная Азия, духовно-нравственное воспитание, политическая нестабильность, интеллектуальная история, средневековая наука, астрономия, философия, Исламская цивилизация.*

**INTRODUCTION.** For Ibn Sina and Biruni, the years 992–995 marked a major turning point in their lives. During this period, the Samanid dynasty collapsed, bringing political instability and social change across Central Asia. Both scholars were born and raised under Samanid rule-Ibn Sina in Bukhara and Biruni in Khwarazm-and were deeply influenced by the cultural and educational values of the Samanid era.

The Samanid state had become one of the leading cultural and economic centers of the Islamic world due to its strong administration, trade development, and support for science and literature. Bukhara, in particular, emerged as an important intellectual center that attracted poets, historians, astronomers, and religious scholars.

However, by the late tenth century, internal political conflicts, growing military expenses, and the rise of local independence movements weakened the state. Decentralization in regions such as Khwarazm and Khorasan further accelerated the decline of the Samanid dynasty, creating difficult conditions that strongly affected the lives and scientific activities of Ibn Sina and Biruni.

**METHODS.** The second force was a newly emerging grouping of Turkic tribes in what is now Kyrgyzstan and western Xinjiang in China. A dynamic leader, Ilek Khan, forged these disparate tribes into an effective confederation. Quite separate from the nomads who staffed the Samanis' army, the Karakhanids, as they are called, adopted Islam and came to admire what they considered the Samanis' worldly and modern lifestyle. But they were also intent on conquering Bukhara and other Samani- ruled regions, including Khwarazm and Khorasan. To resist the Karakhanid army, the Samani emirs greatly expanded their own Turkic forces and imposed onerous new taxes to pay these added hirelings. This in turn stiffened the resistance of Samani landowners everywhere, including those in Biruni's homeland of Khwarazm and its capital, Kath.

Keenly aware of these developments, the Samanis' neighbors to the west, in what is now Iran, set out to attract the leaders of Bukhara's wayward territories to their own camp, creating the third force. The Buyids, as they are known, patronized a rich cultural life in their main cities and up to this point had maintained cordial relations with Bukhara. This arrangement had thrived even though the Buyids were Shiia Muslims and the Samanis were Sunni. However, when the Buyids began exerting pressure on Bukhara, Samani landowners in Khwarazm and Khorasan began flirting with them in order to exert leverage against Bukhara's high tax policies. Either lower our taxes, they warned, or we will shift our loyalties to the Buyids.

Together, the confluence of these three forces created a spirit of secessionism across the Samanis' lands. Strong leadership might have enabled them to weather these centrifugal forces, but the last three Samani rulers in Bukhara (including Ibn Sina's patron, the emir Abu Muhammad Nuh) vacillated between inaction and risky adventurism. In a panic, they granted near- unlimited power to one of their youngest Turkic generals, the ambitious but only marginally loyal Sebuktegin. To sweeten the deal, they also made him overlord of the province of Ghazni in Afghanistan. The rise of the Karakhanids, the secessionist movements in Khwarazm and Khorosan, and pressure from the Buyids led directly to the collapse of the Samani state. It also wrought crises in the lives of Biruni and Ibn Sina. For Biruni, who until now had largely ignored geopolitics, the crisis was unexpected, sudden, and crushing. As he later recalled, "Disaster took me by surprise, erasing all that I had known and all the fruits of my endeavors".

The immediate cause of this downturn in his life were two ill- advised acts by the rulers of Khwarazm. First, the reigning shah of Khwarazm in Kath, Ibn Iraq's brother, took advantage of the confusion in Bukhara to declare his independence from Samani control. Immediately thereafter, Mamun ibn Muhammad, the local emir in the nearby city of Gurganj and a Samani loyalist, mounted a counterattack against the rebellious dynasty in Kath. In 994 the combined force of Sebuktegin's nominally loyal Turks and Mamun ibn Muhammad's troops from Gurganj destroyed the Iraq dynasty's army at Kath. The rebels were marched off to the Samani emir Nuh II, who blinded and then executed them. Other members of the Ibn Iraq dynasty and those who supported them, including Biruni's mentor and colleague, Abu Nasr Mansur ibn Iraq, and Biruni himself, were branded as rebels and outcasts. The capital of Khwarazm now moved officially from Kath to Gurganj.

