Science for the benefit of mankind

FAN VA TURMUSH

«Science and Life» popular science journal

Centre for Promotion of Science Uzbekistan Academy of Sciences

3/2014

THE PATH OF THE MASTER – FROM CRAFT TO PHILOSOPHY

- The role of pheromones in ecology
- Reflection of festive themes in the works of composers of Uzbekistan
- From the history of railway transport
- Green shield of the dry bottom of the aral sea

nterior of the Mausoleum of Hakim at-Termizi - photograph by Vladimir Goncharenko -
cameraman of the journal "Fan va Turmush", awarded 1st place in the International competition of the organization
Wiki Loves Monuments in the nomination "Heritage of Central and Southeast Asia"

OUR DEAR AND RESPECTED READERS!

In the era of rapid development of digital technologies, the flow of information is huge and comprehensive. In many cases, this information is offered in the form of messages that do not have scientifically based arguments. Purely scientific journals are intended for a narrow circle of specialists, and therefore tire both the sophisticated and the ordinary reader of the journal. We offer a golden mean - our journal "FAN V.A. TURMUSH". For more than 90 years, it has devotedly served to advance the educational and scientific knowledge of our people, combining popular language of presentation and academically rigorous research results.

Starting in 2023, a new team is working hard on the content and design of the journal. It is published not only in Uzbek, but also in a separate format - in Russian and English, which significantly increases the interest of foreign readers in various branches of science in our country. In particular, scientists and researchers from the USA, Russia, Canada, UK, Germany, Austria, China, Iran, during their visits to Uzbekistan, became closely acquainted with the activities of the journal and gave it high marks. Our scientists, during their visits to Russia, Tajikistan, Kazakhstan, Belarus, Azerbaijan and other neighboring countries, presented the journal to the Academies of Sciences and central libraries of these countries.

Articles by foreign scientists also began to be published on the pages of the journal. So, last year, the famous Iranian scientist, professor of mathematics Mohammad Sal Moslehian wrote a fascinating and relevant article: "Why should mathematicians ask politicians to avoid the eternal dilemma of theoretical and applied mathematics?" On the recommendation of Academician Shavkat A. Ayupov, we published it, and it aroused great interest among a wide readership. The article by Russian art historian Galina Lasikova "Miniatures of Mavernnahr in the treasuries of the Marjani Foundation," published in the 1st issue of 2024, was perceived as a sensation. It contains information that the Bukhara miniature of the 17th century stored in the Marjani Foundation conveys the image of Mirzo Ulugbek. A fragment of this miniature depicting the young prince Mirzo Udugbek was placed on the first cover of this issue of the journal with the note – Sensation.

Another small but pleasant news - starting from 2024, a new section has appeared in the journal, which provides a brief summary of new books, monographs and textbooks published by scientists and scholars of the Uzbekistan Academy of Sciences.

Dear readers! The same team that works on the preparation and publication of the journal also makes up the staff of the Center for the Promotion of Science of the Uzbekistan Academy of Sciences, under whose auspices it is published. Thus, these are not two different structures or organizations, but a single whole... with two names. Therefore, sometimes the phrase of curious people who do not know the essence of the matter sounds strange when they say: "We know that the magazine is being successfully published, but what is the Center for the Promotion of Science doing?" We answer: the main task of our Center is to popularize and promote the main achievements of the country's science in the journal "FAN VA TURMUSH".

However, we are not limited to just preparing the journal. Over the short period of its existence, the Center has done quite important work to promote academic science in Uzbekistan beyond the pages of the journal. Suffice it to say that in the second half of 2023, on the basis of the Memorandum of Cooperation of the Uzbekistan Academy of Sciences and our Center, on the one hand, and the World Society for the Preservation, Study and Popularization of the Cultural Heritage of Uzbekistan, on the other, a competition for young scientists of the Uzbekistan Academy of Sciences entitled "Eureka" was held in five nominations. In each nomination, 3 places were designated. The laureates who received first places were awarded prizes in the amount of 10 million soums. The young researchers who took second place were awarded televisions, and the laureates who took 3rd place received tablets.

In connection with the preparations for the 80th anniversary of the Uzbekistan Academy of Science, the Center's staff took an active part in preparing the publication of a fundamental book and a documentary film dedicated to this anniversary.

On the initiative of the Center, at the beginning of 2024, the "Eureka" club was organized from among the winners of the "Eureka" competition for young researchers. Members of this club (15 people) promote the activities of the country's Academy of Sciences in educational institutions, work collectives, the media, social networks on the problems of their chosen scientific field directions.

In order to widely promote scientific achievements among the public of our country, the Center's employees carried out official trips to Fergana, Bukhara, Khorezm, Surkhandarya, Kashkadarya, Tashkent regions and the Republic of Karakalpakstan. During these trips, about 20 meetings were held with students and work teams. Information was given about the essence of the reforms taking place in our country, the role of science in building the foundation of the Third Renaissance and the activities of the country's Academy of Sciences.

