Science for the benefit of mankind

FAN VA TURMUSH

«Science and Life» popular science journal
Centre for Promotion of Science Uzbekistan Academy of Sciences
3/2024

IN THE EAST... WHAT'S LIFE WITHOUT A CHAIKHANA?

- Resentation of a new mung bean variety "ISHONCH" in Uzbekistan
- Oil chirag – the light of the ages
- Discovery of radioactivity: history and facts
- The role of folklore in the education of youth

A resident of Samarkand Hasan Yusupov. 1932. Photo by P. Kildyushev

Does Doryphoros have a soul?

Dear readers!

We are asking you this question for a reason. The relationship between physicists and lyricists, mathematics and art, reason and soul, intellect and emotions has worried humanity throughout history. Representatives of the exact sciences, insisting on the priority of their field, proclaimed: "Numbers rule the world." This is how we named the first section of our magazine, but this is not only a well-known saying of antiquity: the power of numbers is felt today. Numerical indicators and digital statistics are important in all spheres of life. What time is it now, the population, how old are you, your height, age, salary, and finally your health - blood pressure, blood composition - and many other vital aspects are determined by numbers. It is no coincidence that digital technologies have become priority areas of modern times... But the power of digital calculation ends when it comes to human feelings. It is impossible to define the volume of human emotions by numbers, it is impossible to calculate the weight of happiness, joy or grief, hatred and love in kilograms... emotions are a space that is completely owned by artists and poets, actors and musicians...

Yes, numbers defined the criteria of beauty and ideals of ancient art. Thus, Pythagoras created the theory of numerical harmony, on the basis of which the sculptor Polycletus sculpted the figure of Doryphoros or Spearman, called "Canon" - a metaphor of the ideal. In sculpture, the main criterion was the ideal proportions of the body and the external beauty of the young spearman. But numerical proportions said nothing about the feelings and spiritual qualities of the young athlete... Did he have a soul?

The teahouse owner in the painting by the famous artist Alexey Isupov "Eastern Cafe" is attractive and mysterious in an oriental way. However, we are talking about a teahouse - as a symbol of everyday culture and ancient traditions of the East. What does an oriental teahouse owner of the early 20th century think about, what are his true emotions... Numbers are powerless here... Only the artist's skill, the virtuoso play of color and smooth lines convey to us the peculiarity of the image's poetics and the nature of his emotions, creating this magnificent oriental nocturne... Looking at his iconic face, the viewer is left with a feeling of impenetrable cold or the young man's conscious detachment from the real world. The feeling does not disappear even thanks to the heat wave emanating from the flaming purple tablecloth and the scarlet tray at the bottom of the painting. But this is not a Buddhist bodhisattva devoid of a sensual soul, but a young man, behind whose mask of indifference hides the centuries-old oriental etiquette of silent respect for guests invited for a cup of tea. A set of round and oval trays decorated with a floral pattern – porcelain teapots and a bowl – is an inorganic symbol of oriental hospitality. The whole picture is a metaphor of spiritual pleasure in the atmosphere of a wise teahouse. It is in this respectable pose of Eastern hospitality that we invite our readers to get acquainted with the next issue of the magazine "Fan va Turmush".

Akbar Hakimov,
Editor-in-Chief, academican

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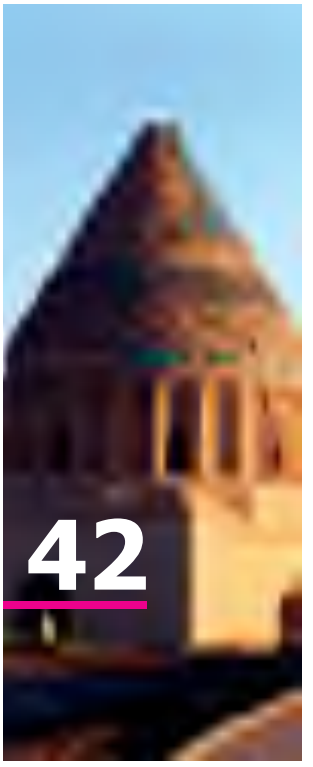

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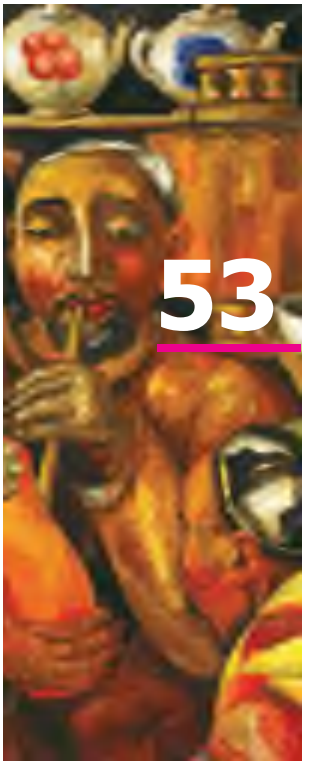


Science in Uzbekistan has suffered a heavy loss. On August 28, 2024, at the age of 79, the President of the Uzbekistan Academy of Sciences, Doctor of Physical and Mathematical Sciences, Academician, Member of the Senate of the Oliy Majlis, and scientist of the Republic of Uzbekistan Bekhzod Yuldashev passed away.

B. Yuldashev was born on May 9, 1945 in Tashkent. After high school, he graduated from Tashkent State University with a degree in physics. He began his career in 1968 as a research intern at the Institute of Nuclear Physics of the Academy of Sciences. In 1972, he defended his candidate's dissertation, and in 1982, his doctoral dissertation. In 2000, he was elected a full member of the Uzbekistan Academy of Sciences.

The scientist, who has received wide international recognition in the field of high-energy physics, demonstrated enormous scientific and organizational potential as director of the Institute of Nuclear Physics and President of the Academy of Sciences. He made a worthy contribution to the training of highly qualified scientific personnel, the development of cooperation with foreign scientific centers, and the implementation of scientific achievements in economic sectors.

In recent years, as President of the Academy of Sciences, he led the work on modernizing the sphere of science, improving the structure of the Academy, and developing research institutions.

B. Yuldashev had a bright talent and deep knowledge, during many years of scientific activity he became the author of many discoveries in nuclear physics and elementary particle physics. Over 400 scientific works, monographs of the scientist, fundamental research in nuclear physics were published in authoritative foreign publications. Dozens of doctors and candidates of sciences were trained under his supervision.

The scientist worked as a scientific adviser at the International Atomic Energy Agency, a professor at the Washington and Stanford Universities in the USA, and the Joint Institute for Nuclear Research. He was the head of large experiments carried out by international research teams in scientific laboratories in a number of developed countries, as well as significant projects to develop practical solutions in the field of strengthening nuclear safety and non-proliferation of nuclear weapons.

B.Yuldashev also made a great contribution to the development of national parliamentarism in our country. In 2000-2004, he fruitfully worked as a deputy of the Oliy Majlis of the Republic of Uzbekistan, and recently as a member of the Senate of the Oliy Majlis, and demonstrated high dedication in the development and adoption of draft laws in the field of scientific development.

The merits of Academician B. Yuldashev in the development of national science have been duly noted by our state. He was awarded the honorary titles of "Honored Scientist of the Republic of Uzbekistan", "Honored Scientist of the Republic of Karakalpakstan", awarded the orders of "Fidokorona khizmatlari uchun" and "Mehnat shuhrati", and the Beruni State Prize.

The memory of Bekhzod Yuldashev, a selfless scientist, caring mentor, and modest man, will forever remain in our hearts.

Sh. Mirziyoyev, T. Narbaeva, N. Ismoilov, A. Aripov, Sh. Ayupov

Memory makes time aware of its lack of rights....

From the editors

The editorial board of the journal joins in the words of official condolences and, in response to numerous requests from colleagues and students, publishes the memoirs they sent to the editorial board about the great scientist and remarkable person - Bekhzod Sadykovich Yuldashev. It was not possible to publish these memoirs in full, as well as the large number of official letters of condolence received by our Academy of Sciences from a huge number of foreign Academies of Sciences, fellow scientists and scientific centers. Therefore, ***we*** *were forced to shorten some of the memoirs, preserving the most important moments.*

The editor-in-chief of the journal, Academician Akbar Khakimov, expressed his feelings in poetic form - in the Uzbek version of the journal - these are the poems "Ne dur armon", and in the English and Russian versions - the poetic nocturne "An unsung song sleeps on my lips".

The editors are grateful to the Academician of the Academy of Arts of Uzbekistan, People's Artist of Uzbekistan Akmal Turaevich Ikramjanov for permission to publish the portrait of Academician Bekhzod Sadykovich Yuldashev, which he created just a few weeks ago. This painting has never been shown or published anywhere.

The editors would also like to thank the family of Bekhzod Sadykovich Yuldashev for sending photographs from the family archive and permission to publish them.

Gairat Bakhadirov,
Chief Academic Secretary of the Uzbekistan Academy of Sciences:

Bekhzod Sadykovich Yuldashev ideally combined the high **qualities** of a man and a scientist - greatness and kindness, love of science and a noble attitude towards people. He was one of the most brilliant scientists of our time, he not only made major discoveries in the field of nuclear physics, but also deep philosophical observations and reflections on life, which will forever remain in the memory of those who communicated with him.

Recently we attended a meeting of the International Association of Academies of Sciences in Moscow. The participants of the meeting paid tribute to and honored the bright memory of Bekhzod Sadikovich Yuldashev with a minute of silence as a major scientist, physicist and organizer of science. World-famous scientists of the International Joint Institute for Nuclear Research in Dubna also noted that Bekhzod Sadikovich was a brilliant scientist, an experienced politician, who gained fame and recognition among colleagues due to his humanity and comprehensive knowledge.

Behzod Sadikovich **was** a truly unique person who loved life very much. He enjoyed life and loved to share joy and happiness with others. Regardless of who they were and what position they worked in, he always congratulated people on their birthdays and wished them well. No one heard a single bad word from Behzod Sadikovich, never saw him in a fit of anger, he tried to solve all problems calmly and wisely.

The bright memory of Yuldashev Bekhzod Sadikovich, a unique scientist and a true man, will live forever in our hearts.

Ilkhom Sadikov
Academician, Director of the Institute of Nuclear Physics Uzbekistan Academy of Sciences:

I have known Academician Yuldashev Bekhzod Sadykovich for 35 years since 1990. Then, for the first time, elections were held for the position of Director of the Institute of Nuclear Physics of the Uzbekistan Academy of Sciences. Bekhzod Sadykovich also participated in the elections among five candidates. Of these candidates, Bekhzod Sadykovich was the least known to our team, although he worked at the Institute for several years in the 1960's, and for the last 10-12 years he worked in the USA and Canada. But his program for the development of the Institute inspired confidence, and his manner of speaking, his charisma and eloquence amazed everyone. Therefore, already in the first round, having gained more than 60% of the votes, he was elected Director of the Institute of Nuclear Physics.

Bekhzod Sadykovich was always focused on a victorious solution to problems. By the will of fate, born on Victory Day, May 9, 1945, he walked as a winner in life. He defended his candidate's and doctoral dissertations very early, was a young Academician and President of the Uzbekistan Academy of Sciences. Behzod Sadykovich was the only scientist who was twice elected President of the Academy of Sciences. By the way, he was also the director of the Institute of Nuclear Physics of the Uzbekistan Academy of Sciences twice. At first, he was the director of the Institute during the most difficult years of the transition period for science in the early 1990s. At that time, Behzod Sadykovich, with his ability to manage and organize research, work experience and wide international connections, not only preserved the Institute of Nuclear Physics, but also began to develop it. In 1991, he created a subsidiary enterprise "Tezlatgich" at the Institute for the production of cyclotron radionuclides. Just a month after its creation, with the direct participation of Bekhzod Sadykovich, Tezlatgich signed a contract for almost 1 million US dollars per year. It was a huge organizational and financial success. And it was precisely at a time when many scientists were leaving science, and young people simply did not go

Childhood and youth of Behzod Yuldashev

into science. Then Behzod Sadykovich created the Minor Academy, the activities of which were aimed at training personnel for the Institute at the expense of the Minor Academy fund, formed from extra-budgetary funds. At the same time, the leading scientists of the Institute taught in nearby schools, at the physics and chemistry faculties of universities. We ourselves compiled the curricula, gave lectures, selected students, paid them the cost of the contract, and according to the contract, after completing their studies, they worked for several years at the Institute and, as a rule, had a scientific background and continued to work there. Thus, Bekhzod Sadykovich created an effective mechanism for training young personnel for science.

Bakhtiyar Ibragimov
Academician of the Uzbekistan Academy of Sciences:

I worked for more than twenty years in the administrative apparatus of our Academy of Sciences, 10 of which were under the leadership of Bekhzod Sadykovich Yuldashev. His horizons were extremely broad. He greatly respected those who knew foreign languages. In 2003, when he accepted me for the position of Chief Academic Secretary, Bekhzod Sadykovich asked a question in English and, having received a satisfactory answer from me, said that this was enough for him to appoint me to this position.

In order to expand international scientific and technical cooperation, Bekhzod Yuldashev invited the Presidents of the Academy of Sciences of a number of countries to Uzbekistan. I especially remember one of these meetings. The President of the Mongolian Academy of Sciences I. Regdel was amazed by Bekhzod Sadykovich's knowledge of Genghis Khan and his dynasty, and asked our leader one question after another, claiming that he was hearing the facts he was citing for the first time. His other foreign colleagues and leading scientists have repeatedly emphasized his encyclopedic knowledge. B. Yuldashev made a huge contribution to the development and strengthening of cooperation between our Academy of Sciences and foreign scientific centers. The bright memory of him will remain in our hearts.

Sirojidin Mirzaev
Vice-President of the Uzbekistan Academy of Sciences:

Behzod Sadikovich Yuldashev began his scientific career in Uzbekistan, and his quest for knowledge led him to the United States, where he conducted experiments in leading nuclear centers. There he acquired valuable long-term experience, which he later successfully applied in the international arena, working at the International Atomic Energy Agency in Austria.

Bekhzod Sadykovich was significantly ahead of his time and remained at the forefront of science throughout his creative life. He headed our Academy twice. By 2017, a crisis in academic science had set in. The republic's leadership entrusted Academician B. Yuldashev with the restoration of the Academy of Sciences, and under his leadership it experienced its second birth.

He possessed encyclopedic knowledge and was well versed not only in mathematics and physics, but

Young scientist Bekhzod Yuldashev

Student years..

also studied history, archeology and other scientific disciplines in depth. His systemic thinking contributed to the synthesis of various scientific disciplines, allowing him to move from detailed analysis to a holistic perception of the objects of study. Nobility and subtle delicacy were deep-seated character traits of Bekhzod Sadikovich. We, his colleagues, often recall how unobtrusively and delicately, sometimes with subtle humor, he shared his invaluable experience. This concerned both professional activities and everyday life situations.

Academician Bekhzod Sadykovich Yuldashev left behind a bright mark that will forever remain in our hearts. He will be remembered not only as an outstanding specialist, but also as a loyal friend, mentor and inspirer. The life and scientific work of Bekhzod Sadykovich serve as a shining example for young scientists, inspiring them to strive for the highest scientific achievements.

Khusniddin Olimov
Director of the Physicotechnical Institute of the Uzbekistan Academy of Sciences:

Bekhzod Sadykovich Yuldashev played a major role in my development as a scientist and head of a research institute. Thanks to his advice, I learned English back in the early 2000s, in which I began writing scientific articles. In 2015, when I had been working as a visiting professor at the Department of Physics at COMSATS University (Islamabad, Pakistan) for over 5 years, Bekhzod Sadykovich convinced me to return to Uzbekistan and write a doctoral dissertation. In 2018, I successfully defended my dissertation as a doctor of physical and mathematical sciences. He sincerely congratulated and blessed me, and also asked me to congratulate and thank my parents. Bekhzod Sadykovich had brilliant intuition and analytical thinking. Traditionally, we met every two weeks in Bekhzod Sadykovich's office and actively discussed our latest scientific results. I saw great joy and deep satisfaction in the eyes of my teacher Bekhzod Sadykovich when our two joint articles on the world's first discovery of an eight-quark resonance particle and a three-proton resonance in high-energy nuclear collisions were published in a prestigious international journal in 2022-2023.

Bekhzod Sadykovich left a rich scientific legacy, including more than 400 scientific works, including 3 monographs and 20 inventions. He not only made discoveries himself, but also generously shared his knowledge and experience, having trained 9 doctors and more than 30 candidates of science. His scientific authority was recognized internationally. For his significant contribution to science, Yuldashev was awarded prestigious awards, such as the Beruni State Prize (1983) and the international ESO Prize (2004). He was elected a member of the American Physical Society, received the title of Honorary Doctor of Indiana University (USA), the University of Washington (USA) and the University of Cambridge (UK), and also became an Academician of the Islamic Academy of


Conference participant Bekhzod Yuldashev

Behzod Yuldashev makes a presentation

Behzod Sadykovich and his wife Toshkhon Gulomova

Behzad Sadykovich with his grandchildren

Sciences (IAS). Yuldashev was an Honorary Doctor of the Joint Institute for Nuclear Research (JINR, Dubna, Russia), an Academician of the International Association of Academies of Sciences (IAAS), a foreign member of the Russian Academy of Sciences and the National Academy of Sciences of Kazakhstan.

The memory of a great and noble man, a brilliant scientist and organizer of science, a caring teacher and mentor, Academician Bekhzod Sadykovich Yuldashev, will forever remain in our hearts.

Bakhrom Abdukhalimov
Vice-President of the Uzbekistan Academy of Sciences:

Scientists of Uzbekistan and many foreign countries knew Academician Bekhzod Yuldashev as a versatile erudite and great scholar. Bekhzod Sadykovich knew the classic works of Uzbek, Russian and foreign writers and poets well. His interests also included problems of history, archeology, oriental studies, ethnography and the emergence of states in the countries of the ancient East and modern Central Asia. He loved and deeply studied history - he was interested in the campaigns of Alexander the Great, the history of ancient Khorezm, Bactria and Sogd. With great interest, he read the works of great thinkers and scientists - al-Khwarizmi, al-Bukhari, Abu Rayhan Beruni, Ibn Sina and others. He paid special attention to studying the life and work of the great Amir Temur, Mirzo Ulugbek and Alisher Navoi. Historians and archaeologists have always been amazed by Bekhzod Sadykovich's fore-

Behzod Sadykovich and his wife Toshkhon Gulomova

B.S. Yuldashev's family

sight of a modern approach to studying ancient archaeological monuments using the latest methods of physics, chemistry and other natural sciences, as well as the capabilities of the Institute of Nuclear Physics of the Uzbekistan Academy of Sciences. He was a well-known nuclear physicist, but he delved deeply into and had a thorough understanding of many areas of the humanities.

Shahida Usmanova
Secretary of the Administrative Office of the Uzbekistan Academy of Sciences:

Working under the leadership of Academician Yuldashev Bekhzod Sadykovich was one of the brightest periods of my life. I was deeply impressed by his wisdom and extensive scientific knowledge, but what attracted me most to Bekhzod Sadykovich were his human qualities – sincerity, kindness and openness. He was extremely demanding as a leader, but this exactingness was always based on the principles of fairness, respect and support for interesting initiatives. Bekhzod Sadykovich adhered to the democratic principle of management, so everyone in the team could openly express their opinion. If someone made mistakes or did not carry out instructions on time, he did not make harsh comments or raise his tone, but gave instructions in a calm and reasonable manner.

Bekhzod Sadykovich was a kind, caring person not only in the team, but also in the family. The smile that appeared on his face when he spoke about his family amazed me every time. His love for his wife, children and grandchildren was surprisingly deep and warm.

The memory of Bekhzod Sadykovich will forever remain in my soul. The scientific heritage left behind by the grateful Bekhzod Sadykovich and the school of leadership full of kindness will always show us the way to high values. We will always remember Behzod Sadykovich with respect and reverence.

A'lo Isakova
Senior Secretary of the Center for the Promotion of Science and the Journal of the Uzbekistan Academy of Sciences and the journal "Fan va Turmush":

Life is like a flowing stream... Each person lives this short period in his own way... Society has reached the heights of civilization, thanks to people who make scientific discoveries and bring benefit to all mankind. One of such remarkable people was the famous scientist, Academician Bekhzod Sadykovich Yuldashev, who received worldwide recognition in the field of nuclear physics. All the research he conducted became a worthy contribution to the development of world science.

Very little time has passed since the establishment of the Center for the Promotion of Science. The purpose of its creation was to familiarize the general public with the scientific achievements of world and domestic science. Much attention was paid to the activities of the journal Fan va Turmush, which became

part of our Center. Our young team began its activities in February 2023. Bekhzod Sadykovich tried to create all the conditions for the activities of the Center and allocated premises in the separate section of the Academy of Sciences building. He always supported interesting proposals and projects. So, he warmly supported the idea of holding the Eureka competition for young scientists, which was a great success in November 2023. Bekhzod Sadykovich was very interested in the activities of the magazine, carefully read the articles and expressed his valuable advice and suggestions.