With nothing but the clothes on his back, Biruni fled into the desert south of Kath and then westward all the way to the city of Rayy, the seat of the Shiite Buyids. Arriving penniless and without friends, he was fortunate to be given lodging by a kindly merchant. Biruni's only known contacts in Rayy were two brothers who traded in rare jewels and metals at the local market, a far cry from the privileged circles in which Biruni had moved in Kath. At one point Biruni even had to endure the insults of "a well- to- do ignoramus," whose sole claim to authority was that he was rich. With no alternative, Biruni was to spend the next two years in Rayy. He had left behind his globe, his astronomical and geodesic instruments, and all of his books, which were destroyed during the rebellion.

**RESULTS.** What remains of medieval Rayy has today been absorbed into the burgeoning Twentieth District of the capital of modern Iran, Tehran. By the time of Biruni's arrival, Rayy, a 6,000- year- old trading center, had become a leading entrepot on the routes from the Middle East to Central Asia and India. Ruled by a wealthy branch of the Shiite Buyids, Rayy boasted rich libraries, was the seat of a major Syrian Christian bishopric, and was the headquarters of what remained of the Zoroastrians. It had also been the birthplace of the renowned if controversial Persian medical pioneer, Abu Bakr al- Razi. The memory of Razi's achievements and also of his subversive philosophical ideas was very much alive in Rayy when Biruni arrived there in 994. More recently, the ruler at Rayy, Fahr ad- Daula, had attracted to his court the great Central Asian mathematician and astronomer Abu Mahmud Khujandi from Khojent, in what today is Tajikistan. Khujandi had achieved distinction in trigonometry by demonstrating how the law of sines could be applied to spherical triangles. He was also a pioneer in trying to explain the impossibility of solving certain equations in rational numbers. This problem, identified first by Pythagoras and known since the seventeenth century as "Fermat's Theorem," was definitively solved only in 1994 by the English mathematician Andrew Wiles. When Biruni arrived in Rayy, Khujandi was applying his expertise in mathematics and trigonometry to astronomy.

It was a coup for the emir to have attracted Khujandi to Rayy. To honor his renowned guest, Fahr ad- Daula funded the construction of an observatory, where Khujandi carried out the studies that were to be the capstone of his career. Prior to Khujandi, astronomical calculations had been based on direct observations- a dangerous practice when they involved the sun. Khujandi's observatory consisted of an enormous and fixed mural sextant covered by a cupola. Light penetrated through a small hole, or diopter, to a darkened chamber, where there was an equally large but movable alidade or pointer. Used carefully, this system made possible precise measurements of the angles of heavenly bodies, including the sun.

Khujandi's goal was to pin down the earth's axial tilt, in other words, to solve the problem of determining the same "obliquity of the ecliptic" that had interested Biruni. Khujandi knew that Ptolemy had concluded that it was 23 degrees and 52 seconds and that Indian astronomers had found it to be 24 degrees. Khujandi bested Ptolemy by calculating the tilt to be 23 degrees, 32 minutes, and 19 seconds. Another of his innovations was his discovery that the obliquity of the ecliptic was changing through time. Khujandi also realized that his own measurement of this shift was off by two seconds. Given that he had proudly drafted a treatise on his grand new observatory, proclaiming, "I invented it!" this was more than embarrassing. The question was what to do. How had this error occurred and how could it be corrected?

Biruni, who had arrived in Rayy penniless and lacking letters of introduction, had somehow managed to win Khujandi's confidence. Some early writers claimed that Biruni did this by pointing out to Khujandi that the error in his measurement of the obliquity of the ecliptic had been caused by the settling of one of the massive walls of his instrument. Biruni himself denied having made this discovery. He did, however, compose a meticulous study of this innovative instrument, a work that gained wide repute and eventually became the basis for the design of the three greatest observatories of the Muslim world: his own in Ghazni, Tusi's in Maragha, and Ulugbeg's in Samarkand. In the end, Khujandi, the world's leading astronomer and mathematician, treated Biruni as an equal. His influence on the young scientist was to equal that of Biruni's first mentor, Ibn Iraq. Biruni's interests in Rayy were not limited to mathematics and astronomy. He was befriended by some jewelers, and this inspired him to begin studying minerals, an interest that would eventually result in his inventing the concept of specific gravity. He also found time to begin compiling a catalogue of Razi's writings on mathematics, philosophy, astronomy, and religion, as well as medicine. Many years later Biruni would return to the study of this immensely talented but controversial figure.