As part of the large-scale festival "Gold embroidery and jewelry art" which was held on May 3-5 in Bukhara, our Center organized an International scientific conference on the topic "Prospects for the development of gold embroidery and jewelry art." Employees of our Center prepared and published a collection of materials from this conference, at which 5 employees of our Center made presentations. Center for the Promotion of Science organized a Republican conference on "Modern ceramics of Uzbekistan: traditions and innovations" as part of a gathering of potters held in Rishton on June 1-5. And again, the staff of our Center not only prepared the conference collection for publication, but also took an active part in the conference with reports, and the Director of the Center, Academician A. Khakimov, was the moderator of this scientific forum.

In collaboration with the TV channel "Uzbekiston Tarikhi" ("History of Uzbekistan"), the Center organized a series of programs on the topic "History and new interpretation", within the framework of which about 30 programs were prepared over 6 months of 2024. They analyze in detail the books and monographs of scientists and scholars of the Uzbekistan Academy of Sciences, published over the past 2-3 years.

In collaboration with the Agency for Youth Affairs of the Republic of Uzbekistan, the Center for the Promotion of Science organized the project "Module 5/academician". In it, academicians and prominent scientists and scholars of the Uzbekistan Academy of Sciences shared their thoughts on the role of science in the development of our country. The Center's employees took part in more than 90 programs on various domestic television channels and other media, the main goal of which was the widespread propaganda and popularization of academic science in Uzbekistan.

Dear readers!

We bring you back to the topic of our magazine. Your careful eye may have detected a common thread among the photographic illustrations presented on the four cover pages. Yes, that's right, despite the differences in the plots, the common visual figure in them is the Circle.

The circle is the shape of an elegant Rishtan lyagan, on which the virtuoso master Sharfiddin Yusupov painted an amazing floating jug - a symbol of hospitality and life-giving moisture...

The circle is a modular basis for the architectural decoration of the masters of the Muslim East, the fantastic embodiment of which we can see in the interior decor of the Hakim at-Termezi mausoleum in Surkhandarya... The photo of this masterpiece was captured by our journal's photographer Vladimir Goncharenko, who received 1st place at the prestigious International Photo Competition "Heritage of Central and Southeast Asia" for this photo.

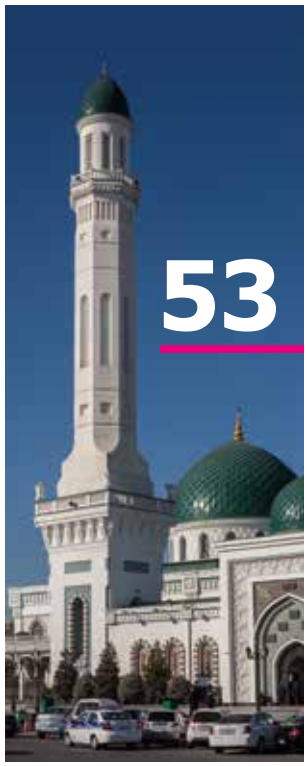
A circle is a kind of visual module, which also underlies the microcosm invisible to the naked eye... Such, for example, is the microscopic picture of the structure of radioactive waste atoms converted into non-radioactive elements using the method of Gerard Mourou, called transmutation....

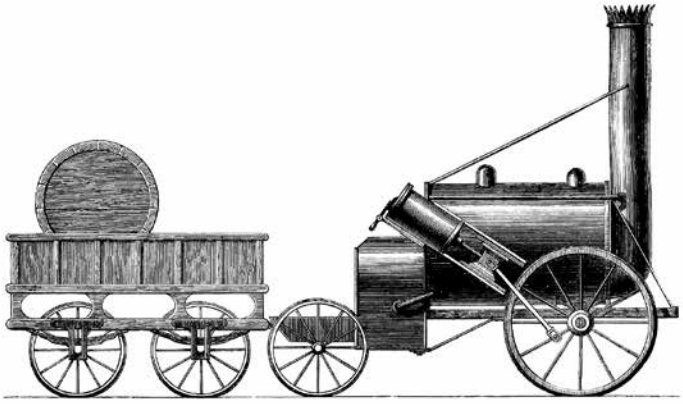
The circle is a metaphorical picture of the universe (falak), inspired in the monumental Tashkent suzani - Oy-palak - by the talented artist Madina Kasymbaeva...

The circle is a universal ideal form, created by God and repeated by the hands of man... the circle is a metaphor - the personification of the sun, the moon, the aura of the globe... And, finally, the Circle is a symbol of the family hearth, in the cozy atmosphere of which it is pleasant to read and view our favorite magazine "FAN" VA TURMUSH"...