We, the young employees of the Center and the journal, were pleasantly surprised by his interested and kind attitude towards us. Warm memories of the great scientist and amazingly responsive person Bekhzod Sadykovich Yuldashev will forever remain in our memory.

Shakir Pidaev
Director of the Institute of Art Studies of the Uzbekistan Academy of Sciences:

My closer acquaintance with Bekhzod Sadykovich Yuldashev took place in 2002. I was called and asked to come to the Uzbekistan State Museum of History. When I came to the museum, Bekhzod Sadykovich instructed me to help in creating a new museum exposition.

Leadership of the Uzbekistan Academy of Sciences – from left to right - Chief Scientific Secretary of the Uzbekistan Academy of Sciences G. Bahadirov, Vice-President B. Ibragimov, President of the Academy of Sciences of the Republic of Uzbekistan B. Yuldashev, Vice–President S. Mirzaev, Vice–President B. Abdukhalimov. November 2023 Tashkent

After that day, I met with Bekhzod Sadykovich regularly. At that time, I was amazed that Bekhzod Sadykovich had an excellent understanding of history and archeology. It never occurred to me that a scientist involved in nuclear physics could know history and archeology so well. I asked him: “Bekhzod Sadykovich, when choosing a specialty after graduating from school, you probably hesitated between physics and history?” I asked. “No, there was no such question. I love physics, but I am interested in history and archeology,” he answered. Over time, I saw that Bekhzod Sadykovich had excellent knowledge in other areas of science as well.

Bekhzod Sadikovich, being a world-famous scientist, really possessed extensive knowledge. In addition to being an outstanding scientist, he was also an extremely modest person. He was a leader **who** treated both seniors and juniors with equal respect. I consider Behzod Sadikovich Yuldashev one of the greatest scientists of our time.

Recently, Bekhzod Sadykovich, as if anticipating the sad days, asked our editorial photographer V. Goncharenko to do a photo session of him personally and together with his family members.

Akbar Hakimov,
Academician, Director of the Center for Promotion and Editor-in-Chief of journal "Fan va turmush"

The song of silence is on your lips

Where is that song that was woven by stars
Sleeping in the scattering across the sky?
The white dove must have taken the song away
With the bitterness branches of a tired heart?

There is no sorrow or pain in that song
There I run barefoot chasing the dawn
And the mother's voice says – watch out my son
Now cluster of stars is rushing to a water all stunned

Don't know what it was, but I know what it will be
Her gentle hands will wake me up in the morning
Dispersing grim thoughts and make them unharming
And cover me tenderly with a shawl of roses

The song of silence is on your lips ...

A. Ikramdzhanov. Portrait of academician, President of the Academy of Sciences of the Republic of Uzbekistan B.S. Yuldashev. 2024

Condolences to the scientist's family and friends, as well as members of the Uzbekistan Academy of Sciences were sent by:

President of the Russian Academy of Sciences Gennady Krasnikov;

Academician of the Russian Academy of Sciences Yuri Yuryevich Balega;

Academic Secretary of the G.I. Budker Institute of Nuclear Physics of the Siberian Branch of the Russian Academy of Sciences A. Reznichenko;

Deputy Director General Head of the Department of Nuclear Energy Mikhail Chudakov;

Chairman, Academician of the National Academy of Sciences of Tajikistan Farkhod Rahimi;

Joint Institute for Nuclear Research. Director, Academician of the Russian Academy of Sciences G.V. Trubnikov;

President of the ROO "National Academy of Sciences of the Republic of Kazakhstan" Academician M. Zhurinov;

Academy of Sciences of the Republic of Tatarstan. President R.N. Minnikhanov;

National Academy of Sciences of the Kyrgyz Republic K.E. Abdrakhmatov;

Turkish Academy of Sciences (TÜBA). President Muzaffer Şeker;

Chairman of the Siberian Branch of the Russian Academy of Sciences Academician V.N. Parmon.

What we know about hydrogen: advantages and prospects for application

Odilhoja Parpiev,
Professor, Director of the Institute of Materials Science of the Uzbekistan Academy of Sciences

Hydrogen is a chemical element of first period in the periodic table of chemical elements by Dmitrii I. Mendeleev, with atomic number 1. If oxygen is the most common element in the earth's crust, then hydrogen is the most common element in the Universe. Hydrogen makes up about 70% of the mass of the Sun and stars. Since hydrogen is the lightest of all elements, such an impressive mass requires a huge number of atoms of this element. Of every 100 atoms found in the Universe, 90 are hydrogen atoms.

Hydrogen probably was once part of the Earth's atmosphere. But because of its lightness, it is able to leave the atmosphere, so the proportion of hydrogen in the air is negligible. In bound form, hydrogen makes up 0.76% of the Earth's mass. The most important hydrogen compound found in nature is water (H_2O). Each water molecule contains two hydrogen atoms and one oxygen atom. In fact, the name «hydrogen» itself comes from the Greek words «hydro» (water) and «genes» (formation). Water molecules are made up of two hydrogen atoms bonded to one oxygen atom.

Hydrogen becomes liquid at very low temperatures (-253 °C), and solid hydrogen is even more difficult to obtain (the melting point of solid hydrogen is -259 °C). Hydrogen atoms are so small that if 100 million atoms were placed in a row, the result would be a chain only 1 cm long . When 1 liter of water is split, 1244 liters of hydrogen are released.

Due to its complex of physical and chemical properties, hydrogen is used in medicine, cosmetics, food and fuel industries. Hydrogen is used for atomic-hydrogen welding, in the production of gyrocompasses, lighting and electronic devices.

In medicine, for the treatment of many types of diseases, including cancer, enriched water is most often used. This substance stimulates endogenous antioxidants in the human body, which helps fight stress and its negative consequences.

Hydrogen in its pure form is not applicable in everyday life. At the same time, hydrogen is used in the creation of ammonia and other household chemical compounds.

Margarine is a solid fat based on various vegetable oils, for the hydrogenation of which hydrogen is used. Hydrogen is also used in the manufacture of soap and cosmetics. In the food industry, hydrogen is known as food additive E949.

Hydrogen fuel has already become one of the most promising types of fuel for the rocket industry. Hydrogen is currently practically not used in aviation. It was previously used to fill lighter-than-air vehicles such as airships. After a series of disasters caused by the flammability of the gas, hydrogen fell out of use.

A promising direction for using hydrogen is hydrogen energy, which is of interest from an environmental point of view, since the gases released during combustion do not contain harmful substances.

The temperature and heat of combustion of hydrogen are very high, it is about 2800 degrees Celsius and is about 120 GJ per 1 ton of substance. Oil and natural gas are hydrocarbons, but their combustion produces heat that is 30-40% less than that produced by hydrogen.

Due to the extremely high speed of movement of its elementary particles, this substance quickly dissolves even in metals. Another property of this gas is very valuable for industry, it is a good reducing agent. The development of all areas of industry increases the need for it more and more, because it is involved in such fundamental processes of the chemical industry as the production of ammonia, hydrocracking and hydrotreating of target products from sulfur in the petrochemical industry. It is necessary in the production of methyl alcohol and hydrogenation of fats.

Compared to gasoline, hydrogen is 2 times more efficient as a fuel. Its efficiency factor (COP) for an internal combustion engine is 50-70% higher than that for a gasoline engine. Fuel consumption will be significantly less, and this reduction will be up to 40% in relation to the hydrogen-free fuel used.

Experts from the Hydrogen Council (Hydrogen Council)* believe that by 2050 the share of hydrogen

Obtaining hydrogen from water using solar energy

Intercity train running on hydrogen fueled tracks

energy in total energy production in the world will be 18%, and by 2100 it will exceed 40%. According to the forecast by Pricewaterhouse Coopers, global demand for all types of hydrogen fuel cells will exceed US$ 2.5 trillion by 2030.

** Hydrogen Council is a global initiative of energy, transport and industrial companies to develop the use of hydrogen as an innovative fuel (the Council includes 62 companies, such as Airbus, Audi, BMW Group, Daimler, General Motors, Honda, Bosch Group, Total, Toyota and others with total revenue of more than 60 billion euros).*

The development of hydrogen energy technology has attracted the interest of all leading countries, since this type of fuel is environmentally friendly and safe for the environment. Hydrogen for energy production can be used in several main areas:

- as an effective environmentally friendly fuel (including additives to conventional fuel), which can increase engine efficiency by up to 40%;
- for steam superheating of turbines, which increases efficiency up to 3%;
- in fuel cells, where efficiency reaches 85%.

A hydrogen-based energy supply system differs from an electricity-based energy supply system in the following main features:

- hydrogen transport is almost an order of magnitude cheaper than electricity transport;
- hydrogen can accumulate, which is equivalent to energy accumulation (electricity can be stored, but its accumulation systems are so cumbersome that they are practically unsuitable for widespread use);
- the dual properties of hydrogen, together with the ability to accumulate, make it possible to build an energy supply system in such a way as to eliminate the harmful effects of daily uneven network load through the use of technologies involving hydrogen as a substance;
- hydrogen makes possible the expanded use of alternative energy sources, since, due to its ability to be stored, it can dampen the uneven operation of a renewable energy source;
- the result of burning hydrogen is water; if hydrogen is obtained from water, then burning hydrogen returns water to nature, and thus the water cycle in nature is not disrupted.

When hydrogen is referred to as a fuel, it is given different colors such as green, blue and grey, depending on how pure it is. The most environmentally friendly hydrogen in the industry is considered “green”. It is obtained from water using energy from renewable sources (RES). The second purest hydrogen is “blue”, it is produced from natural gas. When it is produced, by-product carbon dioxide is captured and stored in special storage facilities. And the “dirtiest” hydrogen is “gray”, which is produced by steam reforming of methane.

Today, hydrogen energy is developing in two main directions - the development of effective methods for producing hydrogen, which can become widely used, but at the same time they will be as cheap and environmentally friendly as possible; At the same time, there must be a widespread and developed infrastructure network that allows cheap and rapid transportation, pumping and storage of produced hydrogen.

There are several flagships in the research and implementation of hydrogen energy in Europe - these are Austria, Germany, Italy and Iceland, which became the first country to almost completely abandon

Automobile using hydrogen as fuel

fossil resources in favor of hydrogen. This country has a program aimed at completely eliminating air pollution by 2030.

Analysts predict that by 2050, hydrogen technology could meet about a quarter of the EU's fuel needs, providing enough energy to power 42 million cars, more than 1.5 million trucks and a quarter of a million buses. To fully exploit the potential of hydrogen, the EU has included it in a list of six strategic areas requiring priority public policy decisions and investments.

Canadian company Terrestrial Energy is developing a fourth generation molten salt nuclear reactor. It has joined forces with several U.S. Department of Energy national laboratories on a research project that seeks to determine whether its reactor technology can efficiently produce hydrogen using nuclear heat.

The China Hydrogen Association predicts that by 2050, hydrogen will account for 10% of China's energy consumption (60 million tons of H_2 / year), and total revenue from hydrogen production will reach $1,480 billion.

After the Fukishima nuclear power plant incident in 2011, the Japanese government has spent more than US$16 billion on hydrogen research.

The two main markets for hydrogen consumption today are ammonia and methanol production; they consume up to 80% of total consumption. In the chemical industry, hydrogen is also used in the production of urea, soap and plastics. In gas processing, hydrogen is needed to produce mixtures, for example, with methanol, ethylene and propylene.

In the future, hydrogen will be widely used as a fuel in road and rail transport. The world's largest automotive leaders are already actively experimenting with hydrogen engines. At least three auto giants are mass-producing passenger cars powered by hydrogen fuel cells: Hyundai ix35 Fuel Cell costs US$53,000, Toyota Mirai - US$57,000, and Honda Clarity - US$59,000.

It should be especially noted that in recent years, the first experimental versions of high-speed railway trains powered by hydrogen fuel have been created and tested on long railway tracks in Switzerland, the USA, China and a number of other countries of the world.

For example, the first hydrogen-powered train for intercity passenger transportation, with a maximum speed of 160 km/h, built in China completed running tests in 2024. This train was developed by Changchun Company Railway Vehicles Co Ltd in Changchun, Jilin Province in northeast China. The hydrogen train was tested at a test site owned by this enterprise, as a result of which a full-system and multi-level test of its performance was carried out. This event marked a breakthrough in the use of hydrogen energy in railway transport.

A significant increase in demand for hydrogen in the oil refining industry is expected; it will be used to improve the quality of oil. Hydrogen is already being widely used to increase the depth of refining, improve the characteristics of oil, purify petroleum products from sulfur contaminants, and produce a wide range of petroleum products: fuels, oils, lubricants.

One of the main problems is the high cost of hydrogen. For the successful development of hydrogen energy, effective methods and processes for producing cheap hydrogen, as well as technologies for its storage, transportation and use, must be developed.

At the present stage, the reforming (conversion) of hydrocarbons has become industrialized. It accounts for 96% of the world's hydrogen production (50 million tons), of which 48 million tons are produced by reforming methane, 30 by oil, 18 by coal. The cost of hydrogen obtained by reforming methane for the consumer is $4.5/kg, which is equivalent to the price of gasoline of about $1 per liter.

Another method of producing hydrogen is based on the traditional electrolysis of water (4% of global production) using electricity obtained in various ways. This technology is very simple and environmentally friendly, but the price of electrolysis hydrogen, depending on the electricity tariff and production volume, according to some data is 6 - 10 dollars / kg, and according to other data - 10 - 30 dollars / kg.

Technologies for producing hydrogen using renewable energy sources (wind, solar energy, biomass combustion) face the same difficulty, i.e. high cost.

Serious difficulties arise in connection with solving the problem of distribution and storage of hydrogen fuel, due to the low density and explosiveness of hydrogen. To store hydrogen, large containers are needed, and special pipelines are needed for transportation, since ordinary ones become fragile.

Scientists from the Uzbekistan Academy of Sciences are also contributing to the implementation of the program for the transition to "green energy" with the production and use of hydrogen. It is known that the only way to obtain cheap hydrogen is to use concentrated solar energy to separate water into oxygen and hydrogen. As you know, the main advantage of Uzbekistan is the presence of more than 280 sunny days a year. Also, there is extensive long-

term scientific experience in the use of concentrated solar radiation for the development, synthesis and creation of new materials.

By concentrating solar energy on the Large Solar Furnace of the Institute of Materials Science of the Uzbekistan Academy of Sciences, which is located in the Parkent district of the Tashkent region, it is possible to obtain high temperatures of up to 3000 °C. The total area of the reflective surface of the furnace is more than 2000 m^2. There are also small solar ovens with a concentrator diameter of 2 m, but here too high temperatures of more than 2500 °C are obtained.

It is necessary to effectively take advantage of these parameters, since the use of concentrated solar radiation to obtain high temperatures (more than 1500 °C) will sharply reduce the cost of the final product - hydrogen.

Scientists from the Institute of Materials Science and the Physico-Technical Institute of the Uzbekistan Academy of Sciences have already created and are testing special reactors for producing hydrogen from water. The experiments are carried out on the basis of the unique scientific facility "Big Solar Furnace". In addition, research is being conducted on the accumulation of hydrogen liquefied at high pressures in porous ceramic and silicate materials produced at the Large Solar Furnace.

Thus, as a result of research and development work in the field of development of hydrogen energy, it is expected that an environmentally friendly technology for producing green hydrogen using concentrated solar radiation will be developed, targeted training of personnel for hydrogen energy will begin, and scientific cooperation will be established with leading foreign scientific and innovation centers.

Research conducted by national scientists will ensure the development of scientific foundations for the country's transition to low-carbon energy and a "green economy," which will allow Uzbekistan to become a leader in Central Asia in the field of hydrogen energy.

An automobile engine powered by hydrogen

Use of solar energy: on the path of solar energy development in Uzbekistan

Romen Zahidov,
Academician,
Mikhail Kremkov,
professor

The Sun is the source of life support for people, all other living beings and biological organisms on planet Earth, the only practically inexhaustible source of energy, heat and light, without which the emergence and development of human civilization would be impossible. It was solar energy that created the necessary conditions for the comprehensive development of humanity, which has been using the energy of the Sun for its practical purposes for many centuries, starting from the earliest periods of its existence. The present and future of people's use of solar energy lies in what existing and new scientific methods and technologies for converting it into electrical and thermal energy will be the most promising to ensure the active transition of industries to the "green economy", including based on the energy generated by solar power plants of various types and capacities. In this regard, it seems important to consider the issue of the formation and development of solar technology, as well as the creation of solar power plants in Uzbekistan.

The Republic of Uzbekistan is geographically located in a region with favorable radiation supply of solar energy. According to estimates, the total solar energy potential of Uzbekistan is about 51 billion tons of oil equivalent (toe), and the technically usable potential of solar energy in the republic is over 177 million toe. This opens up wide opportunities for the efficient use of incoming solar energy for various production purposes and social and domestic needs.

It should be especially noted that the in-demand development of scientific research in Uzbekistan in recent years on the creation of solar photovoltaic stations and installations of various types and capacities, including combined solar-wind and solar-hydro stations, is not being carried out not from scratch.

Thus, historically, the use of solar energy in Uzbekistan based on the achievements of science - solar technology – witnessed its start back in the 1930s. In 1931, the first scientific division, small by today's scale, was formed in Samarkand - the Central Asian Solar Engineering Institute. Here, enthusiastic scientists created the first prototypes of installations that convert solar radiation into thermal energy for heating laboratory premises and greenhouses, and also calculated the designs of a number of solar installations for heating and desalination of water, for the purpose of drying agricultural products and heat accumulation. Further development of these works was continued in 1934 in the Solar Engineering Scientific Laboratory established in Tashkent, which was part of the institutions of the Committee of Sciences of the Uzbek SSR, created in 1932, and then from 1940 the laboratory became part of the scientific institutions of the Uzbek branch of the USSR Academy of Sciences. In this Solar Engineering Laboratory, the first industrially suitable solar installations were developed for heating and desalinating water, mowing and drying silkworm cocoons, drying fruits and for other, mainly agricultural, purposes.

In connection with the creation of the Uzbekistan Academy of Sciences in November 1943, this Solar Engineering Laboratory was transferred to the Physicotechnical Institute (PTI AN UzSSR). Here, scientific research began to be carried out on a systematic basis to create various technical devices and schemes for concentrating solar rays and increasing the productivity of solar thermal installations, including those based on synchronously rotating mirrors, providing a high directional concentration of solar radiation. It should be especially noted that according to this scheme developed at the Physicotechnical Institute of the Uzbekistan Academy of Sciences, today almost all tower-type solar power plants are being built in various countries of the world.

International scientific journal "Applied Solar Energy"

Tower-type solar power plant. Nevada, USA

Since 1959, the heliolaboratory began to conduct research on the wider use of solar energy, which was facilitated by the creation on the basis of this laboratory of the Department of Heliophysics with three laboratories and subsequently an experimental Heliopolygon for testing solar installations developed by scientists.

Research continued on the conversion of incoming solar radiation into thermal and electrical energy, the creation of solar energy concentrators for various purposes, including individual purposes, and their use in agricultural production. Important work began on converting solar energy into electrical energy based on silicon photoconverters and a Stirling gas piston engine, as well as on creating solar heating and hot water supply systems for 2- and 4-storey apartment buildings, regional bath complexes, greenhouses with heat storage and others solar installations.

Solar radiation concentrators have been developed based on glass-mirror plates, solid aluminum and epoxy film reflective surfaces and mirror concentrating systems, including conical, spherical, paraboloid and stacked sector shapes. In 1981, an autonomous solar-fuel power plant was created using small-scale gas fields with the aim of using such installations in remote areas without a central power supply. Many scientific developments at that time were carried out by the Physicotechnical Institute of the Academy of Sciences of the UzSSR together with interested universities - Bukhara and Karshi State Pedagogical Institutes, TIIMSKh, as well as with the institutes of Energy and Automation, Electronics, Central Design Bureau and other design organizations of the Academy of Sciences of the UzSSR. The practically important results obtained in the form of created solar installations, small solar furnaces, photoenergy converters and concentrating solar systems were industrialized and transferred to organizations in Uzbekistan.

International scientific relations of the Uzbekistan Academy of Sciences expanded, including in the field of heliophysics, renewable energy sources and the creation of solar installations and power plants. For this purpose, the Physicotechnical Institute of the Academy of Sciences of the UzSSR began in 1965 to publish the authoritative All-Union scientific journal “Heliotechnika”. This journal is one of the oldest science journals of the Uzbekistan Academy of Sciences, and after Uzbekistan gained sovereignty and independence in 1991, it received international status.

Today, this international journal is published in two separate editions: in the Physicotechnical Institute of the Uzbekistan Academy of Sciences in Russian entitled “Solar Technology”; and also translated into English by “Allerton Press” and is published in the USA under the title “Applied Solar Energy”, which is indexed in the SCOPUS scientific database of prestigious international journals and is distributed worldwide by subscription. This indicates the high international authority of scientists - heliophysicists of Uzbekistan.

Also, together with VNIIIT (Moscow), the country’s first facet-type solar power plant with silicon photoconverters with a power of 200 W was created and, on its basis, a water-lifting installation for the use of underground artesian waters.