Discussion. Biruni's productive days in Rayy were not to last. Even at the time of his arrival the situation there was descending into chaos. The ruler, whose Persian name was Abulhasan Ali ibn Hasan but who had early been awarded the pompous Arabic title "Pride of the Dynasty" (Fahr al- Dawla), spent most of his adult life fighting his brothers over their inheritance. When two of his brothers died in 983– 984, he had claimed their lands and granted to himself the further honorific title "King of Kings" (Shahanshah). A decade later, just as Biruni was fleeing Kath, Fahr al- Dawla foolishly tried to seize one of the Samanis' richest regions for himself. When his forces were decisively repulsed, unrest broke out back in Rayy. Then Fahr al-Dawla's highly competent vizier died, as did Fahr himself, in 997. At this point Mamun Ibn Muhammad destroyed the Ibn Iraq dynasty and prepared to move the capital from Kath to Khwarazm, his own city. As noted, he brought glory to himself by forgiving Ibn Iraq for the sin of being related to the fallen shah and invited him to his court. By 997 Biruni had moved back to his hometown.

During the decline of the Samanid state, Ibn Sina also experienced serious political and economic difficulties. The Karakhanid attacks on Bukhara in 992 weakened the Samanid government and created continuous instability in the region. Military conflicts, rebellions, and struggles for power disrupted social and scientific life. Despite these hardships, Ibn Sina continued his medical practice, taught students, and wrote his first philosophical works.

The death of his father and the economic collapse of the Samanid state further complicated his life. Because his medical activity did not provide sufficient income, Ibn Sina was forced to work in the Samanid financial administration. Nevertheless, he remained devoted to science and education, demonstrating strong spiritual-moral values, perseverance, and commitment to intellectual development even during times of crisis

**CONCLUSION.**The impact of this first period of turmoil on the lives of Ibn Sina and Biruni was to confirm rather than undermine their commitment to the studies they had developed in their earlier youth. For Biruni this meant a focus above all on mathematics and astronomy and their practical application. For Ibn Sina it meant medicine and "thinking about thinking," that is, the rational processes by which we can gain certain knowledge of everything from nature to God. In short, neither abandoned those interests in the face of adversity. Ibn Sina's office job did not prevent him from continuing his medical studies and even allowed time for him to write his first philosophical treatises. Biruni resigned himself to living as a pauper in order to work under the tutelage of the great mathematician and astronomer Khujandi. Thanks to their persistence, both gained recognition and admiration among an ever-widening circle of the intellectual cognoscenti of Central Asia and the Muslim East.

## REFERENCES

*1.Bulgakov, Zhizn i trudy Beruni, p. 35. Abu Raikhan Biruni, The Yoga Sutras of Patanjali, Mario Kozah, transl. and ed., New York, 2020*

*2.For a thorough discussion of Biruni and Khujandi's observatory, see Bulgakov, Zhizn i trudy Beruni, ch. 3.*

*3.Biruni, Geodezia, Izbrannye proizvedendii, P. G. Bulgakov, ed., Tashkent, 1973, p. 137. Abu Raikhan Biruni, Kniga vrazumleniia nachatkam nauki o zvezdakh, B. A. Rozenfeld and A. Akhmedov, eds., Tashkent, 1975*

*4.The French scholar Boilot found the sole copy of this paper at the Jesuit University in Beirut: D. J. Boilot, "L'Oeuvre d'al- Berumi: Essai bibliographique," Institut Dominicain d'etudes orientales du Caire, Melanges, vol. 2, Cairo, 1955, p. 237; but when the Soviet scholar Bulgakov searched for it he was told the paper disappeared during World War I. Bulgakov, Zhizn i trudy Beruni, p. 50. Avicenna (Ibn Sina), Jon McGinnis, transl., ed., The Physics of the Healing: A Parallel English- Arabic Text, 2 vols., Provo, 2009.*

*5.Avicenna (Ibn Sina), Avicenna's Psychology, Laleh Bakhtiar, transl., Chicago, 2013.*

*6.Qurbonova, Z. M. Q. (2024). Oliy ta 'lim tizimida sharq allomalari asarlaridan foydalanishning mavjud holati va uni takomillashtirish yo 'llari. Academic research in educational sciences, (1), 283-286.*