CONTENT

HEADINGS:





Development of international scientific and technical cooperation of the Uzbekistan Academy of Sciences at the present stage

Fruitful creative connections have been established by the Uzbekistan Academy of Sciences with international organizations UNESCO, IAEA, the International Association of Academies of Sciences and TWAS, Academies of sciences of Russia, Ukraine, Belarus, other CIS countries, China, South Korea, etc. Bilateral relations are carried out between the research organizations of the Uzbekistan Academy of Sciences with a number of leading scientific centers and organizations of foreign countries: USA (Departments of energy and agriculture, University of Texas); Russia (JINR (Dubna), Moscow State University named after M.V. Lomonosov, Institute of Bioorganic Chemistry named after Academicians M.M. Shemyakin and Yu.A. Ovchinnikov of the RAS, Physicotechnical Institute named after A.F. Ioffe of the AS, State Hermitage Museum, etc.), Great Britain (University of Cambridge, British Program for Support of Nuclear Centers), Germany (DAAD Program, Potsdam Geodynamic Center, Martin Luther University, German Archaeological Institute, Center for Earth Research, etc.), France (Louvre, National Center for Scientific Research, Institute Pierre and Marie Curie, University of Nice), China (Xinjiang Branch of the Chinese Academy of Sciences, Shanghai Institute of Medical Materials, Center for Earthquake Analysis and Forecasting) and other countries of the world.

The joint implementation of bilateral agreements on cooperation of the Uzbekistan Academy of Sciences with a number of national Academies of sciences (Russia, China, Belarus, Kyrgyzstan, etc.) and international academies (TWAS, etc.), leading universities and scientific institutions (JINR Dubna, Russian Federation, International Institute of Theoretical Physics in Trieste (Italy), Texas, California, Stanford, Washington Universities - USA, Cambridge University - UK, Louvre and astronomical observatories of France, as well as national observatories of China, etc.), with laboratories of the departments of energy and agriculture USA, State Enterprise «Rosatom» - Russian Federation within the framework of the project to create a nuclear power plant in Uzbekistan with a capacity of 2.4 GW, an international collaboration of scientists within the framework of the largest scientific project «Large Hadron collider» and a number of other leading organizations in foreign countries.

Since 2017, international scientific and technical cooperation between the Uzbekistan Academy of Sciences and its research institutions has significantly intensified on the basis of signed Agreements. Thus, cooperation agreements were renewed with the Russian Academy of Sciences, the National Academy of Sciences of Belarus, the National Academy of Sciences of the Kyrgyz Republic, and cooperation agreements were signed with the Chinese Academy of Sciences, the Academy of Sciences of Tajikistan, the National Academy of Sciences of Azerbaijan, the Academy of Sciences of Mongolia, with the Academy of Sciences of Turkey, and the National Academy of Sciences of Armenia and most recently with the Austrian Academy of Sciences.

The Uzbekistan Academy of Sciences participates in the implementation of tasks for scientific and technical cooperation with foreign organizations in the USA, Russia, Kazakhstan, China, Korea, Egypt and other countries and international organizations of the CIS, SCO and OIC under 19 joint programs within the framework of bilateral “Road Maps”. In 2020 - 2023 12 joint international research projects were carried out with leading foreign research institutions, and 56 young researchers were sent on research trips and internships to leading scientific centers and universities in foreign countries. 25 researchers and 10 deputy directors of the Research Institute of the Academy of Sciences underwent scientific and practical training in scientific organizations of the National Academy of Sciences of the Republic of Belarus and exchanged work experience.

In recent years, scientific institutions of Uzbekistan Academy of Sciences have carried out joint scientific projects with related scientific organizations and universities in a number of foreign countries within the framework of the international programs «Uzbekistan - Russia», «Uzbekistan - Belarus», «Uzbekistan - China» and «Uzbekistan - Korea».

In November 2017, a Memorandum of Understanding was signed between the Uzbekistan Academy of Sciences and the Rosatom State Atomic Energy Corporation on cooperation in the field of the use of atomic energy for peaceful purposes. In October 2018, a Memorandum of Understanding was signed between the Uzbekistan Academy of Sciences, the Agency for the Development of Nuclear Energy under the Cabinet of Ministers of the Republic of Uzbekistan and the Rosatom State Nuclear Energy Corporation (Russian Federation) on cooperation in education and training

of personnel in the field of nuclear energy of the Republic of Uzbekistan.

In November 2018, an Agreement on the development of scientific and technical cooperation was signed between the Uzbekistan Academy of Sciences and the Chinese Academy of Sciences.

In April 2019, the Academy of Sciences signed a memorandum with the Cultural Heritage Foundation of the Republic of Korea on the creation of a joint center for studying the preservation of the heritage of the Great Silk Road.