It should also be noted that at the Physicotechnical Institute of the Academy of Sciences of the UzSSR,

for these purposes, a domestic industrial technology for producing of ultra-pure silicon was developed and transferred for development to the Chirchik Electrochemical Industry .

Based on the developments of the Physicotechnical Institute of the Academy of Sciences of the UzSSR in the field of high-temperature materials science and high-temperature synthesis using the technology of heat treatment of oxide and other multicomponent systems with concentrated solar radiation, in the period 1982 - 1987, together with a number of specialized organizations, the first in the country and the second in the world unique solar scientific complex was created, the Large Solar Furnace (LSF) with a capacity of 1000 kW, located in the Parkent district of the Tashkent region. The LSF optical system is a large double-mirror optical-energy installation with a horizontal axis and a large field of heliostats with the world's largest light-gathering surface, high sensitivity and angular resolution. A special system for automatic tracking of heliostats for the daily movement of the Sun was also created for the LSF in order to effectively use concentrated solar radio throughout the daytime.

The LSF technological block, where powerful concentrated solar energy is directed, allows, based on the methods created by scientists, the synthesis of multicomponent materials - oxides and functional and structural ceramics for various purposes, fire-resistant and high-temperature superconducting materials and other substances. On the basis of this LSF, the Physics-Sun NGO was further formed as part of the Physics and Technology Institute and the Institute of Materials Science of the Uzbekistan Academy of Sciences, created in 1993.

In further research by scientists of the Uzbekistan Academy of Sciences, highly efficient integrated-type photovoltaic power sources were created based on a variable hetero-pIn structure, as well as hetero-photoconverters, high-voltage photoelectric generators and models of various photovoltaic installations, photoreceivers and photosensors. The Institute of Ion Plasma and Laser Technologies developed a technology for producing monosilane, suitable for producing crystalline silicon and creating efficient solar energy photoconverters.

Solar water elevator

Based on the developments of the Physicotechnical Institute of the Uzbekistan Academy of Sciences in the field of use and conversion of solar energy, as well as the creation of solar power plants for various industrial and household purposes, the International Institute of Solar Energy was formed in the country in 2013, which was later transformed into the National Research Institute of Renewable Energy Sources in 2021 under the Ministry of Energy of Uzbekistan in order to study the problems of "green" and hydrogen energy, including solar and wind energy.

In recent years, at the Institute of Energy Problems of the country's Academy of Sciences, considerable attention has been paid to the justification of projects for the creation of combined and hybrid solar-wind and solar-wind-hydroelectric power plants for their use in various, especially remote regions of the country.

It should also be especially noted that the universities and higher education institutions of Uzbekistan have trained the necessary specialists on the basis of modern curricula, created textbooks and mastering computer technology methods for organizing work on the creation and efficient operation of solar power plants.

As is known, our country adopted the "Strategy for the transition of the Republic of Uzbekistan to a "green" economy for the period 2019-2030. To ensure the implementation of this Strategy, the Concept of providing the country with electrical energy for the period 2020-2030 was developed and adopted, in which it is justified transition to widespread production of electricity from renewable energy sources and their rapid development in the country.

Scientists from the Physicotechnical Institute of the Uzbekistan Academy of Sciences, the Institute of Energy Problems of the Uzbekistan Academy of Sci-

Perspectives on the Green Energy

ences and the Tashkent State Technical University, together with specialists from the Ministry of Energy of the Republic of Uzbekistan, substantiated projects for the construction of a number of solar photovoltaic stations of various capacities, both for remote areas in rural and mountainous areas, and large industrial solar power plants with a capacity of 100 –300 MW. Due to technical and socio-economic conditions, in order to widely use the capabilities of solar photovoltaic power plants, their construction began in recent years in the Jizzakh, Kashkadarya, Navoi, Tashkent and Samarkand regions of the country.

In this regard, it is necessary to show the advantages associated with the development of renewable energy, including through the use of solar thermal and photovoltaic plants, compared to traditional hydrocarbon thermal power plants. The main factors that have led to the widespread development of solar energy in Uzbekistan in recent years are the following:

- hydrocarbon-free production of electrical energy, leading to a reduction in total carbon dioxide emissions, maintaining clean air and the environment, and ultimately ensuring environmental safety;
- solving a number of social problems aimed at improving the quality of life of people;
- the production of electricity necessary for the sustainable development of the country and ensuring the country's energy security for the long term;
- preservation of reserves of traditionally used primary energy resources (coal, gas, oil, etc.) for other needs and future generations.

Thus, the creation of a number of large solar power plants, as well as wind and hydraulic power plants of various capacities in many regions of the country will lead to a significant increase in the country's energy potential, reliable sustainable energy supply to economic sectors, cities, villages and the population of the country, and will also provide, at the expense of its own energy resources and energy security of Uzbekistan for many, many years.

Combined solar-hydr power plant

Resentation of a new mung bean variety "Ishonch" in Uzbekistan

Abdujalil Narimanov,
professor

Providing the population with food has now become an economic, social and political problem, since accordingly, as the population grows, the demand for food also increases. When solving this problem, important attention is paid to providing plant protein. Providing plant protein is solved in different ways. One of these methods is to sow more crops that have a higher protein content; among these crops, the mung bean crop stands out for its protein content and quality.

Resolution of the President of the Republic of Uzbekistan **No. PQ -146 dated April 1, 2024 "On measures to implement the tasks set within the framework of the dialogue between the President of the Republic of Uzbekistan and entrepreneurs engaged in the cultivation, production and export of agricultural and food products" was adopted.**

Mung bean occupies a leading place among agricultural crops in terms of export volume. In 2023, 154.6 thousand tons of grain were exported worth US$ 120.1 million, which is 28.4% more than in 2022.

Mung bean is considered the most essential food for humans. Mung bean grain contains 24-28% highly nutritious protein, 1.0-1.5% fat and 59-65% carbohydrates and 334-344 kcal of energy in terms of dry weight. Mung bean contains B vitamins, lysine, and arginine. 5-10% mung bean flour is added to wheat flour. Mung bean protein is easily digestible.

The mung bean variety **"ISHONCH" (NAP 2023 0004 02/20/2023) was created at the Institute of Genetics and Experimental Plant Biology of the Academy of Sciences and put into production in 2022.**

In our research, the biometric and quality indicators of the newly created mung bean variety "Ishonch" were compared and assessed. The variety is early ripening, the growing season is 65-70 days, the stem is erect, suitable for mechanized collection, height 60-65 cm, number of pods 35-48, number of grains in one pod 11-13, weight of 1000 seeds - 68 g.

Grain quality and technological indicators: protein content - 23.1%, starch - 67.4%, fat - 1.7%, fiber - 4.7%. The stem is erect, resistant to lodging, shedding of pods and wilting after ripening, drought, heat and disease. The grain in the pods does not fall off during the ripening period and is convenient for mechanized collection.

Suitable for repeated periods and increases soil fertility in crop rotation.

It can be used in preparing various dishes. The green mass of the plant is nutritious feed for cattle.

It is grown as a main and secondary crop in all regions of the country. Mung bean is the best pre-sowing plant for all crop rotation crops. Mung bean has a powerful root system and has the ability to bind atmospheric nitrogen with ammonia, which can be used as a biological fertilizer, forming biological nitrogen in the roots. Due to the fact that mung bean has long been planted on all types of soil in the country, biological nitrogen-containing nodule bacteria are naturally formed in the soil, which, depending on the thickness of the seedlings, accumulate an average of 80-120 kg of nitrogen per hectare.

Stem of mungbean variety "ISHONCH"

Field with variety of mungbean "ISHONCH"

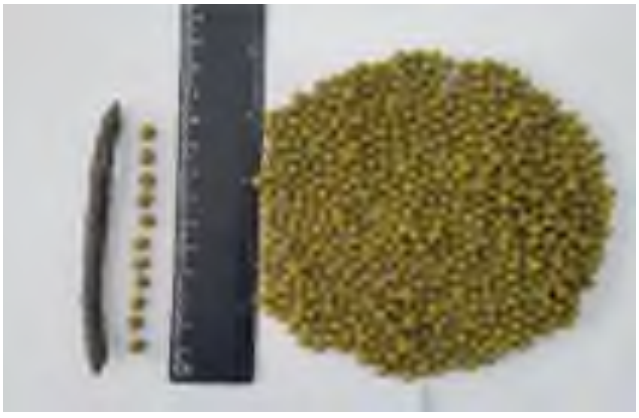
Agricultural technology varieties

This variety is intended for planting on irrigated soils and gives a good harvest in various soil and climatic conditions.

The variety's water requirement is 1000-1200 m3 in the spring and 1500-1800 m3 during re-sowing periods. The sowing rate is 12-15 kg per hectare (200-220 thousand plants per hectare). With two-row planting, it is 24-28 kg per hectare (350-400 thousand plants per hectare). For complete germination, seeds absorb 120-150% of moisture from their mass. For good seed germination, the temperature should be 12-15°C. With repeated sowing, the most favorable condition for good development is a temperature of 18-22°C, and 20-25°C in the budding -flowering phase.

Mung bean leaves behind 2.5-4.0 tons of root residues in the soil over the entire growing season, promoting the absorption of sparingly soluble phosphorus compounds in the soil. When sowing early, it is optimal to sow seeds on April 10-20, and when re-sowing - on June 10-20.

Currently, in order to expand the seed production of the mung bean variety "Ishonch", MoUs have been signed with the MFY "Kangly" of Sharaf-Rashidov district, Jizzakh region, Sakhovat street, building 61 A, the seed production company "Aktash Urugchiligi" LLC , and the seed production company "Aktash Urugchiligi", SEMRUG' CLUSTER LLC and the MFY farm "Sanjarbek Joraev" ("3-Bayaut" SIU "Dustlik", Bayaut district of the Syrdarya region).



Grain of mungbean variety "ISHONCH"

Problems of integrated processing of waste from local and industrial enterprises

Abdushukur Sarymsakov,
professor

Today, along with the development of industries, the amount of household waste is increasing from year to year all over the world. If this urgent problem is not addressed comprehensively, this waste has a negative impact on the ecology of soil, water and air, causing great harm to human health.

Today in developed countries, including the United States and the European Union, certain work has been and is being carried out to solve this problem. The first step in solving the problem is to sort the waste according to its composition into household, glass, metal, paper and plastic waste. Only then will it be possible to comprehensively process this waste.

Today, across the country, the volume of mixed household waste is 6.8 million tons per year, and this amount is increasing every year.

Waste sorting process

Most of the above mixed household waste is transported to special landfills. As a result, over time, due to decomposition, most of them cause damage to the ecology of soil, water and air. The Decree of the President of the Republic of Uzbekistan dated January 4, 2024 “On measures to improve the waste management system and reduce their negative impact on the environmental situation” is of great importance in a comprehensive solution to the problem. To solve the problems presented in this Decree, it is first necessary to organize the collection of waste into the categories “recyclable”, “non-recyclable” and “food”.

According to the decree, an alternative to household waste areas is required, as well as stimulation and increase in the number of enterprises producing products from waste.

In particular, a preliminary pilot project for the production of electricity and microbiological organic fertilizers by burning “recyclable” waste will be implemented in the Andijan region, and the Andijan experience will be applied in other regions of the country.

The main part of household waste consists of plastic packaging materials - films and bags, mineral water and juice bottles, as well as greenhouse film used in the agricultural industries.

These polymer wastes do not completely decompose in landfills for up to 100 years and have a negative impact on the environment and ecology.

It is important to organize comprehensive processing of products containing polymers that do not decompose in nature for many years to solve environmental problems and comprehensively process household waste.

Due to a decrease in oil and gas reserves and an increase in their prices, the production volumes of polymers of existing and new compositions will inevitably decrease. Therefore, among the pressing problems facing the polymer industry and scientists, it is important to return polymer-containing waste to a “second life” by recycling it.

Through complex chemical, thermal and biological processing of polymer waste, the possibility of creating complex methods for producing secondary polymer materials, liquid, solid and gaseous fuel, electricity, etc. opens up.

In this direction, sorting of polymer-containing waste by chemical composition, structure and density is required.

Most polymer films and materials disposed of as waste retain their basic properties. The first stage requires grinding, washing, drying and regranulation of secondary polymers sorted by composition.

Processing of these recycled polymer granules by mechanical, chemical, biological and other methods provides the opportunity to obtain materials for use in various industries and the national economy. From polymer and copolymer granules of complex composition, which cannot be divided into individual polymers, various materials for technical purposes are produced by adding fillers, additives that restore

Process of processing "non-recyclable" waste

molecular weight, antioxidant, softening and coloring components.

Recycled composite polymer granules of undetermined chemical composition can be used for the production of bags, containers, garbage cans, bags and sacks for the needs of various industries.

Based on granular polymer mixtures, it is possible to produce gutters, pipes, fittings, drip irrigation systems, building materials that reduce heat and sound transmission, as well as additives that improve the properties of asphalt and asphalt concrete mixtures.

One of the innovative ways to reduce the negative impact of polymers on the environment is the creation of polymer materials that are biodegradable in a short time under the influence of soil, water and sunlight, as well as the development of the production of packaging film and small containers based on them. In this direction, today PKFI scientists have created a method and technology for producing synthetic polyolefins filled with nanoparticles of natural polymers and polyvalent metal ions, biodegradable in short periods of time under the influence of soil, water and sunlight. In this direction, today PKFI scientists (?) have created a method and technology for producing synthetic polyolefins filled with nanoparticles of natural polymers and polyvalent metal ions, biodegradable in short periods of time under the influence of soil, water and sunlight.

Today, across the country, an average of 6.8 million tons of household waste is generated annually, and this amount increases every year. If this waste is divided into "non-recyclable", "recyclable" and "household food" waste, then there are technologies for processing "household food" waste using biochemical, microbiological methods, and on the basis of these methods there are opportunities for producing biogas and organic fertilizers.

Methods for processing "non-recyclable" waste with a predominant polymer content include processes for producing liquid hydrocarbons by thermal decomposition, from which diesel fuel and fuel oil can be separated at oil refineries.

By filling this liquid fraction with car tires and adding it to asphalt and asphalt concrete mixtures, one can improve the quality of road and roofing surfaces

In conclusion, we note that the introduction of technologies for processing waste containing non-recyclable and recyclable polymers, which today cause great damage to the ecology of soil, water and air in landfills, will solve the existing global problem.


Conversion of "recyclable" and "household food waste" into organic fertilizers

Discovery of radioactivity: history and facts

Igor Pechenkin,
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1903 Nobel Prize in Physics was considered to have been deservedly awarded to Henri Becquerel, who "accidentally" discovered previously unknown rays, and to the Curies, who selflessly paved the way for future generations of researchers discovering the secrets of radioactivity. More than 40 years earlier, while studying various substances for obtaining a stable photographic emulsion, Niepce de Saint-Victor established that the effect of uranium salts on a photographic plate was caused by the invisible radiation of matter, and was not associated with their fluorescence. He correctly described this process back in 1857-1867. Nowadays, many give priority to the discovery of radioactivity to Niepce de Saint-Victor.

In 1789, the German chemist Martin Heinrich Klaproth (1743–1817), while studying pitchblende, characteristic of ores from Bohemian deposits (Czech Republic), discovered what he believed to be a new element, uranium, mistakenly taking its dioxide for pure metal. Uranium was obtained in a metallic state in 1841 by the French chemist Eugène Melchior Péligot (1811–1890). Although its study was carried out, it added little to the data of Klaproth's research. The atomic weight of uranium was taken to be 116 until Dmitry Ivanovich Mendeleev came to the conclusion that it should be doubled and placed in the appropriate place in the table of the Periodic Table of Chemical Elements. After 1896, uranium attracted considerable interest from chemists and physicists in connection with the beginning of the study of the phenomenon of radioactivity, and then with the creation of the atomic bomb and the development of nuclear energy.

In December 1903, the Royal Swedish Academy of Sciences awarded the Nobel Prize in Physics, sharing it between Henri Becquerel (1852–1908) and the Curies. Henri Becquerel was specifically mentioned in recognition of his outstanding achievements in the discovery of spontaneous radioactivity. The new type of penetrating rays, emitted without external irradiation of the source, became known as Becquerel rays. Half of the prize was awarded to Pierre Curie (1859–1906) and Marie Skłodowska-Curie (1867–1934) in recognition of their outstanding achievements in their joint investigation of the phenomena discovered by Professor Henri Becquerel. Marie Curie became the first woman to be awarded the Nobel Prize. She received her second prize (1911, in chemistry) for her outstanding achievements in the development of chemistry: the discovery of the elements radium and polonium, the isolation of radium and the study of the nature and compounds of this element. Curie became the first two-time Nobel Prize laureate. Antoine Henri Becquerel, an employee of the Ecole Polytechnique in Paris, while studying the recently discovered X-rays, *accidentally* discovered in 1896 that uranium salts, when exposed to light, spontaneously emit penetrating radiation that can be recorded on a photographic plate. Further research showed that this radiation was something new, not X-rays.

Henri Becquerel's discovery inspired Marie and Pierre Curie, employees of the Municipal School of Industrial Physics and Chemistry, to further study this phenomenon. They examined many substances and minerals for signs of radioactivity and found that

Winners of the 1903 Nobel Prize in Physics. From left to right: Henri Becquerel, Pierre Curie, and Maria Skłodowska-Curie


Le Petit Parisien
SUPPLÉMENT LITTÉRAIRE ILLUSTRÉ
M. ET Mme CURIE DANS LEUR LABORATOIRE

The Curies in their laboratory. Cover of the magazine Le Petit Parisien. No. 779, January 10, 1904.

the mineral pitchblende was more radioactive than uranium. It became clear that it must contain other radioactive substances. They succeeded in extracting two previously unknown elements - polonium and radium.

The original list of candidates for the Physics Prize included only Pierre Curie and Henri Becquerel. Gustav Mittag-Leffler (1846–1927), an influential member of the Swedish Academy, informed Pierre Curie of this. He immediately replied: "I would like my work in the field of radioactive bodies to be considered together with the work of Madame Curie. Indeed, it was her work that determined the discovery of new substances, and her contribution to this discovery was enormous" . The interests of the Curies as researchers merged so much that even in their laboratory notes they used the pronoun "we" .

Somewhat earlier, in 1896, after Henri Becquerel's report, the scientific community saw no compelling reason to be interested in his work on rays of an unclear nature [8], and he suspended his research in this direction. In this situation, Pierre and Marie Curie began research into invisible rays in 1897. Already in the first months of 1898, Marie Curie and two months earlier Gerhard Karl Schmidt (1865-1949) in Germany discovered that thorium compounds also emit rays similar to uranium. In July 1898, Pierre and Marie Curie reported the isolation of a new chemical element, polonium, from uranium ore, and in December, in collaboration with the chemist Gustav Bemont (1857-1932), they reported the discovery of radium, and for the first time introduced the term "radioactivity". From that time on, scientific interest in radioactivity research began to grow steadily, as scientists saw in radioactive substances a new source of energy of unprecedented power

Henri Becquerel also returned to the study of the radioactive properties of uranium salts. But was he the discoverer of this phenomenon? Back in 1857, 38 years before its discovery, the French officer Claude Felix Abel Niepce de Saint-Victor discovered these properties of uranium compounds, that is, he was the first to observe previously unknown radioactive phenomena.

Claude Félix Abel Niépce de Saint-Victor (1805–1870) was the cousin of Joseph Nicéphore Niépce (1765–1833), a French amateur scientist who, along with Louis Daguerre (1789–1851), is considered the father of photography. He also proposed an original method of dyeing fabrics, which was appreciated by Michel-Eugène Chevreul (1786–1889), director of the National Gobelins Manufacture. Chevreul was interested in photography, and especially in Niépce de Saint-Victor's work on the development of new photographic processes and emulsions. Niépce is considered the first to use albumen in photographs and the first to create negatives on glass and steel plates. In 1845, he joined the Paris Municipal Guard, stationed in the Saint-Martin barracks, where he set up a chemical laboratory.

When he was appointed commandant of the Louvre, he had time to continue his experiments, and it was during this period that he conducted experiments with uranium salts. Niepce de Saint-Victor then worked as a scientist in the laboratory of Alexandre-Edmond Becquerel (1820–1891) at the Physics Department of the Conservatoire des Arts et Métiers. All these years, his research was supported by Michel-Eugène Chevreul.