As part of cooperation with Korea, more than 50 nights of photometric observations of open star clusters and active processes in nearby galaxies were carried out at the Maidanak Observatory. An important success of cooperation was the discovery on May 25, 2017 a supernova explosion, numbered SN 2017ein, and the observation of this supernova on Maidanak was the very first in the world.

In 2019, a Memorandum of Understanding was signed between the Institute of Oriental Studies of the Uzbekistan Academy of Sciences and the National Archives and Manuscripts of the Sultanate of Oman.

A project has been prepared and a Cooperation Agreement is being implemented between the Uzbekistan Academy of Sciences and the Integra company GmbH, (Germany) in collaboration with the company FAMED Engineering GmbH (Austria) to create a Center for Nuclear Medicine and Radiation Therapy in Tashkent. The signing of this Agreement took place during the official visit of the delegation of the Federal Republic of Germany to Uzbekistan in May 2019.

In 2020, Uzbekistan became an associated member of the Global Biodiversity Information Portal (GBIF system); the Institute of Botany and the Botanical Garden of the Uzbekistan Academy of Sciences are active performers of work on biodiversity.

Uzbekistan also renewed its membership in the Joint Institute for Nuclear Research (JINR, Dubna, Russian Federation) in 2020; the Institute of Nuclear Physics of the Uzbekistan Academy of Sciences has been an active participant in scientific cooperation with JINR for many years.

During 2018-2023, hundreds of events were also held within the framework of international scientific and technical cooperation. Thus, on October 28-30, 2018, the International Olympiad among students in mathematics named after Muhammad al- Khwarizmi was held for the first time in Urgench. Academicians and other leading employees of the V.I. Romanovsky Institute of Mathematics, Uzbekistan Academy of Sciences, took an active part in the preparation and conduct of the Olympiad. 334 students participated in the international Olympiad - representatives of over 58 universities, including 35 universities from 19 foreign countries. The initiative to organize this Olympiad was announced by President Shavkat Mirziyoyev at the first Summit of the Organization of Islamic Cooperation on Science and Technology, held in Astana in September 2017.

Uzbekistan Academy of Sciences attaches particular importance to cooperation with Academies of sciences - members of the International Association of Academies of Sciences (IAAS with headquarters in Minsk, Belarus). In September 2023, representatives of the Uzbekistan Academy of Sciences took part in ceremonial events in Minsk in connection with the celebration of the 30th anniversary of the creation of IAAS.

A number of leading scientists of the Uzbekistan Academy of Sciences are members of problematic scientific councils of the IAAS, and have also been elected in recent years by foreign members of the Academies of sciences of foreign countries (China, Russia, etc.).

Joint implementation of signed bilateral agreements on cooperation of the Uzbekistan Academy of Sciences with the organizations of the Rosatom State Corporation and JINR (Dubna) - Russia, with the IAEA and an international collaboration of scientists is being carried out within the framework of the largest scientific project “Large Hadron Collider» and a number of other leading organizations in foreign countries. So, in 2022 a group of scientists from the Physico-Technical Institute and the Institute of Nuclear Physics of the Uzbekistan Academy of Sciences at the JINR inchrophasotron (Dubna) for the first time

in the world received experimental confirmation of the existence of a new eight-quark resonant particle.

Close scientific ties between the Institutes of the Uzbekistan Academy of Sciences have developed with the Institutes of the Chinese Academy of Sciences: - in the field of bioorganic chemistry with the Shanghai Institute of Medical Materials, Xinjiang Technical Institute of Chemistry and Physics, Wuhan Institute of Virology; - in the field of botany, joint laboratories were organized with the Kunming Institute of Botany of the Chinese Academy of Sciences and the Chinese side allocated significant financial resources for their equipment and joint research.

The original drug developed by the Institute of Bioorganic Chemistry of the Uzbekistan Academy of Sciences against influenza infection - Rutan , was tested by Chinese scientists against coronavirus infection, as a result of which a reduction in the impact of the SARS CoV-2 coronavirus was demonstrated by 78.3%. In 2020, 11,000 packages of the drug Rutan were transferred to the Uzbekistan Ministry of Health and sent to Iran as humanitarian aid against coronavirus, and successfully passed laboratory tests there.

The Institute of Chemistry of Plant Substances of the Uzbekistan Academy of Sciences cooperates with scientific and industrial institutions in China, Russia, France, Belgium, Germany, Turkey, Japan, Belarus, Kazakhstan, and Kyrgyzstan. Thus, a joint scientific laboratory for the study of medicinal plants has been created with the Xinjiang Technical Institute of Physics and Chemistry of the Chinese Academy of Sciences, combining research and teaching functions, and a Central Asian Center for the Study of Biologically Active Substances has been created. Together with the Xinjiang Technical Institute of Physics and Chemistry and the Shanghai Institute of Medical Materials, technology is being developed and registered in the country for the drug Sofosbuvir for the treatment of hepatitis C. The Institute, together with the Institute of Organic Chemistry (Ufa, Russian Federation), is developing a new generation antiarrhythmic drug with the prospect of its release to the international level. An agreement was reached on scientific and technical cooperation with the Institute of Experimental Medicine of the Federal State Budgetary Institution "Northwestern Federal Medical Research Center named after V.A. Almazova" Ministry of Health of the Russian Federation (St. Petersburg) in the field of studying the mechanism of molecular action of the Axarhythmin antiarrhythmic drug and accompanying alkaloids. Together with the Institute of Plant Physiology named after K.A. Timiryazev, RAS, the Institute has been working on growing cell cultures of the Ajuga plant turkestanica. For many years, the Institute has been exporting a number of medicines and dietary supplements to the CIS countries and beyond. The authoritative International Scientific Journal "Chemistry of Natural Compounds", published by the Institute of Chemistry of Plant Substances of the Uzbekistan Academy of Sciences from 1965 to the present, is very popular among scientists from more than 40 countries of the world, which is translated into English by Springer Science+Business Media, Inc. and is indexed in the SCOPUS scientific database of prestigious international journals.

From 1965 to the present, the Physico-Technical Institute (PTI) of the Uzbekistan Academy of Sciences has been publishing the authoritative International Scientific Journal "Solar Engineering", which is translated into English by the American company Allerton Press, published in the USA under the name "Applied Solar Energy" and is distributed by subscription. The journal "Applied Solar Energy" is indexed in the SCOPUS scientific database of prestigious international journals. In 2017 the journal "Applied Solar Energy" was recognized by Clarivate Analytics as the best science journal of Central Asia and received the Web of Science Awards 2017. The Physico-Technical Institute of the Uzbekistan Academy of Sciences has developed and manufactured combined Stirling engines of various powers - from 0.5 to 5 kW, used in integrated power supply systems. Such engines were manufactured by the Physico-Technical Institute of the Uzbekistan Academy of Sciences and transferred to India, England, Russia, China and Kazakhstan.

The Institute of Botany of the Uzbekistan Academy of Sciences began publishing in English a new International science journal on problems of botany in Central Asia entitled "Plant Diversity of Central Asia".

In 2023 the Gala Meeting dedicated to the celebration of the 80th anniversary of the Uzbekistan Academy of Sciences was held at the "Uzbekistan" Palace of International Forums in Tashkent. On December 13, 2023, the final representative international conference "Science is the foundation of a new Uzbekistan" was also held in the Great Hall of the Presidium of the Uzbekistan Academy of Sciences with the participation of the broad scientific community of the country, Presidents and Vice-Presidents of the Academies of sciences of Russia, Belarus, Kazakhstan, Kyrgyzstan, Tajikistan, Azerbaijan, China, Turkey, Mongolia and the Republic of Tatarstan.

In 2024, delegations from the Uzbekistan Academy of Sciences also took part in anniversary celebrations dedicated to the 300th anniversary of the creation of the Russian Academy of Sciences, held in Moscow, and then in the Ural and Siberian regional scientific branches of the Russian Academy of Sciences.

The existing fruitful creative connections between scientists of Uzbekistan and their colleagues from other countries will undoubtedly receive further development. This will serve to reach a new, higher level of international scientific and technical cooperation of the Uzbekistan Academy of Sciences during the years of the Third Renaissance.

Published based on materials from research institutions of the
Uzbekistan Academy of Sciences

Interest capitalization and number *e* (practical mathematics) Number *e*

Shavkat Alimov,
Academician, National
University of Uzbekistan

A happy man was walking along the street of a medieval European city, having won 1 ducat on New Year's Day. A certain gentleman approached him with the following proposal:

- I suggest you put your ducat in our bank at 100% per annum on conditions convenient for you. Namely, you can withdraw your deposit at any time.

- What does it mean?

- If you come for a deposit in a year, then another one will be added to your ducat. And then instead of 1 ducat you will have 2. If you want to withdraw the deposit earlier, then the money will also increase, but less than one ducat.

- How much less? What will happen if I come not in a year, but, say, in six months?

- If you come back in six months, your ducat will be returned to you and only 50% will be added to it, that is, half of the ducat. This means that in six months you will receive 1+1/2 = 1,5 ducats.

- And if, having received these one and a half ducats in six months, I immediately put them back in your bank, then how much can I take by the end of the year?

- Well, it's easy to calculate. You put down 1+1/2 a ducat, 50% will be added to them over the next six months, as a result you will receive

$$\left(1+\frac{1}{2}\right)\left(1+\frac{1}{2}\right) = 2{,}25$$

- What if I come not in six months, but in 4 months?

- This is also easy to calculate. Since 4 months are 1/3 years, only one third will be added to your ducat, i.e. you will receive 1+1/3 a ducat.

- What if I withdraw all the money every four months and immediately invest it again in your bank?