Claude Félix Abel Niépce de Saint-Victor

The Becquerel family (left to right). Antoine César Becquerel, Alexandre Edmond Becquerel, Antoine Henri Becquerel, Jean Becquerel

From a historical point of view, the work of Niepce de Saint-Victor should be considered the most important, presenting the first results in the field of "photography of the invisible" as early as 1857. The first article shows that the discovery did not happen by chance, and the publication of 1861 proved that he recognized the nature of the phenomenon, concluding that it was not related to fluorescence and phosphorescence. For nine years, Niepce de Saint-Victor worked to explain the phenomenon he had discovered. Despite the fact that the level of development of physics and chemistry at that time was insufficient for understanding the nature of radioactivity, some of his conclusions turned out to be more correct than the initial explanations of Henri Becquerel. In contrast, Niepce de Saint-Victor immediately decided that the effect of uranium salts on the photographic plate was caused by invisible radiations of matter, not related to the fluorescence of uranium salts. Niepce's scientific supervisor, Michel-Eugène Chevreul, recognized this phenomenon as a fundamental discovery *("une d couverte capitale"*), pointing out that uranium salts retained their ability to expose photographic plates even after 6 months in the dark. As early as 1861, Niepce had already explicitly reported that uranium salts emitted a kind of radiation invisible to the human eye: "... this constant activity ... cannot be due to phosphorescence, since it could not last so long, according to the experiments of M. Edmond Becquerel; it is therefore more probable that it is an invisible radiation ... " .

Niepce's first report appeared in the report of the meeting of the Academy of Sciences on November 16, 1857, but at the same time the first note by Edmond Becquerel was added. The reviews of the Academy of Sciences report that these materials were added to the minutes at the last minute, thanks to the intervention of Edmond's father, Antoine César Becquerel (1788–1878). Thus, in *La Lumi re : Revue de la Photography* from November 17th one can read: "At the end of the session, Mr. Becquerel announced that his son, Mr. Edmond Becquerel, intended to read information on the various properties and effects of light; a work which, from several points of view, is related to the work of Mr. Niepce" .

It is evident that there was, if not competition, at least a lively rivalry between Niepce de Saint-Victor, represented by Chevreul, and Edmond Becquerel, supported by his father. On May 24, 1858, Edmond presented a second note to the Academy of Sciences, in which, seven months after Niepce de Saint-Victor, he wrote about "uranium compounds' . This chronology suggests (without proof) that Edmond Becquerel was interested in this, remaining with his opinion on the leading role of phosphorescence and fluorescence of uranium compounds, despite the results obtained by Niepce de Saint-Victor. It is clear that the Becquerel family was trying to fight for priority in obtaining results of new, as yet not fully understood, radiation processes.

The founder of the dynasty of outstanding scientists of the Becquerel family was Antoine César Becquerel - a physicist, an expert on minerals and their piezoelectric properties, a researcher of magnetic, electrical phenomena and phosphorescence. He headed the physics department at the Paris Museum of Natural History, was a member of the Paris Academy of Sciences, and from 1838 - its president. His son Alexandre Edmond Becquerel continued the research, first as an assistant, and then as director of the Museum of Natural History. He conducted research in the same directions as his father, whose authority he deeply admired, and became a pioneer in the analysis of uranium salts, using a technique based on phosphorescence. Like his father, Alexandre Becquerel was a member of the Paris Academy of Sciences (1863), and later its president (1880). The real triumph of the dynasty came with Antoine Henri Becquerel, who continued the work of his father and grandfather at the Museum of Natural History. It is easy to imagine what was going on in Henri Becquerel's mind when, in 1895, three years after he had taken over his father's chair at the Museum of Natural History, he read William Conrad Roentgen's (1845–1923) article on the discovery of X-rays. Like his father, he assumed that certain substances could also emit invisible radiation when exposed to light rays. He was therefore tasked with testing Jules Henri Poincaré's (1854–1912) hypothesis that X-rays accompany all phosphorescence.

The Museum of Natural History provided all the conditions for testing this assumption. Surprisingly, unlike many outstanding scientists, no films have been made about Henri Becquerel, no books have been written, and there is no complete biography of him. An exception was a small book by Kapustinskaya K.A., published in 1965 by Atomizdat (Moscow).

Of the 55 years of Henri Becquerel's life, only the events of the day when his main discovery was made are described in detail, but in different versions they contradict each other. Becquerel is alone, then with a lab assistant, in his hands he holds a metal plate covered with uranium salt, representing a Maltese cross or a patterned lattice, and almost a cigarette case. The researcher puts it away either in a closet or in a table (the main thing is in the darkness!). In the mass of information noise accumulated over a hundred years, it is difficult to understand what actually happened there. It should be noted that Henri Becquerel did not succeed in the subsequent part of this drama. Soon after he announced to the Academy in 1896 "the invisible radiation emitted by uranium salts ", several respected scientists pointed out that the same discovery, with the same mineral and practically the same methods, had been made forty years earlier and published in the same journal. Despite this, Henri Becquerel refused to mention his predecessor for seven years. When he finally did so in 1903, it was only to demonstrate the " fallacy" of Niepce's work. He wrote: "Uranium is present on paper in such small quantities that, in order to produce a noticeable effect on the [photographic] plates used by the author, it was necessary to keep them side by side for several months. Niepce could therefore not have observed the uranium rays". To make matters worse, Henri Becquerel had rewritten the history of his research. In his first lecture to the Academy, he, like Niepce before him, initially announced that he had discovered a kind of *lumi re noire* that could be reflected, polarized, and refracted in the same way as ordinary light.

The Becquerel family dynasty ended with Jean Becquerel (1878–1953), Antoine Henri's son by his first marriage. He continued the work of his illustrious predecessors. His scientific interests covered problems of physics and astrophysics related to radioactivity and nuclear energy. After the death of Henri Becquerel and the passing of many witnesses who remembered Niepce de Saint-Victor's experiments, Jean Becquerel returned to defending his father's priority in 1921. He wrote a letter to Louis Mathou, deputy director of the laboratory where he had worked as Henri Becquerel's assistant after 1897, asking him to provide the available documents and answer a number of questions: "... Who is that *le salaud* who claimed that Niepce was the first to observe radioactive phenomena? Do you know? I would like to have some details about this experiment ... what is the explanation for his research. Chemical action, yes, but what?" . From this it is clear that the Becquerels were never interested in the opinions of other scientists if they did not coincide with their judgments. Henri Becquerel's

Dmitri Ivanovich Mendeleev and Bohuslav Brauner

harshest critic, one of those who pointed out Niepce's priority in this matter, was the physician and sociologist Gustave Le Bon (1841–1931). In fact, it was Le Bon's experiments in 1896–1899 that showed that the new rays did not have the properties of light, but were identical to cathode rays, that is, electrons. This meant that Becquerel's first experiments were probably erroneous [4]. Becquerel himself came to the same point of view by 1899, without recognizing Le Bon's claims, and Becquerel's supporters continued to claim that he had immediately shown that uranium rays were not reflected or refracted. In addition to all this, the question remains: did Henri Becquerel know about Niepce's work or "forgot" about it? Although Alexander Edmond Becquerel already referred to his articles published in *Comptes rendus de l ' Academie des Sciences* (1857–1867) in his fundamental monograph *La lomiere , ses causes et ses effets* , published in 1867–1868.

All this became irrelevant when the Nobel Prize was awarded to Henri Becquerel in 1903, which is awarded for discoveries, not always for their understanding and explanation. We note that the reference to a predecessor would not have harmed Henri Becquerel, since by the time the Nobel Prize was awarded, Niepce had already died, and the Nobel Prize is not awarded posthumously. After receiving the Nobel Prize, Henri Becquerel stopped responding to his critics.

Nobel Prize, established in 1895

If the story of Abel Niepce de Saint-Victor teaches us anything, it is that the history of science should be separated from the history of the Nobel Prize. Perhaps justice will eventually be restored. And it is no coincidence that in recent years Abel Niepce de Saint-Victor has become the acknowledged discoverer of radioactivity in France and in several other countries.

The subsequent history of the discovery of other radioactive elements - polonium and radium - is no less dramatic. Bohuslav Brauner (1855-1935), one of the most famous Czech chemists, received a letter from Sir William Ramsay (1852-1916) on August 19, 1896. It contained a request to purchase samples of eliasite for further study of the possibility of discovering new noble gases. Bohuslav Brauner had worked with the ores of the Ore Mountains since his youth and later became a mineralogist. He sent Ramsay samples of uranium ore from the St. Elias mine near Joachimsthal, and Ramsay gradually isolated all the noble gases from eliasite. In the same year, Brauner discovered that the Swedish mineral cerite and the Czech eliasite emit unusual radiation. So Henri Becquerel and Bohuslav Brauner were experimenting with uranium minerals essentially at the same time. The difference was that Brauner did not publish anything about it, since his scientific interest was much broader - the experimental study of rare elements in general. In 1897, Brauner submitted a request to the Ministry of Education in Vienna for the allocation of about 5,000 kg of uranium ore of Joachimsthal, as well as permission to rent a workshop and employ three or four workers. He justified his request by saying that he had identified a new element in this uranium ore and an unknown radiation associated with it by spectral analysis and other analytical methods. He measured its high intensity and intended to name the element "*Austrium*" in honor of Austria.

The government highly valued Brauner as a researcher – the first chemist in the country – but not as a citizen. The fact is that Charles University, where Brauner worked in 1882, was divided into Czech and German (Charles Ferdinand University). A number of teachers, including Brauner, did not agree with the transfer of individual buildings and laboratories to the new educational institution, since they had nowhere to give lectures and conduct experiments. In addition, Czechs who graduated from a Czech university could only enter government service with a fluent knowledge of German. As a result, the ministry decisively rejected Brauner's request. The refusal did not affect him much. He calmly continued experiments with his favorite rare earth elements. The final classification of 14 rare Earth elements in the Periodic Table of Elements was important to him. Even as a student, Brauner became an ardent supporter of D.I. Mendeleyev. Since 1881, there had been a lively correspondence between Boguslav Brauner and D.I. Mendeleev, and they met three times in 1883–1901. D.I. Mendeleev highly valued Brauner as a scientist and considered him "one of the true strengtheners of the periodic law."

Chirag – the light of the ages

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Mankind, since its inception, has strived for light. The Sun plays an important role in human life, but on dark moonless nights, man feels the need for artificial lighting. To protect themselves from the cold, primitive people mastered fire back in the late Paleolithic era, that is, 40 thousand years ago. They learned to make fire by striking flint against flint or by rubbing wood. Then they tried to maintain the fire, not letting it go out. Fire was primarily a means of protection from the cold. But fire is also a source of light.

At first, people wrapped old animal skins around tree branches, dipped them in animal fat, and used a torch-shaped fire as a source of light. This was also a means of driving away animals by scaring them. Because oil lamps turned black with long use, they were colloquially called "black lamps".

Archaeological research shows that the first lighting fixtures for home lighting, i.e. oil lamps, appeared in the Bronze Age. According to archaeologists, at first the lamps were cast from metal, and later, with the growth of demand for them, they began to be produced in large quantities from clay. The first oil lamps on the territory of the country were discovered in Southern Uzbekistan – in the archaeological sites of Sopollitepa and Jarquton.

An oil lamp is a round or oblong object made of ceramics, stone, and metal, with a cavity for storing liquid. Archaeological research has found many lamps and their fragments. This is due to the fact that oil lamps were the main means of lighting from the 3rd century BCE to the beginning of the 20th century.

Stone and metal lamps were distinguished by their long service life. Stone lamps were made of talc. This type of stone is soft and easy to process. Also, metal lamps with two, three, four or more ends have been identified.

It is difficult to say exactly when the first oil lamps appeared in Khorezm. They are kept in many museums of our country, in particular, in the State Museum of the History of Uzbekistan, the Museum of the History of Culture of Uzbekistan, the Termez Archaeological Museum, the State Museum of the History of the Fergana Region, the Museum of the History of Culture of the Republic of Karakalpakstan, the "Ichan-Kala" State Museum-Reserve and others. A cup-shaped oil lamp, an incense burner, dating back to the 3rd-4th centuries BCE, has been recorded [http://goskatalog.uz/432215]. But the place where this item was found has not been precisely identified, so its dating is questionable. The incense burner, kept in the "Ichan-Kala" State Museum-Reserve under the No. KP 476, looks like a modern item [Cultural Heritage of Uzbekistan. Collection of the "Ichan-Kala" State Museum-Reserve - Tashkent, 2021. 63 p.]. The passport of this item, covered with red *angob* (*angob* is a coating of liquid clay that is applied to the surface of a raw or fired item), indicates Khorezm, 4th-5th centuries. However, when exactly and in what archaeological site it was found is not indicated. In the stock inventories, the censer is indicated as copperware. There are various images on the outside of the exhibit.

Medieval chirag

Ancient chirag samples

Chorchirag, a lamp from a mosque in Langar. Kashkadarya. XV-XVI centuries.

The first lamps were cup-shaped, the body was round, without a handle, the upper part of the wall was bent inward, and narrowed at the end for the wick. They were usually made without glaze, with *angob* of the same color (red, black) applied on top. Vegetable oil or animal fat was poured into the lamps.

The shape of the cup-shaped censer of the 7th-8th centuries with two curved edges served as the basis for the shape of later lamps [http://goskatalog.uz/595217; Cultural Heritage of Uzbekistan. Collection of the Ichan-Kala State Museum-Reserve. – Tashkent, 2021. 64 p. KP 5958/53. Diam. 14 cm, Height 10.5 cm.].

From this period onwards, the lamps were covered with glaze. The lamps were coated with the same colour - black, yellow, green, blue, brown. The lamps dating back to the 9th-15th centuries consist of three parts: a handle, a spout and a base where the oil is stored. The lamps were made in different volumes. The most common sizes were 8-10 cm long and 5-6 cm high.

Lamps can be divided into groups by shape: round and long, by coating: glazed and unglazed, by finish: decorated and undecorated.

In many regions of our country, such as Samarkand, Bukhara, Fergana Valley, Surkhandarya, Khorezm, glazed ceramic lamps of the medieval period were found. Although their structure is close to each other, there are some differences in shape, and the finishing is clearly different [http://goskatalog.uz/415772, http://goskatalog.uz/305208, http://goskatalog.uz/305268 ,].

Glazed ceramic bowls related to Khorezm have been found in Khiva, Khazarasp, Kyat-Kala (Shavat), Guldursun-Kala, Kavatkale, Mizdakhan, Yonpik-Kala, Kyzylkala and other archaeological sites and are currently kept in the museums of our country.

In the 9th-15th centuries, oblong, decorated teapots with a coating became widespread. The lamps were made by molding. The lamp was made in two separate forms, which were then fastened together. Some types were made by hand and clay decorations were attached to them. The pointed side of the lamps was shortened so that the wick could be lit, and a handle was attached to the opposite side. Cup-shaped lamps consisted of a part where the wick burned and a base where the oil was stored, i.e. the belly part.

Stone chirag. Janpikkala IV c. BC. - 1st century AD.

Chirag. Janpikkala IV c. BC. - 1st century AD.

The patterns are mainly applied to the upper part of the lamp handle. The patterns were in the form of fir trees, tree branches and plants. There are also calligraphic decorations on the lamps of Maverannahr [Cultural Heritage of Uzbekistan. Collection of the State Art Museum of Uzbekistan (Tashkent). - Tashkent, 2020. 84 p. Ilyasova S.R., Ilyasov D.Ya., Imamberdyev R.A., Iskhakova E.A. "There is no benefit in wealth..." glazed ceramics of the Tashkent oasis of the 9th -12th centuries. - Moscow, 2016. 155, 268 p.; http://goskatalog.uz/415772], however, among the lamps of Khorezm, no objects with inscriptions were found.

An oil lamp from the beginning of the 13th century, found in the Meshekli caravanserai (Khorezm region, Tuprakkala district) is covered with orange glaze [Khorezm Mamun Academy. - Tashkent: Sharq, 2006. 45 p.; Permanent exhibition of the history and culture of Khorezm].

One of the rare, unique items is a special lamp stand (candelabrum). This item, stored in the funds of the Karakalpak State Museum of Arts named after I.Savitsky, is hand-made from clay. The candelabrum dates back to the 12th-13th centuries and was found in the archaeological site of Yonpikkala [KP 36604. Height 24 cm, diameter 19 cm].

There is a handle at the top for carrying. On the front side there is a rectangular opening for installing a lamp. Although the candelabrum is not covered with glaze and decorations, it is unique in shape. Ceramic lamps served as an important household item for urban and rural residents of Central Asia throughout the Middle Ages.

It is appropriate to explain the term "candelabrum" here. A candelabrum is a ceramic object that contained 2-3 oil lamps. Candelabrums were usually placed in public places such as temples, mosques, bazaars and caravanserais, and people used them to light their lamps. If necessary, the lamps placed in the candelabrum could be taken away. Such candelabrum lamps have been preserved in the museums of Nukus, Bukhara, and Fergana. An object called a lamp stand served as a base for candelabrums or lamps.

There were also incense burners, which were mainly used for medicinal purposes or in religious ceremonies.

Candlestick. Meshkeli caravanserai, XII-XIII cc.

Analysis of unique coins of Khorezmshah Ali ibn Ma'mun

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Mamunid dynasty, which left an indelible mark on the history of Uzbekistan, Ali (999-1008), son of the Khorezmshah Mamun, was soon after the death of his father enthroned by the military, who swore allegiance to him[1]. At the end of 999, the Karakhanids launched another attack on Bukhara. As a result of the attack, the Samanid dynasty, which had ruled Mawarannahr and Khorasan[2] for almost two hundred years, was overthrown. After this, the state ruled by Ali ibn Mamun became independent. At that time, its territory included, in addition to Khorezm, Farawa and Nisa in Northern Khorasan, and in the north, territories up to the Mangyshlak Peninsula. For, in the course of research conducted in recent years, 33 types of coins of Ali ibn Mamun were discovered, minted in Jurjania, Kath, Farawa, Nisa and even Bukhara[3]. Although the fall of the Samanid state gave Khorezm political independence, it now pitted it against two new powerful states that had emerged in Central Asia and Afghanistan. These were the Karakhanid state, which had emerged in place of the Samanid state, and the Ghaznavid state, which had emerged in Khorasan. Khorezm now directly bordered on these states, which could attack and capture Khorezm at any time. Therefore, from the first years of independence, Ali ibn Mamun pursued a policy of neutrality and survival as long as possible between these two powerful states[4].

In 390 AH (1000 CE), a representative of the Samanid dynasty, Abu Ibrahim Ismail ibn Nuh, escaped from captivity in the city of Uzgen, which was subordinate to the Karakhanids, and arrived in Khorezm via[5] Bukhara. Abdujabbar Utbi describes this event as follows: *"After escaping from captivity, he hid with an old man in Bukhara until the soldiers lost hope of finding him. "Then he went to Khorezm, asking for help from God to take revenge, like a sword that destroys fortresses, a flying star that pierces everything and emits sparks, and a fire that burns everything ..."*[6]. Having gathered in Khorezm the remnants of the Samanid army, opponents of the Karakhanids and people loyal to him, he invaded Maverannahr. He captured the main cities of Bukhara and Samarkand and, under the name of Ismail al-Muntasir (390-395 AH / 1000-1005 CE), revived the Samanid state[7].

Undoubtedly, Khorezmshah Ali also helped him in forming this army. For in this way Khorezmshah achieved two political goals. *Firstly, he established warm relations with Ismail al-Muntasir, who as the legitimate representative of the Samanids demanded the return of his ancestral lands. Secondly, the two political forces threatening the independence of Khorezm, the Karakhanids and the Ghaznavids, were distracted from Khorezm and focused their attention on the representative of the Samanids. This characterizes Ali ibn Mamun as a skillful politician. These actions of his ensured the establishment of peace in Khorezm for many years, and contributed to his patronage, as a ruler, the development of culture, art and science.*

According to the traditions of the Muslim world at that time, when the ruler of any Muslim country ascended to the throne, he minted coins bearing his name and with the mention of the name of the thethen Arab Caliph. These symbols indicated that the ruler was the holder of legitimate power, and, at the same time, meant that this country and the ruler were vassals of the Caliph. Accordingly, it can be seen that on most of the coins minted during the reign of Ali ibn Mamun, the name of the Caliph Al-Qadir is embossed. Billah (991-1031)[8], who ruled during this period.

Two coins of Khorezmshah Ali ibn Mamun with such engraves were recently discovered in a private collection in the Khorezm region and are low-quality silver coins.

The first of the coins was most likely minted in the city of Jurjaniya (Ko'hna-Urganch, Old Urgench), the time of its minting is unknown. In the center of the obverse of the coin in five lines is written "الاصل\اخ

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[5] Özbayraktar A. Me'mûnîler devrinde Harezm. Dok.tezi . Selçuk Universitesi . – Konya. 2021. – S 51
[6] Abu Nasr Muhammad ibn Abdujabbar Utbiy. Tarixi Yaminiy // Mss, O'zR FA SHI No. 3252/V. – F 353.
[7] Duman A. Ebû İbrahim İsmail El-Muntasır'ın Sâmânî Devletini Diriltme Gayretleri Bağlamında Karahanlılar ve Gaznelilerle İlişkileri//Gaziantep Üniversitesi Sosyal Bilimler Dergisi. C.XI/2 . – Gaziantep, 2012. – S 535-548.
[8] Bosworth KE Musulmon sulolalari (yilnoma va shajaralar bo'yicha ma'lumotnoma). Tar: Asror Samad. – T., Fan, 2007. – B. 14.

Coin of Khorezmshah Ali ibn Mamun minted around 1000 in modern Kunya-Urgench (Jurdjaniya)

اله الا\لله وحده\لا شريك له\القادر بالله", that is, "Khalid. There is no god but Allah, and He has no partner. Al-Qadir Billah." This sentence, quite common in Khorezm, is part of the word "Kalimai Tawhid", which is considered the basis of Islam[9]. Such words first appeared on Islamic coins in the year 66 AH (686 CE) on the coins of the Caliph Abdul Malik ibn Marwan (685-705 CE / 65-86 AH) [10]. This text was preserved in its entirety on the coins of Khorezm until the Mongol period.

Used on the coin "القادربالله" , that is, "Al -Qadir Billah", is the nickname of the Caliph Abul Abbas Ahmad ibn Is'haq ibn Muqtadir Billah ibn Mu'tazid , who ruled from 991 to 1020[11].

Along the edge of the obverse of the coin is a sentence in two lines. However, these inscriptions are completely erased. It is a modified form of the 33rd verse of Surah Tawbah and the 9th verse of Surah Saf. On the inner circle are the place and date of minting. However, it is impossible to read this sentence in its entirety.

On the reverse of the coin is written the phrase" Ali ibn Mamun Khwarezmshah, the Just Ruler". The sentence on the circumference of the coin is completely erased. It is possible that the 4th verse of Surah Rum was carved here.

The title **"Al-Malik al-'adl"** (**الملك العادل**) used on this coin was used on a number of coins of Ali ibn Ma'mun minted in Jurjaniya, Farawa, Nisa, Khwarezm and on coins whose place of minting is unknown. The word **"عادل"** in Arabic means "just", "equal", and here together with the title "malik" it has the meaning of "just king" or "just ruler". The form **"عدل"** , which fully corresponds to this word in meaning, was first used in various Islamic coins minted between 132-218 AH (750-830)[12]. Also *fels (*small copper Arabic medieval coin) in Central Asia were first minted in Bukhara on behalf of the caliphs in 185-209 AH (801-825)[13].

In his article, researcher A. Makarov designated this coin as number 12 and noted that the coin was minted in Jurjaniya in 396 AH (1006). Another 4 samples of this coin were in a hoard found in a place called Kreshshenny Baran in Russia at the beginning of the last century, and they weighed 3.85-4.70 grams.

It is impossible to determine where and when the second coin was minted. The obverse of this coin retains the word "Tawhid", which is one of the most important words in Islam. On the reverse of the coin there is an inscription: "لله\محمد رسول الله \\الملك السيد\ بن مامون ..." ", that is, "To Allah, Muhammad is his messenger. Malik as-Said ... ibn Mamun." The inscription on the coin is "Al-Malik as-Said" (**الملك السيد**). This title is mentioned on the coins of Ali ibn Mamun, minted in Kath, Farawa and other regions. "Malik" is an aristocrat who ruled small territories as a vassal of the "sultan" in the 11th-12th centuries[14]. The title "Said" means "noble", "lord", "chief" and is considered an honorary title in Islam. This title is usually given to the descendants of Muhammad's uncle Ab-

9 https://islom.uz/maqola/7995

10 منصور فطاع ناصر. Yes, no matter what. – دار القاهرة: الخلافة للنشر, 1448م. – ص 182.

11 : محمد وصبح عجار. 10 ج . خيرات في لملكا . الاثير ابن محمد يوسف القادل . – بيروت : دار الكتاب العلمية, 1987. – Apr 39 .

12 فطاع منصور ناصر. In the future. ج 1. - القاهرة: دار الزهراء القرش , 2002.- ص 112-126

13 Mohammed S. Tawfiq and etc. A historical and numismatic study of the dinars of the Ghaznavid Sultan Mahmud b. Sabuktegin at Nishapur // Espacio, tiempo y forma. No. 33. –Madrid. 2020. – P 634 .

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The foundation of the minaret of Ma'mun. XI c. Kunya-Urgench

The decree of Abul Abbas Ma'mun ibn Ma'mun in the form of a lead tablet. XI century. Kunya-Urgench

. Coin minted during the time of Khorezmshah Ali ibn Mamun (999-1008).

bas and Abu Talib, as well as his son Ali. In the Hijaz, this title was only applied to the descendants of Hussein, the grandson of Muhammad[15].

In general, the first quotation from the Quran can be seen on the coin of Nuh ibn Asad Samani, minted in Khorezm in 203 AH (818 CE). The circumference of the obverse of the coins contains a sentence given in the 9th verse of Surah Saf and the 33rd verse of Surah Tawbah. However, the meaning of this sentence differs from the meaning given in the Quran.

Its content is as follows: " O Muhammad, the Messenger of Allah, who sent him with guidance and the true religion, to defeat all religions, **even** "unless those who are steeped in polytheism want it." Here, the first part of the sentence in the Quran is given in this sense: "هو الذي ارسل رسوله..." , that is, "He sent His prophet..." On the coin, it is this part of the coin that means *"The Messenger of Allah Muhammad, to give him (i.e. the ruler who minted the coin) guidance and the true religion, to prevail over all religions." This quote was used on dinar coins from 77 AH (696) and on dirhams from 78 AH (697)*[16].

It should be noted that four verses mentioned in the Holy Quran were used on the coins of Khorezm in the 9th – late 12th centuries. Three of them, as mentioned above, are sentences found in the 28th verse of Surah Fath, the 9th verse of Surah Saf, and the 33rd verse of Surah Tawbah. Another quotation used is from the 4th verse of Surah Rum: " And whatever came before it and what came after it is from Allah. On that Day the believers will rejoice[17]."

Among the coins minted in Khorezm, the first coin with the 4th verse of Surah "Rum" is a silver coin minted by Ahmad ibn Muhammad in 348 AH (959)[18]. In addition, this coin is the first coin of the Khorezmshah dynasty minted with the title "Khorezmshah" based on Arabic script and verses of the Quran.

In conclusion, it can be said that by studying these coins, it will be possible to clarify the unknown dark pages of our country's history and find answers to a number of questions. The two coins identified above are rare finds in the numismatics of our country, and only a few copies have survived to this day.

[15] حسن البابان. الألقاب الإسلامية في التاريخ و الوثائق و الآثار . – القاهرة: دار الفنية, 1989 م. – ص 37

[16] فرج اللهوسوني: الآيات القرآنية على المسكوكات. 2003 . – ص 45-46

[17] https://quronvasunnat.uz/quron?sura=30

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Tile master Usto Abdullah

Nodirjon Abdulakhatov,
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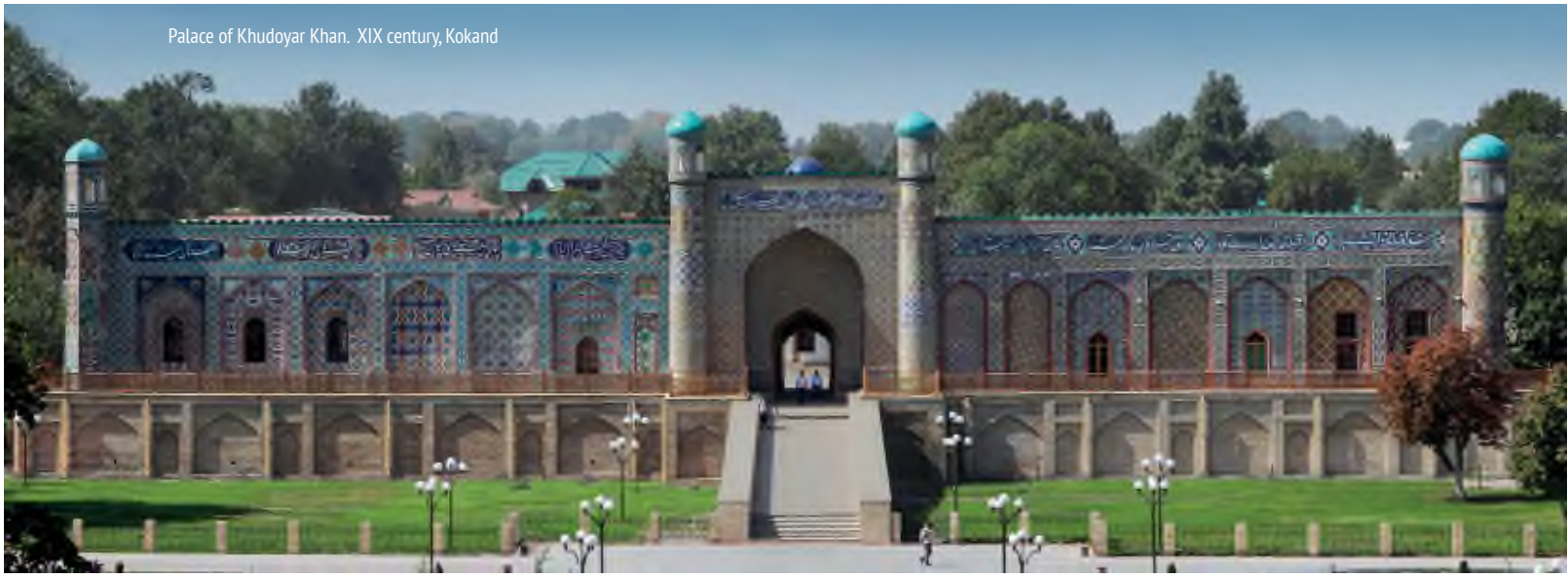
he iridescent ensemble of Urda in the center of Kokand is considered the most beautiful and majestic among the architectural monuments of the 19th century in the Fergana Valley. This building clearly expresses the components of folk architecture - artistic ceramics, the art of pattern, wood and stone carving. The harmony and elegance of carefully selected tiles of different colors and shapes indicate that pottery in Fergana, including Rishtan, was at a high level in the 19th century.

The author of these tiles was master Abdullah (1797-1872), a master potter from Rishtan who lived in the 19th century, and about whom Abdusamad Egamberdiev writes in his article "The Legacy of Tile Master Abdullah":

"Master Abdullah's father was a potter from Kokand. He later moved to Rishtan. He had three sons, the eldest of whom, Ubaidullah, was a merchant in Kokand, the middle one, Master Azim, and the youngest, Master Abdullah, chose their father's profession. Master Azim became an excellent potter at the age of 17. He worked as an apprentice for several years with one of the master potters in the province of Kashgar and learned the secrets of porcelain making. Before returning home, he showed Chinese porcelain to a foreign merchant and said that in a year in Fergana he would make a Rishtan porcelain bowl (*kasa*) of the best quality, but the merchant did not believe him. A year later, the merchant, who came with his caravan to Fergana, was incredibly surprised. Master Azim put the most beautiful porcelain items in the world in front of him and offered to select from among them items made from the most famous foreign porcelain. After much thought, the merchant began to click the bowls with his finger. Only one of the bowls made a gentle ringing sound. After all, the rest were made of ordinary Rishtan clay... Master Abdullah was also known from his youth for the quality and elegance of his work. When the Kokand Khan Khudayar began building Urda, the master's name was known throughout the valley... Khudayar Khan immediately called Master Abdullah from Rishtan. The work of making tiles and decorating the building was entrusted to Master Abdullah. Old masters still remember this story, passed down from mouth to mouth" [1, 24].

In the courtyard of Urda, large kilns (in the form of jugs) were installed for making tiles. Having descended into the kiln, the master laid the tiles inside. Since this work was very delicate, only Master Abdullah did it. The khan visited the construction site every other day and monitored the progress of the work. When he arrived, everyone stopped working and froze in a bow. And this greatly disturbed Master Abdullah, who was working in the kiln. Knowing this, the assistant potters joked several times that the khan was coming and laughed heartily, watching how he hastily climbed out of the kiln. As they say, the truth from the mouth of a liar also seems like a lie, and once, when the khan came, although the potters said several times, "Master, the khan has arrived," he continued to work, not paying attention to anything. The khan, angry that Master Abdullah did not come out to greet him, ordered the lid of the kiln to be closed and a fire to be lit. When the fire went out and they opened the lid, Abdullah, red from the fire and all sweaty, climbed out and said: «Hello, lord.» Then the



Palace of Khudoyar Khan. XIX century, Kokand

Kitoba" decoration in the left hemisphere of Khudoyar-khan's palace

khan laughed and said: «You almost became shashlik, bald one.» Usta Abdullah said: «Lord, we potters are accustomed to being roasted in the oven,» and looking at the disproportionately fat confidants of the khan, he continued: «If sometimes your courtiers were lowered into the oven and roasted a little, you would see a rare sight. However, it is a pity that they will not fit into the hole of the oven.»

- It's good that you made the oven opening narrow. Otherwise, I would have lost all my courtiers, - the khan also joked.

After this, Master Abdullah showed the Khan the patterned tiles made in recent days. Seeing the multi-colored tiles playing in the sun, the Khan was touched and said: «We are pleased with your service, say your wish.»

- Your Majesty. I have long wanted a madrasah to be built in Rishtan. I dared to ask you for money to build this madrasah as a reward for my work... Soon, on his initiative, a madrasah was built in Rishtan" [1, 24].

Information about master Abdullah is also presented in the book "History of Kokand and its Literature" by Pulatjan Kayumov (1885-1964), an enlightened teacher, literary scholar and local historian from Kokand: "Master Abdullah from Rishtan. This man is the only one who proved that he is a great master, with his skill in working with ceramic glaze during the decoration of the Ark, built in 1866. His clay madrasah was near the Rishtan bazaar. He was born and raised in Rishtan and died there. Currently, the artel is an enterprise. Domullah Abdullojan Makhdum Baki (12.VII.1951) tells about this man. I was young. I used to go to this master's yard. There were always 3-4 cauldrons there, in which soft, clay-like stones were soaked. It is said: put it in water for a week, then grind it in a mill, mix it with ash and make clay, from this they make Chinese ceramics and fire it, they make it by adding cast iron to the paint" [2, 70-b.].

All the ceramics of Ark were made in this way. At that time, Khudayar Khan came to Rishtan. There were six respected people. They always spread the *dastarkhan* in front of the khan. One of them was Master Abdullah. Since the work for Ark was approaching its peak, Master Abdullah was busy with the kiln and could not spread the *dastarkhan* in front of the khan. The khan began to investigate in anger. Hearing that he was at work, the khan mounted his horse and rode to his home. He rode straight into the yard on horseback, and then to the master's workplace. He saw that he was working. Busy with his work, Abdullah did not notice the khan's arrival. When he raised his head, he saw the khan in front of him, was surprised and humbly bowed his head. The khan's anger did not subside, although he saw that the famous master was busy with his work. He ordered that he be locked in a big clay vessel and a fire be lit. Willy-nilly, his students

Exterior view of Khudoyar-khan's palace "kitoba" decoration

lit a fire. When four bundles of firewood had already burned, one old man asked Khudaiar what the master was guilty of.

- After all, this poor craftsman makes decorations for your palace. If he is busy with work, is guilty - will he be a sinner? - and with these words he lifted the lid of the jug. The flames shot up, and the skilled great craftsman was saved from being burned alive. Four men pulled him out of the vessel. They say that with his eyes closed and his mouth wide open, he looked like a baby. Another twenty minutes and he would have been finished. They say he was a short, frail man with sparse hair, almost bald» [2, 71-b.].

When the Ark was completed, and Khudayar Khan asked Master Abdullah what he wanted, the master asked the Khan to pay him 2 *tanga* (forty kopecks) for each pottery kiln. Khudayar Khan did not know how many kilns he had in his possessions, so upon hearing his wish, he said, "Are you really asking the Khan for such a trifle?", laughing at Master Abdullah and giving his consent. Soon Master Abdullah became rich by two *tanga* for each kiln, and built a mosque for this money.

It is said that when Khudoyar Khan finished building his Urda, he called for Master Abdullah. The Khan said to him: "We have built the main building by the will of Allah Almighty. But for how many centuries will it be able to stand as a symbol of our kingdom?" Master Abdullah silently led the Khan to the roof of the building. When they reached the roof, the master placed a dish full of millet on top of the *mezan* (the place where the call to prayer is pronounced). Looking closely, the Khan saw that the grain was slowly sifting through. However, the air was clear and there was not the slightest breeze. Soon the dishes were empty. When the Khan asked what the secret was, the master pointed to the village of Ovchi. The sounds of the water mills in this village could easily be heard even from Urda. Then the Khan felt that the earth was barely shaking from the blows of the mallets hitting the rags. «If the paper mills are moved three or four miles from the city, these buildings will stand for a thousand years,» said the master. For Khudayar Khan, the preservation of Urda, which was considered a symbol of the state and kingdom, was above all else. In accordance with his decree, the Kokand papermakers were resettled to the village of Kalacha in the Sokh Valley [3, 68-b.].

The Urda of Khudayar Khan, recognized as an example of high architectural art, testifies to the creative potential of our ancestors. Of course, the merits of such master tile-makers as Abdullah are immeasurable. Therefore, thanks to the many years of hard work of such skilled craftsmen, unique examples of architecture in our country continue to amaze foreign tourists to this day.

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Exterior view of Khudoyar-khan's palace "kitoba" decoration

Epigraphic monument of the 19th century Chagatay cemetery in Tashkent

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In 2024, during a visit to the Chagatay cemetery in Tashkent in search of genealogical information, Doctor of Geological and Mineralogical Sciences Alexander N. Bogdanov and his sister Umida M. Khalilova recorded fragments of four epitaphs dating back to the 19th century.

Considering the high source study potential of the texts on gravestones, regardless of the time of execution and the degree of preservation, in order to develop the maximum possible factual material for future generations, it was decided to prepare the collected data for publication.

The rather capacious layer of information obtained during the study of the steles did not allow the publication of the results of the research of all four objects of study simultaneously. For this reason, the article presents a description of one monument.

Several research methods were used to analyze the object, namely, laboratory processing, paleographic analysis with subsequent identification of specific expressed features of writing, deciphering graphic markers, collecting epistemologically based material for a detailed analysis of the content of the text part, etc.

Thus, the most fully preserved monument has the form of a vertically installed elongated rectangle with a semicircular top with *shoulders*. The *katib* is not installed. Dimensions: height 136 cm, width 51 cm, thickness 17 cm. The epitaph is dedicated to Nurmukhammad, son of Muhammadshakir Haji.

The gate of the Chagatay cemetery. Tashkent

The stele was made according to all the traditions of epigraphic art of the 19th and 20th centuries, which were most widespread in the territories of Central Asia and the Middle Volga region. This is indicated, among other things, by the similarity of the calligraphic motifs and techniques of the master's execution with the works of outstanding Tatar stone carvers of the same period - Gabdelbari Barudi, Nuri Burtasi, muezzin Fatkheddin, Fatkhelkadir Kalmetov al-Kazani [6] and many other unknown authors.

Exegetical analysis of the contents of the front page.

The epitaph begins with an expanded formula of one of the most frequently recited phrases in Islam, known by the term *basmala* or *tasmiya* [1].

The expression about the mercy of the Almighty is followed by the following verse about the inevitability of death (Holy Quran, Surah 29 "Al- Ankabut", 57th verse). Visual-paleographic analysis of the epitaph allows us to conclude that authors often use only

[1] The prayer formula is an integral attribute of not only almost all religious and didactic, Arabic-Persian, Turkic classical poetic and prose works. As the author of the monograph "The World of Meaning in Few Words: Philosophical Views of Mahmud Shabistari in the Context of the Era" A.A.Lukashev notes, the founders of the tradition of beginning literary works with an expanded formula *of basmala* are the Persians [3].

According to the opinion of the majority of religious scholars, the formula is not the first verse of *the* Surah al-Fatiha, but only serves as a dividing function between the chapters of the Holy Quran. As a fully-fledged formula, the phrase is mentioned in the Quran as a fragment of the 27th surah "an- Naml ", verse 30 , which tells of Solomon's letter to the Queen of Sheba (Balqis): " مِسْبِ هُنَّإِوَ نَامَيْلَسُ نْمِ هُنَّإِ مِيحِرَّلا نِمْحَرَّلا هِلَّلا " . The necessity of using this formula in all cases of life is also confirmed by the hadiths of the Prophet Muhammad, which could not but be reflected in the epigraphic tradition of the peoples professing Islam.

Gravestone of Nurmuhammad son of Muhammadshakir haji.
Photo by A. Bogdanov and U. Khalilova., 21.04.2024.

the initial fragment of the verse, focusing the reader's attention on the temporality of all things. In the presented version, the carver uses the quote in full, essentially summing up the whole meaning. *Katib* continues the theme of the endless mercy of the Almighty, according to which everyone will be resurrected and everyone will be asked, which also indicates the fair attitude of the Creator to all living things.

In this same part, after the initial fragment of the verse "كل نفس ذائقة الموت» there is a postscript similar to the expression «الحكم له». The author, for a number of reasons, omits the second fragment of the verse to the next line, highlighting it with a frame.