- Then in a year your contribution will be

$$\left(1+\frac{1}{3}\right)\left(1+\frac{1}{3}\right)\left(1+\frac{1}{3}\right)=\frac{64}{27}\approx 2{,}37. \quad -$$

That is, instead of one additional ducat, in a year I will receive 1.37 ducats as an addition?

- Absolutely right!

- What if I carry out such an operation every quarter, that is, every three months? Since three months is a quarter of a year, then in a year I will have

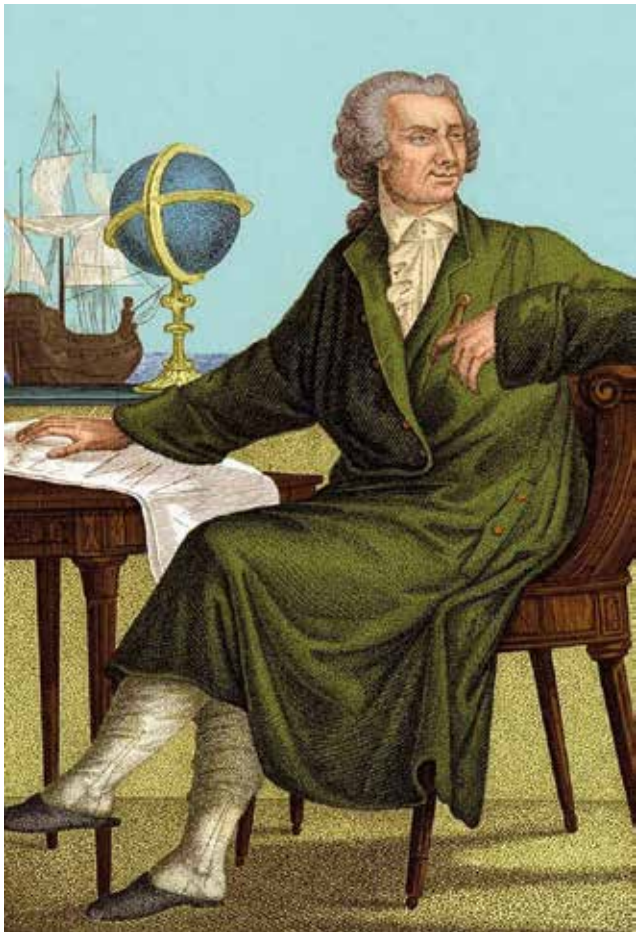
$$\left(1+\frac{1}{4}\right)\left(1+\frac{1}{4}\right)\left(1+\frac{1}{4}\right)\left(1+\frac{1}{4}\right)=\frac{625}{256}\approx 2{,}44\,?$$

- Yes!

- I must consult with my friend.

- As you wish.

The friend with whom the future investor decided to consult was Jacob Bernoulli (1655-1705), a representative of the famous Bernoulli family of Swiss mathematicians. In 1685 he became interested in the problem of the capitalization of interest, which confronted the lucky man at the beginning of our history. Interest capitalization refers to the calculation of in-



Leonhard Euler (1707-1783) - mathematician and mechanic

Jacob Bernoulli. 1655-1705

terest not only on the money invested, but also on the interest received.

Bernoulli noticed that the contribution increases with the frequency with which interest is capitalized. If capitalization is carried out after six months, then for the year it will increase by a factor, if every four months (i.e., dividing the $(1+1/2)^2$ year into three parts), then by a factor, and if every three months (i.e., $(1+1/3)^3$ quarterly), then in $(1+1/4)^4$ time.

Here the notation a^n denotes raising a number a to a power n :

$$a^n = a \cdot a \cdot a \cdots a \text{ (total } n \text{ multipliers).}$$

(Recall that this notation was introduced by the French mathematician R. Descartes half a century before the events under consideration).

A simple calculation shows that the inequalities are satisfied

$$\left(1+\frac{1}{2}\right)^2 < \left(1+\frac{1}{3}\right)^3 < \left(1+\frac{1}{4}\right)^4.$$

If you go further and capitalize the interest every month, then the contribution will increase by several times, and this number is greater than $(1+1/12)^{12}$ each of the previous ones.

The question that interested Jacob Bernoulli is how much can the deposit grow if capitalization is carried out very often?

In other words, he looked at the numbers

$$\left(1+\frac{1}{n}\right)^n \qquad (1)$$

sequentially at $n = 1,2,3,4$, etc. and found that as the number n increases they increase. The question is - how much?

So, he showed that they will not increase that much, they will always remain less than 3.

More accurate calculations show that the sequence of numbers (1) as it increases n approaches some extremely important number from a mathematical point of view, slightly larger than 2.7. Later this number received the designation e .

Mathematically, the fact that the sequence of numbers (1) n approaches the number as it increases e is written as follows:

$$e = \lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n. \qquad (2)$$

Apparently, this is the first time in mathematics when a number is defined as the limit of a certain sequence of numbers.