Next, several lines are given for information about the deceased, for whom the next three segments in the center of the slab are used. On the first, the name of the deceased is carved) *Arabic* : اسم with the mention of the patronymic (*Arabic.*(نسب with the prefix *ibn*. The second cartouche records the age at the time of death and the name of the area to which the deceased belonged. It becomes known that a pilgrim (hajji) from the mahalla "Kallakhana" was buried. The name of the object is often mentioned in historical reports of Tashkent. Thus, according to the materials of the Soviet scientist-geographer, professor of the Central Asian State University Mallitsky N.G., the above-mentioned area is listed among 56 other quarters in the Kukcha part (*Kukcha district*) [5] of the old city of Tashkent. The mosque on the Kyzyltut passage, now in the Almazar district, is also designated by the same toponym. The Okchullik-Kuktunlik ota cemetery belonged to the Kallakhana mahalla [4].

The date of death is cut according to the Christian calendar, using the Hindu-Arabic number system.

The vertical frames on the sides and the last lower segment are occupied by pious prayers for the deceased. The presented *dua* addressed to the Almighty is essentially a semantic addition to the 57th verse of the Surah "*Spider"* **(العنكبوت)** and a reworking of the *hadith* transmitted by one of the closest companions of the Prophet Muhammad - Abu Said (Abu Said al-Khudri Saad ibn Malik ibn Sinan, a native of the Khazraj tribe of Ansars and the Hudra clan) (612-693) [1; 8] which states that "The grave is either a garden from the gardens of Paradise, or a pit from among the pits of Hell [2]. "

The compositional structure and organization of graphic signs allow us to conclude that the epitaph is executed in Arabic script, using the incised technique of execution, in an individual handwriting, predominantly *naskhu*, in some cases with the use of techniques mainly characteristic of *nastaliq*. Diacritical signs in the form of *shadda* with *fatha* and *a* dividing *hamza* (هَمْزَة الْقَطْع) are placed in the introductory pious formulas on the tympanum of the front side and in the expression "ئَ مسحّ ء عنه ». Along with the fact that the epitaph is the basic source of information, the calligraphic composition in the presented case also acts as the main decorative element. The carver does not resort to the use of any additional geometric or floral motifs.

Characteristic features of the letter. The final *ta-marbuta* in the word "ذائقة" in the hands of the master acquired the form of a curved hook with the characteristic signs *of i'jam* (إعجام).

The initial soft consonant *ta* in the word "ترجون" is raised above the last syllable of the previous word, causing the author to truncate the symbol *Nuqat* medial *noon* in the word «منىلا». In this same part of the expression, in order to use the available space more compactly, the *kerning* technique is used, which is also more characteristic of *Nasta'liq* than of *Naskh*. The velar consonant sound ң (*n* with a lower descender) in the word «كـنن سى حله» is represented by a combination of two *nun* and a final *kaf* .

When writing the middle *sin* in *tasmiyah* «بسم الله» and the final form of the same letter in the word «نفـس» and in some other words, the technique of additional lengthening is used, known under the term *kashida:* the letter cut out in the form of a slightly curved horizontal arc with a slight increase in thickness from right to left. The letter *shin* in the word «ایشندە» is almost identical in outline, but is already made in the form of a clear horizontal line, but with a slight slope from top to bottom. The final *mim* in the word «الحكم» has a slightly pronounced angularity. The final *kaf* in almost all cases of its use with a characteristic *sarkesh* elongated under the relative diagonal.

The proportional relationship of the width of the characters varies. Elongated letters visually expand from right to left. The initial *he (ha - ye havvaz)* has a

2

Translation into Russian	Text in Arabic script
1. In the name of Allah, the Most Gracious, the Most Merciful.	1. بسم الله الرحمن الرحیم
2. Every soul will taste death. All is His will.	2. کل نفس ذائقة الموت له الحکم
3. Then you will be returned to Us .	3. ثم الینه ترجعون اذه قبر
4. in this grave is Nurmuhammad son of Muhammad-	4. نور محمد ابن محمد
5. Shakir Haji died	5. شاکر حاجی وفات
6. at the age of 39	6. بولدی ۳۹ یاشنده
7. From the mahalla Kallakhana.	7. کلّه حانه محله سی ننک
8. And in 1897 according to the Christian calendar,	8. و 1899 سنه ء مسحیّه
9. July 17th. Lord	9. نچی ایی ولده حد
10. May He have mercy on him. Amen.	10. رحمت قیلسون آمین
11. O Allah, make his grave a blooming garden from the gardens of Paradise,	11. اللهم اجعل هذاالقبر روضة من ریاض الجنان
12. and do not make one of the pits of the fiery Gehenna.	12. ولا تجعله حفرة من حفرة النیران

Text of the monument

two-eyed spelling, in most cases, the consonant *mim* is simplified to a spot. *The tail* of the final *yay* in the word "حاجی", turning to the right, it merges with the incised line of the cartouche.

The monument is in good condition, without visible chips or damage to the text. There are minor traces of biodegradation in the form of moss.

Text of the monument (table 1)

Thus, the epitaph monument analyzed in the article, along with other written sources, regardless of the time of execution and the level of professionalism of the work performed by the katib, are a valuable source of information for a number of historical disciplines. The research methods used in studying the text part allow us to identify relevant facts on the history of the formation of certain settlements, religious communities, etc. The epitaph provides complete information on the onomastics and genealogy of local residents. The linguistic features of the letter, stylistics, chronotype, specific calligraphic markers will replenish the database of philologists, and as a result - dialectologists, theologians, codicologists with important data of a linguocultural nature.

About the waqf deed of the times of the arabshahid dynasty of the Khiva Khanate

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As in other Muslim countries, the institution of waqf played a key role in the material support of religious and social institutions, the education system, and social infrastructure in the Khiva Khanate. Very few historical documents, in particular waqf deeds, dating back to the Arab Shahid dynasty (1511-1770) rule in the Khiva Khanate have survived. Among them is a waqf deed copied from an original document around 1070 AH/1659-1670, which reflects the historical activities of the *khanaka of Sheikh Suleiman Haddadi. It is noteworthy that the original document was drawn up in 750 AH/1349, and contains information about the document circulation culture and aspects of the waqf institution practiced in the region during the Mongol period.*

Today, this waqf deed related to the *khanaka of Sheikh Suleiman Haddadi is kept in the historical documents collection of the Khiva «Ichan-Kala» State Historical and Architectural Museum-Reserve. Another waqf deed related to the khanaka of Sheikh Suleiman Haddadi was compiled in 721 AH/1321-1322, and its text was written in khatt -i divani. At the moment, waqf deeds of Central Asia executed in khatt -i divani constitute a very small number, and the original waqf deed of the Timurid period, written in this type of script, has been analyzed in only one study.*

The waqf deed which belongs to the *khanaka of Sheikh Suleiman Haddadi is in the form of a scroll and is written in nastaliq script. The size of the scroll is 200 cm x 24.5 cm. The upper part of the paper with the text of the deed is decorated with an arched image in the form of an altar (mihrab), and the inner and outer parts of the altar, as well as the fields on both sides of the text, are decorated with various floral patterns in red and black. In addition, the word «Bismillah» is inscribed inside the mihrab. On the upper part of the altar-shaped image is an imprint of an almond-shaped seal; it is not possible to read its entire inscription. Based on some words discernible in the imprint of the seal, it can be assumed that it belongs to the Khivan khan Abulgazi Khan (ruled 1644-1663).*

If we pay attention to the internal structure of the text of the waqf deed, it begins with the praise of Allah. Then follows the praise of the Prophet Muhammad. Then, the identity of the donor of the waqf (waqif) is determined, in the text he is mentioned as «Amir Kutlug Timur».

The person mentioned in the waqf deed as the donor of the waqf is praised through the use of various metaphors and is described in the following words: «the great emir, the generous ruler (wali), the pride of the world's scholars, famous among the Turks, Arabs and Ajam, the ruler of the cities of Khorezm and his viceroy ... Kutlug Timur.» Indeed, this person, often known in local modern historiography as "Kutlug Temur" was appointed governor of Khorezm at the beginning of the 14th century.

Unfortunately, historical sources contain very little information about the personality of Kutlug Timur and his political activities. For example, the

Image of Uzbek Khan on a map drawn by Angelion Dalorto before 1339

work of Fazlullah Rashiddin «Jami al-Tawarikh» contains a mention of his relations with the Ilkhanid state. According to him, the ruler of the Ilkhanid state Gaykhatu (reigned 1291-1295) and the governor of Khorezm, Kutlug Timur, were related by family ties, and the daughter of the governor of Khorezm,

Minaret of Kutlug-Timur. XIV c, Kunya-Urgench

Eltuzmish Khatun was the wife of Gaykhatu [1]. In addition, in the work of an unknown author «Tarikh-i-Sheikh- Uvays», there is a mention of an early alliance between the khan of the Golden Horde Uzbek Khan (ruled 1313-1341) and Kutlug Timur. In particular, in 703 AH/1303-1304 they took part in the execution of Iksar, who had just ascended to the throne of the Golden Horde. After this event, Uzbek Khan took the khan's throne. Probably for these services, Kutlug Timur was promoted to the position of governor of Khorezm, and he even married the daughter of Uzbek Khan.

The waqf deed also emphasizes Kutlug Timur's activities as a patron of the arts. In particular, he is mentioned as "the builder of mosques, madrassas and *khanakas". Indeed, Kutlug Timur built the tallest minaret in Central Asia in Old Urgench in 1320-1330. The minaret was named after Kutlug Timur and is 60-62 meters high. The names of Uzbek Khan and Kutlug Timur are inscribed on the front side of the minaret. In the waqf deed, which served as the basis for our study, he is also mentioned as the builder of two khanakas in honor of Sheikh Suleiman Haddadi.*

In the manuscripts of that time there are only records about the name of Kutlug Timur and the name of the family to which he belonged, i.e. «Kungrat». The most important feature of this waqf deed is that it contains information about the ancestors of Kutlug Timur, especially about his father and grandfather. In particular, his full name in the text of the document appears as «Kutlug Timur bin Najmiddin bin Tuidi Ako».

The waqf deed also describes the *khanakas built in honor of Sheikh Suleiman al- Haddadi and their brief history. First, it is noted that even before the creation of this waqf, the White Khanaka was built in honor of the sheikh at the foot of Mizdahkan (now the Khojeyli district of the Republic of Karakalpakstan). Then, the type of real estate objects created, their location and the income of the waqf are described. Kutlug Timur provided his lands between Mizdahkan and Baghdad with canals as sources of water*[2]. This canal was popularly known as Tugrul Tekin, and the lands of the waqf were located on both sides of it and separated by three other ditches. Further, it is said about the owners of these canals and ditches. Among them, among the influential figures of that time, the wife of Kutlug Temur namely Turabekkhanum is mentioned.

The lands in Mizdahkan and its environs were suitable for cultivation, and a wheat harvest of 8,000 mann (a Khorezm unit of weight) could be yielded[3]. In turn, the lands in Baghdad and its environs were also suitable for agriculture, and 15,000 mann of harvest were collected from them. However, there is no clear information on whether this amount represents the total harvest or the waqf rent. However, from the analysis of the claim reflected in the last part of the

[1] Fazlullah Rashid ad din. Jami-at-tawarikh. – Baku , "Nagyl Evi", 2011. – P. 198.

[2] Gulomov . Ya.G. Khorazmning sugorilish tarihi. – T, "Fan", 1959. – B. 177-178.

[3] *Mann (batman)* - A unit of weight used in the Khiva Khanate, in In Russian sources of the 17th century it was equal to approximately 4 kg . See: Davidovich E.A. Materials on the metrology of medieval Central Asia. – M., 1970. – P. 85-86.

Minaret of Kutlug-Timur. XIV c, Kunya-Urgench

waqf deed, it can be understood that it is about the amount of *ushr (tithe), that is, it is 10% of the total harvest.*

An analysis of the waqf deed of Sheikh Suleiman Haddadi's *khanaka shows that Kutlug Timur established a waqf for the second time and built a new large khanaka for Sheikh Sulayman al-Haddadi. This large khanaka is known as Hururi / Harwari and is located near the southern part of the river Nasiri. In turn, it is noted that Hururi / Harwari was one of the kishlaks of the city of Khivak. Kutlug Timur allocated the land around this site as a waqf property for this second khanaka. Like the list of properties above, the boundary of the land converted into a waqf is also described on four sides. It is noteworthy that, while indicating the boundaries of the land plot allocated for the large khanaka, not only religious objects of that time are mentioned, but social institutions, toponymic names of the surrounding area, rivers and deserts are also mentioned - the mausoleum of Sheikh Kabul Ata, the prayer hall of Nuri Khosa, a bath, mahalla Nizam near Baba Mangu mausoleum, Haykonik river and Daroz steppe. It can be assumed that most of these toponymic names existed at the time of creation of these khanakas, that is, in the 14th century and earlier. In addition, among the names of individuals, the property belonging to Davlatshah was also mentioned. Suffrador Dalal, and it was noted that he is one of the closest collaborators, that is, one of the students of Sheikh Suleiman Haddadi.*

Usually, the waqf deed also specifies the identity of the person appointed to the position of *mutawalli*, the person responsible for managing the waqf property. The waqf document also reflects such issues as the procedure for using the waqf property, its income and its distribution. Kutlug Timur appointed the most righteous person among the descendants of Sheikh Suleiman Haddadi as the *mutawalli* for managing the property with which he endowed the White Khanaka and the Great Khanaka. From the analysis of the conditions in the text of the deed, it follows that both *khanakas* were managed as a single waqf. Further, the issue of distribution of waqf income is clarified. It was implied that after the *mutawalli* received his fee, half of the income from the waqf property would be distributed among the descendants of Sheikh Suleiman Haddadi. After this, it is said in detail for what purposes the remaining half of the fund's income should be directed. In particular, it is determined that the funds will be spent on the urgent needs of the two *khanakas* and the needs of the poor and other people living in them. From the distribution of waqf income, it becomes clear that mosques also operated at the *khanakas*. The imam and muezzin, responsible for performing 5 collective prayers in the mosque of the complex, are provided with funds in the amount of 100 and 50 *tanga*, respectively. It is noteworthy that in relation to this *tanga*, special emphasis is placed on the fact that it must be a silver *tanga* minted in Khorezm. This means that in the 14th century, in Khorezm, one of the administrative units of the Golden Horde, minting of coins was practiced and they were used in internal trade.

The income from the waqf property was also used to support other workers who service the *khanaka*, and a total of 300 *tangas* were allocated for these purposes. In addition, the income from the waqf was used to support various events held in the *khanaka* (*khanakas*) on Fridays and holidays. It was envisaged to allocate 5,000 Khorezm silver *tangas* annually for

Mausoleum of Khorezmshah Tekish. Kunya-Urgench (Turkmenistan), XII century

Abdulgazi Bahadur - Khan of Khiva (1643-1664)

these needs. It should be especially noted that among these events, the celebration of the day of Ashura is also separately mentioned. Until now, such a condition has not been encountered in the waqf deeds related to the activities of the *khanaka*, compiled during the Arabshahid and Kungrat dynasties. The special mention of the celebration of the day of Ashura indicates that not only representatives of the Shiite community carried out activities in the *khanaka*, but also the possible affiliation of Sheikh Suleiman Haddadi to this movement.

The waqf deed also specified that 400 coins should be given annually to the sahib-i sajjoda (the one who spreads the prayer mat of the *pir* of the *khanaka*) and the *pir*, who is the leader of the people living in the *khanaka*. It was also intended to provide for the constant sustenance of the inhabitants of the *khanaka*, and 27,900 mann of wheat from the revenues of the waqf were allocated for the expenses related to the preparation of bread, rice and *haleem*.

The last part of the text of the waqf deed of Sheikh Sulayman Haddadi reveals the date of the original, the identity of the *qazi* who signed it, and the reason for copying this deed. It first mentions that the authentic copy of the waqf deed and the correctness of the waqfs were confirmed by the seal of the Qazi-ul-Islam Abu Hafs al-Makki ar-Rahmani. It also clarifies the date of the original document, which was issued by this judge on the second day of Ramadan 750 AH/14 November 1349.

The reason that led to the renewal of the original waqf deed of the Khanaka of Sheikh Suleiman Haddadi was clarified by explaining an incident that occurred during the time of Abulghazi Khan, a representative of the Arab Shahid dynasty. According to him, «the reason for writing this new document was that one day, in the year 1070 of the Wild Boar, when Abu-l-Fath wal-Zafar Abulgazi Bahadir Khan was sitting in the office of the *mazolim (who hears civil cases), a young man of about 18-19 years old came and filed a claim for «ushr -i zamin» against a grey-bearded man. He (the old man) said that he inherited this land from his father and also from his grandfather. My father and my grandfather did not pay ushr (tithe) from here, and (I too) did not pay. The young man, refuting the words of the old man, took out two amulets from his bosom and said: I am from the clan of the Saids (descendants of the Prophet) and lost my father when I was a baby, one of these two amulets is my genealogy, and the other is the waqf deed of Sheikh Suleiman Haddadi. His Majesty examined both (documents) and ordered me, a poor man, Mullah Tahir bin Mullah Ashik Khivaki: rewrite these two amulets on paper anew (translate), so that the origin of this said and the good deed of a good man (i.e. Tugluk Timur) do not remain unknown to people. (By) the highest command I began to work, and the paper (of the original) was torn, and the inscriptions were smeared. I wrote its contents exactly.»*

This passage is important not only for determining the procedure for renewing the waqf deed, but also because it reflects the establishment of a special system - the activities of the Divan (office) during the Arab Shahid period, for the ruler to resolve the appeals of the population.

In conclusion, it should be noted that the waqf deed belonging to the family of Sheikh Suleiman Haddadi sheds light on some aspects of the economic and cultural processes during the period of Mongol rule in Central Asia, in particular, in Khorezm. Also, a comparative analysis of this type of document with other sources sheds light on such issues as historical toponymy, the activities of specific historical figures in the economic and cultural sphere, and the evolution of the culture of document circulation. In addition, it provides valuable information on some aspects of the governance system that operated during the Arab Shahid period and the practice of waqf law during this period.

The World of Ornamental Symphony Uktam Saidov

Sobirjon Sobirov,
Junior Researcher at the Khorezm Ma'mun Academy

Uktam Saidov, one of the original creators of modern fine arts in Uzbekistan, is a real master of painting. Uktam Saidov attracted the attention of art critics and specialists as soon as he presented his first works at republican exhibitions. Yes, the artist sees and understands existence through his worldview, through the eyes of his heart. In his works, he puts the experiences of his heart, the most magical feelings and thoughts. Those who see a sample of a created visual work find meaning in it, based on their own worldview, thinking, unique methodological research, spectacular experiments with form and color, and most importantly, feel the bright and warm inner world of the artist. Uktam Saidov was recognized as an artist with an original style of work, the ability to freely express his thoughts and the desire to create something new.

In this article, we want to think about the unity of form and content, which is one of the main issues of pictorial composition. The importance of this question lies in the fact that the works of artists differ from each other in the solution of form and content. If one artist expresses his idea close to nature, paying attention to vitality, another artist depicts the idea through abstraction or symbolism, various relative modified forms. The art of Uzbekistan has always been rich in bright creators. At present, it is multiplied by a new generation of artists with their own artistic worldview and creative position.

Uktam Saidov, one of the artists who adhere to his own direction and style in modern Uzbek painting, was born in 1980 in the city of Urgench, Khorezm region in a family of artisans. Since childhood, he liked the changes in nature and characters of people. From childhood, the young artist was amazed to discover the philosophical sides of life. His creative interest was formed through observation of the nature and traditions of Khorezm, where he grew up. In 1997, the interests led the future artist to the gymnasium of arts No24 in the city of Urgench, Khorezm region. Uktam graduated from this educational institution with excellent grades. In 2002, he graduated from the National Institute of Painting and Design named after Kamoliddin Behzod with a bachelor's degree in easel painting, and in 2004 he received a master's degree.

Uktam learned the secrets of painting from such representatives of the great Uzbek painting, skilled artists and teachers as Rakhim Akhmedov, Mannon Saidov, Negmat Kuzibaev, Muhammad Nuriddinov. It was undoubtedly a great gift of fate for the young artist in search of his creative path in the world of art. In his works, the artist pays great attention to decorative qualities.

Today, U. Saidov is inspired by the works of modern Uzbek painters, primarily Babur Ismailov, Akmal Nur and Fayzulla Akhmadaliev. One of the great merits of the mentors is that they created a creative environment at the Department of Easel Painting of the Institute and introduced students to the art of the Western European and Russian avant-garde. They were taught not only to improve their professional skills, but also to express reality in their own way, to conduct bold research and experiments. Therefore, one of their students, Uktam Saidov, boldly plunged into the world of creativity. Any artist goes through creative searches. After all, creativity changes in connection with life – it is not only a creative experiment, but also an attitude to a changing reality. When choosing themes, he tries to give his works a philosophical meaning, referring to famous scientists and folk proverbs. Being a thoughtful person by nature, the artist strives to establish a philosophical dialogue with the viewer through his works. The artist does not overwhelm the

Life path - near future. 2022

From the series of Proverbs. A dog will bite a poor man even on a camel. 2024

reality in the work with many details, he expresses the event in the language of subtle hints. To do this, he turns to comparisons, artistic plots, legends and images of our poetry. Bringing the expression of national thinking to the expanses of fine art, he chose the path of creating paintings with such a strong root.