The number e turned out to be non-rational, that is, it cannot be represented as a ratio of two integers. It is expanded into an infinite decimal fraction, its expansion with the first fifteen decimal places after the decimal point has the form $e = 2{,}718281828459045...$

Usually the number e is replaced by an approximate value, believing $e \approx 2{,}7$ that it is quite sufficient for many calculations.

Interest capitalization

1. Simple interest . One of the most common bank deposits is a time deposit without interest capitalization. The bank offers the client to invest a certain amount for a period of 1 year at a certain interest rate without the possibility of receiving any part of it within a year. If we denote the annual interest rate by $p\%$, then after a year the bank returns to the client an amount that is as $(1+p/100)$ large.

For example, if the annual interest rate is equal to 24%, i.e. $p = 24$, then after a year the invested amount will increase by $(1+24/100) = 1{,}24$ times.

Let's assume that the client invested 5,000,000 soums with an annual interest rate of 24% . Then by the end of the year his account will be

$$(3)\quad 5\,000\,000 \times \left(1+\frac{24}{100}\right) = 5\,000\,000 \times 1{,}24 = 6\,200\,000 \text{ soums}.$$

Therefore, the investor's income for the year will be 1,200,000 soums.

The interest received on a fixed-term deposit without capitalization is called simple.

Capitalization

2. Compound interest. To interest the client, the bank can open a deposit with interest capitalization. Typically such a contribution looks like this.

By depositing, for example, 5,000,000 soums into an account with an annual interest rate 24%, the investor can receive from his deposit within a month 24%/12 = 2%

Since 1% of 5,000,000 is 50,000, then 2% of the deposit is 100,000 soums. At the same time, he may not withdraw this money, but immediately add it to the main deposit. Thus, the initial deposit will increase (1+2/100) = 1,02 several times and amount to 5,100,000 soums.

In another month, the investor will receive 2% from this increased amount, i.e. 102,000 soums. If he does not take this money, the deposit will increase again by 1.02 times and amount to 5,202,000 soums. Thus, in two months the initial deposit will increase by $1{,}02 \times 1{,}02 = (1{,}02)^2$ times.

If the investor continues to act in this way, then by the end of the year his account will be $(1{,}02)^{12}$ times larger than the initial contribution, i.e.

$(1{,}02)^{12} \times 5\,000\,000 \approx 1{,}268241 \times 5\,000\,000 = 6\,341\,205$.

Comparing this result with (3), we see that compared to a simple deposit, income increased by 141,205 soums.

This happened for the following reason. In the case of a simple deposit, the invested amount increased times over the year. In the case of (1+24/100)=1,24 a deposit with interest capitalization, every month at an annual rate of 24% the deposit increased by 1.02 times and, therefore, by $(1{,}02)^{12}$ times a year. Simple calculations show that $(1{,}02)^{12} \approx 1{,}268241 > 1{,}24$.

The interest received in the case of capitalization, in contrast to simple, is called compound.

3. Comparison of simple and compound interest. How much does the difference between simple and compound interest change with changes in the annual interest rate p?

In order to simplify subsequent calculations, we will measure the annual interest rate not in percentages, but in shares, which we will denote by the letter s . Namely, if the annual interest rate is equal to $p\%$, then we will call its fraction the value: $s = p/100$.

For example, if the annual interest rate is 8% , i.e. $p = 8$, , then $s = 8/100 = 0{,}08$.

With this designation for a time deposit without capitalization with an annual interest rate equal to in shares s, the invested amount will increase $(1+s)$ times in a year.

If the capitalization of interest is carried out every month, then after the first month the capital will increase by (1+s/12) times, after the second month by $(1+s/12)^2$ times, after the third month by $(1+s/12)^3$ times, and by the end of the year – by $(1+s/12)^{12}$ times. In general, if the year is divided into n equal periods of time and capitalization is carried out after each interval, then after the first interval the contribution will increase by $(1+s/n)$ times, after the second by $(1+s/n)^2$ times, and by the end of the year by a $(1+s/n)^n$ times.

As a result, by the end of the year the numbers appear

$$\left(1+\frac{s}{n}\right)^n, \qquad (4)$$

similar to numbers of the form (1).

Using the properties of degrees, numbers (4) can be written in the following form:

$$\left(1+\frac{s}{n}\right)^n = \left[\left(1+\frac{s}{n}\right)^{\frac{n}{s}}\right]^s.$$

If we choose integers such that $n = ms$, i.e., then the last equality can be rewritten as $m = n/s$ follows:

$$\left(1+\frac{s}{n}\right)^n = \left[\left(1+\frac{1}{m}\right)^m\right]^s.$$

Comparing the expression on the right side with formula (2), one can guess that the value inside the square brackets tends to the number e. It follows that sequence (4) tends to the number e^s, i.e.

$$\lim_{n\to\infty}\left(1+\frac{s}{n}\right)^n = e^s. \qquad (5)$$

Thus, we again come to a remarkable number e, but to some positive extent s.