The original creative path of U. Saidov shows art critics that more attention should be paid to his paintings, and his works, saturated with both national and world problems, should be scientifically explained. Today, the artist conducts pedagogical work in the educational institution where he studied, and teaches painting to young artists and sculptors.

In his early compositions, such as “The Great Silk Road”, “Lovers”, “Near Future”, “Address of Life”, “Old Urgench”, U. Saidov reflected human feelings and inner experiences. These subtle sides of human nature manifested themselves through the plasticity of the form, and sometimes the artist’s style, color balance, and managed to show the bright nature of his talent.

The work “The Great Silk Road” inspires a strong philosophical observation. The color used in the picture, the perspective view, the fact that trains replaced caravans on the Great Silk Road, that our architectural monuments are known all over the world, the construction of the first railway, and the smoke emitted by the train imprints the gate “Ota Darvoza” of the historical fortress of Khiva Ichan Kala. We see that when creating this work, the artist turned to history, studied it, and expressed the dream of the chief vi-

Kunya-Urgench. 2024

Tradition. 2024

zier of the Khiva Khanate, Islamkhodja. An artist can express his feelings with a decorative combination of colors and strong energy. This can be especially clearly observed in the film "The Near Future". Expressive colors increase the vividness of the picture. This work served to create a harmony of color, and if you look closely, you can see that different colors depict embryos, which are the successors of life. The use of different colors is illustrated by different people and different creatures.

One of the artist's works in the historical genre is the work "Kunya Urgench" ("Old Urgench"), in which the historical old city located on the territory of Turkmenistan and the daily life of the people living in it are depicted on the example of land cracked from lack of water. If the colors in the work, clouds in the sky, depict the tragedies of Kunya Urgench, then brown is a symbol of his native land. By the combination of brown color with all the symbols in the work, you can understand that the Motherland, every inch of its soil is dear and sacred. It is the duty of every human being to protect every inch of it from hostile forces.

One of his next philosophical works, The Address of Life, depicts a tree in the desert and a chair in the shade of a tree. The fact that a person lives as a traveler conveys this tree, which is a temporary place where the traveler can temporarily rest and continue his journey. If this painting of the artist is dominated by rich yellows, blues and whites, then in some works elegant spring greens and blues dominate. Uktam Saidov uses the laws and principles of color science in the works of the series, in some aspects he strengthens them, and in some cases increases the expressiveness of the picture due to the faded colors. In this way, the artist reflects the harmony of the world, expressing the surrounding colors in their purity. In the works of the "Proverb" series, the artist maximally expressed the rhythm and philosophical motif of the paintings in the oriental decorative interpretation of the styles of expressionism and minimalism. The bright yellow color covers the entire surface of the painting with large strokes. In the following works of the series, the only image of a nail in the center of the picture is complemented by galoshes, syryk and horseshoes.

From the series of Proverbs. Don't make an elephant out of a fly! 2024

These items tell about the traditions and beliefs of the peoples of the East and connect people with the sense of trust that has guided people for thousands of years. The artist criticizes these beliefs in very simple language using the example of one nail. It glorifies the great sense of faith that governs humanity.

Although U.Saidov's works on philosophical topics are always rich in content, the language used is very simple and easy. This is another facet of the artist's talent. From 2008 to the present day, we have been observing philosophical works in the artist's work, reflecting the dramatic manifestations of time, life conflicts and fate.

The artist's painting is distinguished by an individual manner of painting and unique oriental images. In recent years, it can be noted that works dedicated to Uzbek folk arts and crafts have appeared in the artist's work.

The decorations and patterns of the old monument, which speak of medieval oriental culture, are expressed as a reference to the civilization of our people. The pigments of the shade of the soil, green, white, blue, samples of calligraphy and patterns (naqsh) in the work are made as real.

Each artist chooses his own creative direction. In all the works listed above, a strong field of the artist's thinking is felt. In the paintings of Uktam Saidov, philosophical, religious and everyday themes are raised, but they all have their own solutions. The artist seems to be looking for answers to the questions of the old world in the images he creates. Many works created by U. Saidov are also notable for serving as an excellent school of experience for young people entering the art of painting.

The role of folklore in the education of youth

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Folklore is the spiritual and cultural wealth of the people, which has been formed over centuries and passed down from generation to generation. The rich cultural heritage of the Uzbek people, oral folklore - dastans, fairy tales, proverbs, sayings, folk songs and rituals - play an important role in the education of youth.

Folklore is such a beautiful art in which the history, traditions, goals, dreams and thoughts of a certain people are expressed very elegantly and popularly. If you are familiar with the folklore of any nation, you will be fascinated by its mentality and original actions. Folklore is the people's wealth. Happy is the nation that has managed to preserve its wealth. The folklore art of the Uzbek people is very rich. Folklore has entered our lives so deeply that we can use it for the proper education of modern youth. Folklore works are of great importance in the awareness of youth of national identity, the formation of moral qualities and the development of creative abilities.

Folklore is a symbol of the historical experience, customs, traditions and values of the people. Oral creativity of the Uzbek people - dastans, fairy tales and proverbs - is the main source of understanding of national identity for young people. Through these works, young people deeply understand their national culture and are proud of it. For example, the epic "Alpomish" is a vivid example of the rich cultural heritage of the Uzbek people, reflecting the heroic traditions, courage and patriotism of our people. The courage of Alpomish, the hero of the epic, his loyalty to his homeland and people are important for young people to realize their national identity, to form a deep sense of respect and loyalty to their culture. Alpomish's heroism and dedication instill in the youth a spirit of courage and bravery. The dastans of the "Gorogly" cycle are also of great importance in understanding national identity. The hero of the Gorogly epic stands up for the people and fights for justice. His brave deeds and love for his people are an incomparable tool for educating young people in the spirit of patriotism.

Fairy tales are also important for young people to understand their national identity. For example, the fairy tale "Zumrad va Qimmat" with its spiritual content educates young people in the spirit of hard work, loyalty and honesty. In the fairy tale, Zumrad's hard work and good intentions help her achieve success, which means that young people need to be aware of their national identity and respect their cultural heritage.

Folklore works are especially important as a means of moral education. The rich oral creativity of the Uzbek people - proverbs, sayings, dastans and fairy tales - is an important tool for developing such qualities as justice, kindness, humanity, and hard work in young people. These works bring the people's way of life, moral standards and human qualities into the consciousness of young people. Proverbs are the shortest and most meaningful form of folk art. For example, the proverb "If you do good, put it in the water - if not a fish, then Allah will know about it" teaches young people good deeds, generosity and kindness. Through this proverb, young people understand the importance of good deeds and their moral value. Also, the proverb "One bad person - a thousand troubles, one good person - a thousand good deeds" also explains the place of people in society and the importance of moral qualities. The proverb explains that the place and influence of a good person in society will be of great importance, and as for a bad person, he will become the cause of many problems. Such proverbs encourage young people to be highly moral, kind and responsible people.

Fairy tales are also important as a means of moral education. For example, through the fairy tale "The Rich Man and the Greedy Man" young people understand that greed is harmful, and generosity elevates a person. The heroes of fairy tales show the results of good and evil, which forms moral standards in the minds of young people.

Folklore is also of great importance in developing the creative abilities and thinking of young people. Fairy tales and epics with their fantastic events encourage young people to think creatively. Thanks to these works, young people develop the ability to consider life situations from different angles, find new solutions and implement them. For example, the fairy tale "Sweet Spring" ("Shirin Buloq") serves as a source of unique discoveries for young people. The heroes of the fairy tale - resourceful and talented children - overcome difficulties with their smart and skillful actions. This fairy tale encourages young people to overcome various difficulties, discover new opportunities, and develops their creative abilities. The dastan "Kukcha" also encourages young people to think creatively. The brave deeds of the hero

of the dastan Kukcha, his talent and ability to solve various problems develop young people creatively and intellectually. The combination of fantastic and real events reflected in fairy tales encourages young people to expand their ideas and discover new and advanced ideas. This process develops the thinking of young people and makes them creative individuals.

Folklore works are an important means of preserving national values and passing them on from generation to generation. The rich cultural heritage of the Uzbek people - dastans, fairy tales, proverbs - is of great importance for young people in understanding national values and treating them with care. Thanks to these works, young people become acquainted with the cultural heritage of their people and learn to take care of it. For example, the epic "Kuntugmish" is of invaluable importance for young people in preserving national values. Through this dastan, young people deeply delve into such values as patriotism, justice, and hard work. The hero Kuntugmish acts to protect and serve his people, which awakens in the minds of young people a sense of preserving and developing national values.

The fairy tale "Mushfiq Ona" is also of great importance in preserving national values. The fairy tale reflects maternal love and the value of a mother, it teaches young people to treat their parents with respect and devotion. This process forms in the minds of young people a sense of caring for national values and loyalty to them.

The use of folklore in the modern education system helps young people become spiritually, morally and socially complete individuals. Today, in the era of advanced technologies, despite the fact that the attention of young people is largely focused on modern mass media, the role and importance of folklore in the modern education system has never diminished. On the contrary, it is necessary to further promote folklore works in order to preserve national values and convey them to the younger generation in the modern flow of information.

The use of folklore in the modern education system is an important tool for young people to understand national and universal values, find their place in society and express themselves. The rich folklore of the Uzbek people with its spiritual and moral content serves as one of the main sources in the process of modern education. The introduction of folklore works into the modern educational process is of great importance in educating young people on the basis of national values, in the formation of their spiritual and moral worldview. In this regard, it is possible to increase the interest of young people in national culture by studying and analyzing folklore works in schools, colleges and universities. For example, in Uzbek language lessons, young people learn about their national values studying such fairy tales as "Alpomish" and "Gorogly", "Zumrad va Qimmat", "The Rich Man and the Greedy Man", "The Golden Cradle". These works play an important role in modern students' understanding of national identity and their formation as spiritually mature individuals. It is also possible to develop the moral and social skills of young people by working on folk proverbs and sayings in schools and higher educational institutions, organizing discussions on how they can be used in modern life. For example, discussions based on the proverb "Don't dig a hole for someone else, you'll end up in it yourself"

Khorezm folklore art

Folklore-ethnographic folk group "Shalola" Baysun

teach young people to be fair and have good intentions towards others.

The study of folklore in the modern education system also serves to develop the creative and thinking abilities of young people. Writing new stories based on fairy tales and epics, analyzing the events described in them from a modern point of view can be an effective means of developing the creative abilities of young people.

It is necessary to take a number of measures to strengthen the role of folklore in the education of young people. First of all, it is necessary to use modern technologies to promote folklore among young people. For example, it is possible to interest young people in our national culture through the widespread promotion of folk epics, fairy tales and proverbs via the Internet and social networks. It is also possible to interest young people in national values and traditions by organizing special clubs dedicated to folklore in schools and universities, introducing them to folk art. Thanks to these clubs, young people not only get acquainted with the rich heritage of Uzbek folklore, but also have the opportunity to contribute to folk art. Another effective measure is the adaptation of folklore works to modern life. By creating modern stories, films and cartoons based on fairy tales and dastans, it is possible to strengthen the feeling of caring attitude towards national values and loyalty to them in young people.

In conclusion, it should be said that folklore is of great importance in the education of youth not only in moral and spiritual aspects, but also in social, cultural and creative development. The rich folklore of the Uzbek people is an indispensable tool for young people to realize their national identity, form moral qualities, develop creative abilities and thinking skills. The widespread introduction of folklore into the modern education system plays an important role in educating the younger generation as mature and comprehensively developed people. In today's era of globalization, the preservation and development of national values and their transmission to the younger generation are more relevant than ever. Therefore, it is necessary to strengthen the place of folklore in the education of young people, to more widely introduce it into the modern education system. This ensures not only the spiritual maturity of the younger generation, but also the preservation and development of national culture. Folklore works serve as a means for young people to preserve and develop national values, customs and traditions. This will make young people active, conscious and responsible members of society in the future. Thus, folklore must be highly valued not only as a cultural heritage, but also as a means of education that ensures the future of the nation.

Eastern teahouse

A'lo Isakova,
Master's student

> The teahouse keeper - portly and sociable,
> To my tea, saying that the Russian should be impressed,
> Instead of spicy vodka and wine
> He gives me bitter tea.
>
> *"Persian songs" S. Yesenin.*

Teahouse? Why exactly in the East? We will describe the reason during the periods of development of the art of Uzbekistan. First of all, let's talk about what connects tea, tea house and art.

In the 3rd millennium BCE, a wonderful event took place in the history of China that would affect the development of world economy and trade for many centuries: tea was discovered. A number of information about it has been preserved in Chinese written sources and legends (legends about Shen Nun). Later, tea was grown in countries such as Japan, Korea, India, and Sri Lanka. There is no exact information about when drinking tea became a tradition in Uzbekistan. According to some sources, tea entered the cities of Turkestan through Indian traders. The reason for this conclusion was the launching of the Samarkand tea packing factory in 1923 by Indian merchants, which was the only one in Central Asia and worked on imported raw materials. According to written sources, in 1913, 720,000 poods (circa 16,3 kg) of tea were imported to Central Asia (75% green tea), 240,000 poods of which were sold in Turkestan, 150,000 poods in Bukhara Khanate, and 40,000 poods in Khiva Khanate.

As for the term "Teahouse", initially tea products were very expensive and even this product was used as currency in Mongolia, Tibet and Siberia until the 19th century. At first, tea, which was considered very sacred, was consumed only in noble households. Ordinary people did not have the opportunity to consume tea in their daily life. This drink was drunk only in special public places where tea was prepared, with dried fruits or sugar. Such places were built around neighborhood guzars, bazaars and mosques and madrasas. The sermons of the Friday prayers, the last deeds of the judges or the fatwas of the imams were reported and discussed here. Most of the issues have been resolved in the teahouses of certain guzar. Teahouses in cities had special rooms for welcoming guests from villages and distant countries, and also served as a hostel. People from abroad got acquainted with city life, people's customs, culture, socio-political information here.

The East has always fascinated the people of art. If we pay attention to the European painter, the French artist Henri Matisse was inspired by Oriental art. Especially the miniature works created by Kamoliddin Behzod had a great influence on his work. The influence of Oriental applied art is clearly visible in the works, in bright and sharp colors, ornaments, composition and pure colors, of "Artist's workshop" and "Qizilkhana". Or the golden-haired Russian poet Sergey Yesenin traveled in Central Asia and the Caucasus in 1924-1925 and lived in Tashkent for a short time, and for a while he was in Samarkand. Yesenin's series of poems called "Persian Poems" (1924-1925) was born as a product of immense respect for Eastern artists such as Hafiz, Sa'di Shirazi, Omar Khayyam. The East has repeatedly attracted the people of creativity with its fairy-tale charm.

By the early 1920s, Central Asia fell to the Bolsheviks, and despite initial armed resistance, Uzbekistan and the rest of Central Asia were incorporated into the Soviet Union. On October 27, 1924, the Uzbekistan Soviet Socialist Republic was established. During these periods, the traditional structure of society, the type of culture formed over the centuries, and relations between people were banned from the republics that were part of the-then Union. The peoples of the region separated from the single Eastern Muslim civilization and the world of the nomadic region and got acquainted with a fundamentally different European culture. Therefore, the formation of fine art took place in the context of fundamental changes in the entire system of traditional society, by rejecting the founda-

Teahouse in Samarkand. 1926. Photo by P. Kildyushev

tions of Muslim culture in order to introduce new, European genesis, types and genres of fine art instead.

Of course, the art of the 20th century is fundamentally different from the art of the earlier artistic and cultural periods of the era. At the beginning of the 20th century, on the one hand, the changes in society and political views, forced alienation of cultural, traditional and religious views, on the other hand, the utopian and philosophical oriental views of Eastern artists developed in the works of Russian artists who came to Turkestan. These two attitudes towards the East changed with the establishment of the totalitarian system of the Soviet regime on the basis of national myth (memorial) and creative myth (futurological).

Russian artists Alexey Isupov, Alexander Volkov, Usta Mumin (Alexander Nikolayev), Pavel Benkov and others, who were among the first to come to Uzbekistan, first of all fell in love with the tolerant and hospitable people of our country. Isupov, who worked in Central Asia, did not limit himself to direct observation of the surrounding life. Isupov painted a series of works on wooden plywood with tempera. He deeply studies the traditions of iconography and the unique aspects of the Eastern miniature technique and presents his original interpretation. Aleksei Isupov's 1921 work "Eastern Cafe" is interpreted as a symbol of the attractive and mysterious everyday culture and ancient traditions of the East. At the beginning of the 20th century, an Oriental teahouse owner invites guests to tea with a tray in his hands. There are so many stories in his eyes. He brushes his real human feelings. The skill of the artist, the virtuoso play of colors and smooth lines convey to us the poetry of the image and the nature of its feelings, reflecting the stories of these wonderful Oriental fairy tales....

Due to the fact that the teahouse was convenient for conducting public, political and cultural activities, it became a center of propaganda and agitation as well as organizational and educational activities in the early years of Soviet power. In the 1920s, the

. Alexander Volkov. Pomegranate chaikhana. 1924

organization of the Communist Party of Turkestan expertly used folk traditions and customs that were close to and understandable to the local population in carrying out ideological work. In the "Instructions to Agitators" approved by the Political, Cultural and Educational Department of Turkestan on June 28, 1922, it was not without reason spoke of the need to pay close attention to local living conditions, customs, tastes, morals, beliefs, recreation, education, etc., practiced by the population. This process is reflected in Mikhail Kurzin's painting «Red Teahouse», created in 1932. In the 1930s, the strict canons imposed on art and literature by the totalitarian regime greatly limited artists who were looking for harmony between European painting and examples of local applied art using bright and warm colors. Creative people were obliged to create works that served ideological propaganda. M. Kurzin's work depicts a typical teahouse. Old people are chatting around a pool on the terrace over a bowl of tea. A megaphone is installed on a column. Agitational speeches are constantly heard from it. Colored flags are hung on the ceiling of the terrace. In the center of the painting is a portrait of Lenin. The main coloring of the painting is given by red colors - the color of blood, elevated by the Bolsheviks to a symbol of the struggle for justice for oppressed peoples.

During these times, teahouses were not only focused on ideological work, but were also the meeting place for the members of the national enlightened movement. Pavel Benkov in 1932 in his work "Under the trading domes of Old Bukhara". Teahouse" describes a teahouse around the bazaar. The work is made in the impressionist tradition. Colors are minimally mixed, bright and dark tones express the Oriental flair by mixing complementary colors. The teahouse is located right on the threshold of the bazaar, and is a convenient place for visitors and people returning from the bazaar to rest and drink tea. From behind, another load of camels is coming. The tea market is still brisk today. The artist deliberately avoids the ideological context, trying to convey the charm of a momentary episode in the life of an old eastern city.

Navbahor Chaikhana, Tashkent 2024. Photo by V.Goncharenko

For this reason, the Bukharans who could not hold meetings in the mosque or madrasah gathered in the teahouse in Labi Khavuz. The teahouse was considered not only a place for rest and food but also a gathering place for intellectuals of the time. When another meeting was held in the teahouse, the emir's police arrested everyone. Among them was Shaniyaz Ata, who was seriously injured during interrogation and died a few months later, leaving his infant son an orphan.

The famous artist Alexander Volkov also addressed the teahouse theme many times. Art lovers are familiar with his 1924 work "Pomegranate Teahouse", which received the Grand Prix in Paris in 1937 and is now the pride of the Tretyakov Gallery collection in Moscow. This masterpiece's mystical and artistic significance has been beautifully revealed in many scientific works. Perhaps, we will pay attention to Volkov's 1936 work "Teahouse". In the work, the eyes of the person smoking a cigarette are half-closed, as if the worries of the world are slowly receding and

Mikhail Kurzin. Red teahouse. 1930

Alexander Volkov. Teahouse. 1936

he is traveling to the utopian land he imagined. Two people standing sideways to the audience and a young man holding a gourd in his hands are watching the effect of a person smoking chilim (hookah).

Another task of the creative people was "socialist realism". This direction began to be used not only as a form of art, but also as a method of educating the Soviet man. The state becomes the main customer, inspirer, consumer and evaluator of Soviet artists. Many works were created under the motto national in form, socialist in content, and international in composition. Zakir Inoghomov's work "Teahouse keeper" created in 1958 is notable for its vivid and lifelike representation of the national spirit and characters' faces. Our hero, smiling at the viewer in national clothes, is happy with life. Everyone has equal rights regardless of age, race and social background. Whether you are a tea shop owner or a tea drinker, your position is the same. Plots such as women going to pick cotton with joyful songs, children playing in kindergartens in the fields, women mechanics, schoolchildren coming to harvest grapes were commissioned by the state, and sometimes they were well paid. During these years, folk wits - askiyachi and famous singers, performers of traditional maqoms and katta ashulya delighted visitors to the crowded teahouse with their performances. The teahouse opened early in the morning and closed late in the evening - such was its magnetic power.

In the early 1960s, Mick Jagger, Elvis Presley, Jim Morrison and many other Western musicians became icons among students. Young people wear crisp white nylon shirts with narrow collars, ankle boots, thin ties, leather jackets, and white socks. Girls had short hair and wore dresses and pants. Westernization has also become very popular in the field of art and culture. Now cafes, bars and restaurants have become popular as competitors to teahouses. Most of the young people chose entertainment places. The work "Cafe" by Konstantin Suryayev in 1966 is a clear proof of this opinion. In the play, young men and women in modern clothes are dancing to the music. During these years, the spiritual and religious views were much faded, and the local population and the people who moved from other republics had an international culture.

Of course, from the 1970s to the 1990s, there was a more tolerant attitude towards creative people. This period left a bright mark on the cultural life of Uzbekistan. Striving to update the principles of traditional images in painting, working on new forms of expression, testing oneself in various stylistic principles, creating works in an impressionistic-figurative style became popular. Artists gradually began to leave social realism. The idea of a philosophical understanding of life is leading. These changes were determined by a number of social and political factors. Artists began to depict the topics related to the historical and cultural past without any pomp and ceremony. Predominant in their interpretation of metaphoric, poetic-imagery, artists began to work on historical and cultural themes in a creative free style.

It should be noted that the fate of teahouses has also changed radically. Many eateries have become restaurants, and teahouses next to eateries have become self-service. As a result, the true essence of the teahouse, which once attracted the whole world, has disappeared. Speed has become an urgent problem. Copper samovars, porcelain teapots, and bowls were replaced by tanks, tin kettles, and glasses in most of the teahouses. Trestle beds were replaced by tables and chairs. Real classic style teahouses have dwindled to the number of fingers. Here, Tora Shomirzayev's

TTura Shomirzaev. Teahousekeeper. 1994

Rustam Bozorov. Noodle shop. 2023

1994 work “Teahouse keeper” is a clear proof of our above thoughts.

In recent years, a system of eateries designed to cook only one type of food and fast-food chains, which have entered very quickly from Europe, have been launched. Lagmonkhana (noodle café), soup centers, KFC and similar places have become a natural thing to meet at every step in cities and regions. Instead of preparing food at home, it has become popular to order semi-finished foods or ready-made meals. As a result, it can be said that teahouse culture and hospitality became a status related to materiality only.

Yes, after the 1920s, the visual art of Uzbekistan developed very rapidly. The painting styles developed in Europe and Eastern Europe through many years and even centuries of research became the basis for new styles that were adopted in a short time in our country. Our creators who can make the name of Uzbekistan known in different places of the world have grown up. And, of course, the European culture did not fail to influence not only art, but also our culture. Our age-old customs, our traditional teahouse culture have also been lost in a sense.

Pavel Benkov. Chaikhana. 1932

Of course, such losses are sad, but the attitude of the Uzbek people to tea has not changed over the centuries. Now take some tea. Go for green tea, black tea, fruit tea, drink this sugary tea and be healthy!

This is what the teahouse owner on the cover of our magazine says, inviting us to a cosy Uzbek teahouse…

Zakir Inogamov. The teahouser. 1955

The editorial team visited Navbahor chaikhana in Tashkent to see that the big city still needs the cozy silence of an “Oriental Café” today

Academician Karim Shaniyazov is 100 years old

Karim Shaniyazov, academician, scientist and ethnographer, 1990s

In our country, much attention is paid to the sphere of science. It has become a tradition to honor the memory of great scholars and scientists who passed away. This year, our country widely celebrates the 100th anniversary of the famous scholar, ethnologist and historian, Academician Karim Shaniyazov. In connection with the anniversary, round tables and meetings are held, a number of articles have been published. A scientific conference is planned for the 100th anniversary of the scholar.

Karim Shaniyazov was born to a family of peasants on October 1, 1924 in the village of Karluk of Kasan district of Kashkadarya region. His ancestors were originally from Bukhara. Having lost his mother at the age of one and his father at the age of six, Karimi was first raised by his grandmother, then in a boarding school.

Karim Shaniyazov began working very early, from the age of 11 he worked on a collective farm. In 1941 he volunteered for the front, participated in World War II on the Leningrad, Ukrainian, Belorussian, and Baltic fronts. He was a commander of a motorized reconnaissance platoon and fought in Romania, Poland, and Germany. For courage and bravery he was awarded 5 orders and 15 medals.

After the war, Karim Shaniyazov graduated from the Tashkent State Pedagogical Institute in 1952, worked as an employee of the State Security Committee of the Uzbek SSR, and as a technical school teacher.

In 1957-1960 he studied in graduate school at the Leningrad branch of the Institute of Ethnography of the USSR Academy of Sciences and, under the scientific supervision of his teacher, the famous Turkologist Leonid Potapov, became an expert in the ethnic history of the Turkic peoples.

All activity of K. Shaniyazov was connected with the Institute of History of the Uzbekistan Academy of Sciences, where he worked in positions of senior scientific employee (1960-67), head of department (1967-73), lead scientific employee (1999-2000). The study of the ethnogenesis and ethnic history of the Uzbek people is directly connected with the name of Karim Shaniyazov, the researcer published a number of scientific works on this topic. The first major scientific work of the scholar, the monograph «Uzbeks-Karluks (Historical and Ethnographic Essay)» was published in 1964. This work is dedicated to one of the large ethnographic groups of Uzbeks - Karluks. In his work, K. Shaniyazov continued a deep study of ethnic history, the process of formation of the Uzbek people, conducted historical and ethnographic research on such individual components as Kangly, Kipchaks, Yuzs, Kurama and others.

In 1975, K. Shaniyazov defended his doctoral dissertation on the topic «On the Ethnic History of the Uzbek People», and in 1990 he received the title of professor. He is also the author of such fundamental

Karim Shaniyazov, 1940s.

Karim Shaniyazovich Shaniyazov, 1940s

works as «Kang and Kangly» (1990), «Karluks and the Karluk State» (1999). He studied the relations of Uzbeks with other peoples of the Central Asian region, the role of Turkic-speaking peoples in the ethnogenesis of the Uzbeks. The scholar devoted many articles, sections of collective monographs, reports at conferences and symposiums to these issues. Among them are «Modern Ethnic Composition and Ethnic Processes in the Uzbek SSR» (1970); «Ethnocultural Ties of Uzbeks with Other Turkic-Speaking Peoples of Central Asia» (1976); «Some Issues of Ethnic Dynamics and Ethnic Ties of Uzbeks in the 14th-18th Centuries» and others.

K. Shaniyazov headed a number of ethnographic expeditions, as a result of which almost all regions of Uzbekistan were studied and huge, unique materials of field research related to various ethnographic problems were collected. The scholar summed up his many years of research on ethnography in the collective monograph «Uzbeks», prepared in the Department of Ethnology of the Institute of History of the Uzbekistan Academy of Sciences in the 1980s. Together with co-authors, the researcher created the four-volume «History of the Uzbek SSR» (1968) and «History of Uzbekistan» (three volumes, 1993). In these books, he wrote chapters and sections on the life and culture of Uzbeks in different periods of history. He actively collaborated with ethnographers from Moscow, Leningrad and many republics of the former Union, and is the author of a number of collective studies: «Essays on the history of the economy of the peoples of Central Asia and Kazakhstan» (L., 1973); «Economic and cultural traditions of the peoples of Central Asia and Kazakhstan» (Moscow, 1975); «Ethnic processes among the national groups of Central Asia and Kazakhstan» (Moscow, 1980). K. Shaniyazov's scholarly interests were quite significant: he studied social relations in the village, public land use, forms of land ownership, traditional folk festivals, games and other issues. In 1981, together with H. Ismailov, he wrote «Ethnographic essays on the Uzbeks of the late 19th - early 20th centuries». The scholars' last scientific work was «The process of formation of the Uzbek people». This is a fundamental work in which the author, based on new sources, provided extensive information on the ethnogenesis and ethnic history of the Uzbeks, starting from the 1st century. K. Shaniyazov's scholarly works made a fundamental contribution to the development of the main problems of the historical ethnography of the Uzbeks.

K. Shaniyazov was married to S. Azimjanova, a famous Orientalist. He raised a son, a daughter, many grandchildren and great-grandchildren. He was awarded the title of «Honored Scholar of Uzbekistan». In 1994, he was elected a corresponding member, and in 2000 - a full member of the Uzbekistan Academy of Sciences.

Karim Shaniyazov died on October 5, 2000. Currently, dozens of his students are engaged in various topical issues of ethnogenesis and ethnic history. It has become a tradition in our country to hold a scientific seminar «Readings of Academician K. Shaniyazov «, dedicated to the memory of the scholar.

Prepared by M. Abdullaev based on Internet materials.

Allaev K.R.
Modern energy and its development prospects.
Under the general editorship of Academician A.U. Salimov.

Publishing house "Fan va tekhnologiyalar". 2021, 952 p.

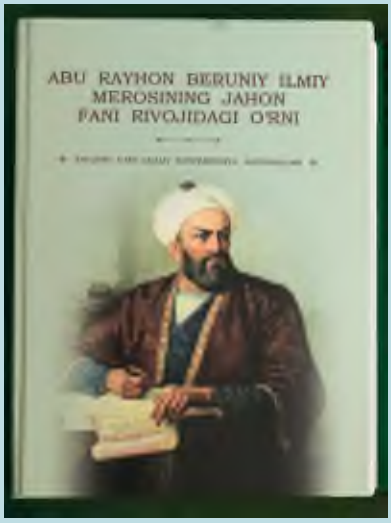
The monograph, consisting of 2 parts, analyzes the current state and prospects for the development of energy in the world and Uzbekistan until 2040-2050.

The first part examines the scenarios for the development of global energy developed by the International Energy Agency (IEA), the state of global supply of oil, natural gas, coal, nuclear energy, renewable sources, including hydrogen energy until 2040-2050. The issues of intellectualization, digitalization, decarbonization and the introduction of distributed energy, as well as the impact of energy on the environment, are studied. The problems of increasing energy efficiency and energy production and consumption are considered separately.

The second part presents data on the electric power industry of the Republic of Uzbekistan. It is shown that by implementing the Decrees and Resolutions of the President of Uzbekistan Sh.M. Mirziyoyev, as well as the decisions of the Government on the development of the electric power industry, the country has achieved success in providing the economy and population of Uzbekistan with reliable and high-quality electric and thermal energy. The prospects for the use of nuclear energy and renewable energy sources in Uzbekistan in the medium and long term - up to 2050 - are highlighted.

The monograph is recommended to heads and managers of energy enterprises and departments, organizations involved in energy development in the medium and long term, researchers and doctoral students, as well as undergraduate and graduate students in energy specialties. The information provided will be useful to all readers interested in energy development in the world and Uzbekistan.

The monograph is published in Russian with brief annotations in Uzbek and English.

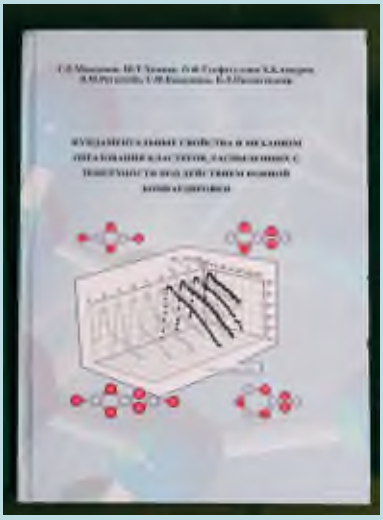


Authors
The Contribution of the Scientific Heritage of Abu Rayhan Beruni to the Development of World Science
Editors: Prof. B.A.Abdukhalimov, PhD
M. Khodjimatov

"MA'NAVIYAT" Publishing House. Tashkent. 2023

The book is a collection of articles from the International Scientific and Practical Conference dedicated to the 1050th anniversary of the great thinker and polymath Abu Rayhan Beruni. The collection of articles of the International Conference includes scientific reports presented in Uzbek, English and Russian by famous orientalists and historians from the USA, Indonesia, Italy, Malaysia, Morocco, Egypt, Pakistan, Russia, Turkey, Turkmenistan, Tajikistan, Kyrgyzstan, Iran, India, Uzbekistan and other countries of the world, telling about the life and creative work, contribution to world civilization, science and practice of the outstanding thinker and polymath Abu Rayhan Beruni.

The collection includes reports in the original in Uzbek, English and Russian.



Umarov A.A.
Innovative activities of research institutions in the context of modernization of the economy
Editor-in-Chief M.V. Kremkov, Professor, Academician of the Russian Academy of Natural Sciences

Publishing house "Fan va texnologia"
Tashkent. 2016

The monograph is devoted to the consideration of characteristic features, priorities and prospects for the development of innovative activities of research institutions in the context of modernization of the national economy. Particular attention is paid to issues of legislative, organizational, personnel, logistical, financial, economic and information support for innovative activities, as well as to the assessment of the effectiveness and efficiency of scientific and innovative activities of research institutions. The current problems of the impact of various factors, including risks, are considered in order to activate innovative activities of research institutions with the participation of financing and infrastructure organizations that contribute to the development, promotion, implementation and commercialization of intellectual property objects created as a result of the implementation of innovative projects by scientists.

The book is intended for researchers, economists, doctoral students, masters and university students specializing in the field of macroeconomics, innovative development of the economy and innovative activities of research institutions.

The monograph was published in Russian.

B.M. Beglov, Sh.S. Namazov, A.R. Seitnazarov, A.M. Reimov, B.S. Zakirov
Phosphogypsum and its utilization

Publishing house "METODIST NASHRIYOTI"
Tashkent. 2023

The monograph is devoted to the problems of using and utilizing phosphogypsum, a large-tonnage waste product of extraction phosphoric acid production. The study describes the ways of utilizing phosphogypsum, including as: - an ameliorant for saline soils, - a feed additive for cattle, - a paper filler, - a raw material component in the production of various grades of mineral and organomineral fertilizers - ammonium and potassium sulfates, complex fertilizers, slow-acting and granulated fertilizers. The paper describes thermal methods of processing phosphogypsum, including: - obtaining a hydraulic binder, sulfur dioxide and lime, - sulfur dioxide and Portland cement clinker, - sulfoaluminate silicate cement and high-grade fast-acting cement, as well as methods for obtaining sulfur, calcium sulfide and fluoride from phosphogypsum. The toxicological and hygienic characteristics of phosphogypsum are given.

The book was written by a team of authors – research fellows of the Institute of General and Inorganic Chemistry of the Uzbekistan Academy of Science and is intended for researchers and specialists in chemical production, as well as doctoral students, master's students and university students specializing in the field of general and physical chemistry and chemical technology.

The monograph is published in Russian.

About a rocket for children

Despite the fact that people no longer find a rocket amazing, few ordinary people know how it works. But even more people do not know how a rocket takes off . Now we will fix this. And what's more, we will become real experts in rocket science!

This word was borrowed from the German language into the Russian during the reign of Peter I. When in 1696, when using military projectiles, ship signals or projectiles for fireworks, they said “rocket”.

The word itself, translated from German, meant a projectile consisting of a thick paper tube with a gunpowder mixture inside, and a wooden rod attached to the end.

It is not surprising that dreams inspired man to invent the rocket!

A Soviet inventor, who is considered a brilliant self-taught scientist, was the first in the world to invent a rocket. His name was Konstantin Eduardovich Tsiolkovsky. As the researcher himself said, at night he loved to watch the stars through a telescope. And of course, every time he thought about how great it would be to fly to them! As a result, Konstantin Eduardovich came up with a rocket that ran on fuel. When burning, the fuel evaporated, releasing a powerful flow of gas, which pushed the rocket upward.

However, if Tsiolkovsky is rightly considered the father of cosmonautics in general, then the father of rocketry is Sergei Pavlovich Korolev. It was he who managed to figure out not only how to lift a rocket off the ground and overcome gravity, but also how to make a spacecraft controllable.

The official launch date of the first rocket is April 11, 1937. But rockets for space exploration have been launched continuously since the 1950s.

In fact, the principle of the rocket that the Soviet scientist invented also works on modern spacecraft. That is, the rockets that take off now overcome the gravity of the earth due to jet thrust. When the huge thing pushes off from the ground, the energy released from the combustion of liquid in the fuel tanks helps it. Interesting fact: during takeoff, the rocket spends the lion's share of fuel! Namely , about 90% of the entire reserve. The combustion power during takeoff is so strong that the fuel evaporates in just a few minutes.

How does a rocket work?

We already know that it takes a lot of force to fly into space. That's why a rocket is so big.

A spacecraft consists of stages . Stages are sections of a rocket that are thrown off during takeoff. When, for example, the first stage uses up all its fuel, it simply separates from the structure. Then, the same thing happens with the second stage, and so on, until only the spacecraft remains - the very top of the rocket.

If you look at the structure of the rocket from the bottom up, the first thing is the "nozzle" - in simple terms, this is the opening through which the burning cloud of gas comes out. Next is the combustion chamber, to which huge pumps come. Fuel and oxidizer enter the chamber through these pumps. The giant fuel tank is located just above the pumps, and even higher is the oxidizer tank.

By the way, an oxidizer is absolutely necessary! Because without oxygen, fuel does not burn. So the rocket has to "stock up" not only on fuel, but also on a large tank of oxidizer to continue moving in a vacuum.

The post-instrument (?) section comes next. It actually contains the equipment that controls the rocket. And the rocket's design is completed by the spacecraft, this is the very peak of the rocket. It is the spacecraft that remains, after all, to perform its tasks in space.

Why does a rocket consist of stages, can't it be made in one piece?

Yes. No modern rocket is ever whole. They are all multi-stage. In fact, inside the first stage there is another rocket, consisting, as we already know, of an engine and tanks with oxygen and oxidizer.

When the first stage separates, the second stage is turned on, inside of which there is also a rocket with an engine and tanks... and so there can be up to four stages. The largest stage is, of course, the one that is closer to Earth. After all, you need to break away from our planet, remember? And that means spending a lot of fuel. Accordingly, each subsequent stage is smaller.

But why such complications?!

This is how the rocket efficiency increases! In a simplified version, the formula of scientist Tsiolkovsky sounds like this: "The less the weight of the rocket at the finish compared to its initial mass at takeoff, the more efficient the rocket is".

Still not clear?

Let's imagine that we went on a hike to a waterfall. Naturally, we took a large backpack with provisions. But along the way, we slowly got rid of the things in it. As a result, the closer we were to the waterfall, the lighter our backpack became. Consequently, with each step it became easier to carry, and we could walk faster to our destination!

Based on this logic, it all looks simple! Isn't it? Why would a rocket carry empty tanks with it that no longer contain fuel? Of course, it's better to get rid of them, reduce the mass and save more energy.

In addition, in space, only the very tip of the rocket remains. It is light and maneuverable, easy to control. Large fuel reserves are not required in space, impulse engines pushing the rocket are enough. But now imagine that a huge machine is flying in space, with empty tanks. Can you imagine it? That is why it is not profitable, and not practical, to send a rocket into space in one piece!

CENTRE FOR PROMOTION OF SCIENCE UZBEKISTAN ACADEMY OF SCIENCES

"Fan va turmush". A quarterly popular science journal.

Issues since 1933
For 12 years old and beyond.
Founder: Uzbekistan Academyof Sciences
Journal is published in Uzbek, Russian and English.
Journal is registered on December 6, 2006 by Uzbekistan Republic Press and Information Agency.
Certificate: No. 0022.

English language editor **– K.Kh. Abdullayeva**
Translator from Uzbek to English – **K.Kh. Abdullayeva**
Page designer – **N.M. Vyatkina**
Managers: **Kh. Kholmuradov**
Photographer: **V. Goncharenko**
Pictures courtesy of **V. Vyatkin, A. Khakimov**.

Our address: 100047, Tashkent, Ya.Gulomov street, 70.
Phone: 71 2334305:
Electronic mail: fanturmush@gmail.com
Journal web page : www.fvat.uz

The journal is published in the "PRINT MAKON" LLC printing house.

Address of the printing house: Tashkent,
Uchtepa district, 23-47-45
Permission granted to print: 18.11.2024

"Fan va turmush" Issue No. 3 (602), 2024
Paper size: 60x84 1/8. Size: 8 sheets. Circulation: 200 copies.

Subscription to the journal is available in the editorial office, at any post office through the representative offices of subscription agencies or online: http://www.pochta.uz/subscribe/
Index: 1407

Contract price

In the first issue of our journal in 2024, in the article by G. Lasikova, signed as "Scene of the feast of the king of Yemen in the garden. Saadi. "Bustan". 1500s. Bukhara. Marjani Foundation. Inv. IM/R-3. L. 15, due to the editorial fault, a photo of a different miniature was presented. To correct the error, we are publishing a photo of the miniature "Scene of the feast of the king of Yemen in the garden. Saadi. "Bustan". 1500s. Bukhara.

گرچند از مقالات آن [illegible]
که نه ملک دارد نه سیم و گنج
شنیدم که جشنی ملوکانه ساخت
چو چنگ اندر آن بزم خلقی نواخت

Index: 1407

Radioactive decay (visual module) is a mechanism in which an unstable atom loses energy through radiation