From formula (5) we can conclude that when interest is capitalized, the initial deposit with the s annual rate cannot grow more than twice e^s. Note that for any $s > 0$ the inequality holds $e^s > 1 + s$.

This means that the income received from interest capitalization is always greater than the income for a deposit without capitalization.

Note that in the case when the annual interest rate is low, this difference is almost imperceptible.

The fact is that it is strictly mathematically possible to prove that there is an approximate equality

$$e^s \approx 1 + s, \qquad (6)$$

moreover, if $s < 1$, then the error does not exceed s^2.

For example, at $s = 0{,}03$ (i.e. at a rate of 3% per annum) the error in formula (6) will be less $s^2 = 0{,}0009$. This means that with a deposit of 1,000,000 soums, the income from a deposit with capitalization will differ from the income from a simple deposit by less than 1 000 000×0.0009=900 *soums*

For comparison, this is about ten times less than the money a client must pay to withdraw his million from an ATM.

Therefore, with a low annual rate and a small down payment, a deposit with interest capitalization is practically no different from a simple deposit.

4. Long-term deposit. The situation changes if the term deposit is renewed annually for many years. In this case, a simple deposit (without capitalization of interest) with an annual interest rate $p\%$ renewed annually for, say, twenty years, after 20 years will increase by a times of 20 compared to the initial $(1 + p/100)^{20}$ contribution. For example, returning to the beginning of our story, suppose that the investor decided not to touch his ducats for a year, but each time after the year he invested them again on the same terms. In the case we considered, p=100 even after 20 years, the contribution will increase by

$$\left(1+\frac{100}{100}\right)^{20} = 2^{20} = 1\,048\,576 \ \text{ðàç.}^{times}$$

This means that instead of one ducat, the investor will have more than 1 million ducats.

Of course, with such an interest rate, no serious bank will open deposits for a long period. But even if the rate is not 100%, but, say, 24%, i.e. in shares it is 0.24, then after twenty years the down payment will increase by $(1+0{,}24)^{20} = (1{,}24)^{20}$ *times.*

If capitalization of interest occurs during each year, then, as shown above, a deposit with an interest rate equal in shares s will grow by the end of the year no more than e^s times, and over twenty years - no more than e^{20s} times. For example, when s = 0,24

$$e^{20s} = e^{20\cdot 0{,}24} = e^{4{,}8} \approx 120 \ \text{ðàç.}$$

This means that by investing 1 ducat, the investor can receive a huge amount of money in 20 years, but, with any method of interest capitalization, no more than 120 ducats.

In order to increase, or at least maintain the real purchasing power of money invested for a long period of time, the investor should take inflation into account. Namely, it is necessary that the annual interest rate be no less than the annual increase in inflation.

A little more about the number e

The power of any positive number b has the following remarkable property:

$$b^x \times b^y = b^{x+y}. \qquad (7)$$

In this equality x and y are arbitrary numbers. 70 years before Jacob Bernoulli, the Scottish mathematician and astronomer John Napier drew attention to the fact that equality (7) can be used to speed up calculations of the product and quotient of any numbers. To do this, Napier compiled tables in which each positive integer n is associated with a number x such that the equality holds $n = b^x$ (this equality may be approximate, but with an acceptable error). Napier called n the number the logarithm of the number x to the base b.

If one needs to multiply two integers, then he should, using Napier tables, present them in the form b^x and b^y, add them $x+y$ and, again using the tables, find b^{x+y}. This found number is, according to (7), the desired product.

Thus, J. Napier, with the help of his tables, reduced the cumbersome operations of multiplication and division to relatively simple operations of addition and subtraction.

Let us recall that in the Middle Ages, the decimal notation of numbers had just begun to spread in Europe thanks to the translation into Latin of the outstanding work of our great compatriot Muhammad Al-Khwarizmi *"The Book of Indian Accounting (Arithmetic Treatise, Book of Addition and Subtraction)"* (it was published in Latin called *"Algoritmi" de numero Indorum"*). In the previously used Roman notation for numbers, even the operation of addition was a difficult problem, not to mention multiplication and division. Try, for example, to find the sum*CXXXIV + MCXLIX = ?*

Looking at this record, it is difficult to even imagine how the calculations can be carried out. While the algorithm outlined in Al-Khorezmi's book allows you to immediately find the required amount: 134 + 1149 = 1283.

Therefore, the equality is true *CXXXIV* + *MCXLIX* = *MCCLXXXIII,* which certainly looks impressive.

This simple example explains the enormous popularity of Al-Khwarizmi's book, first in the Arab East and then in Europe.

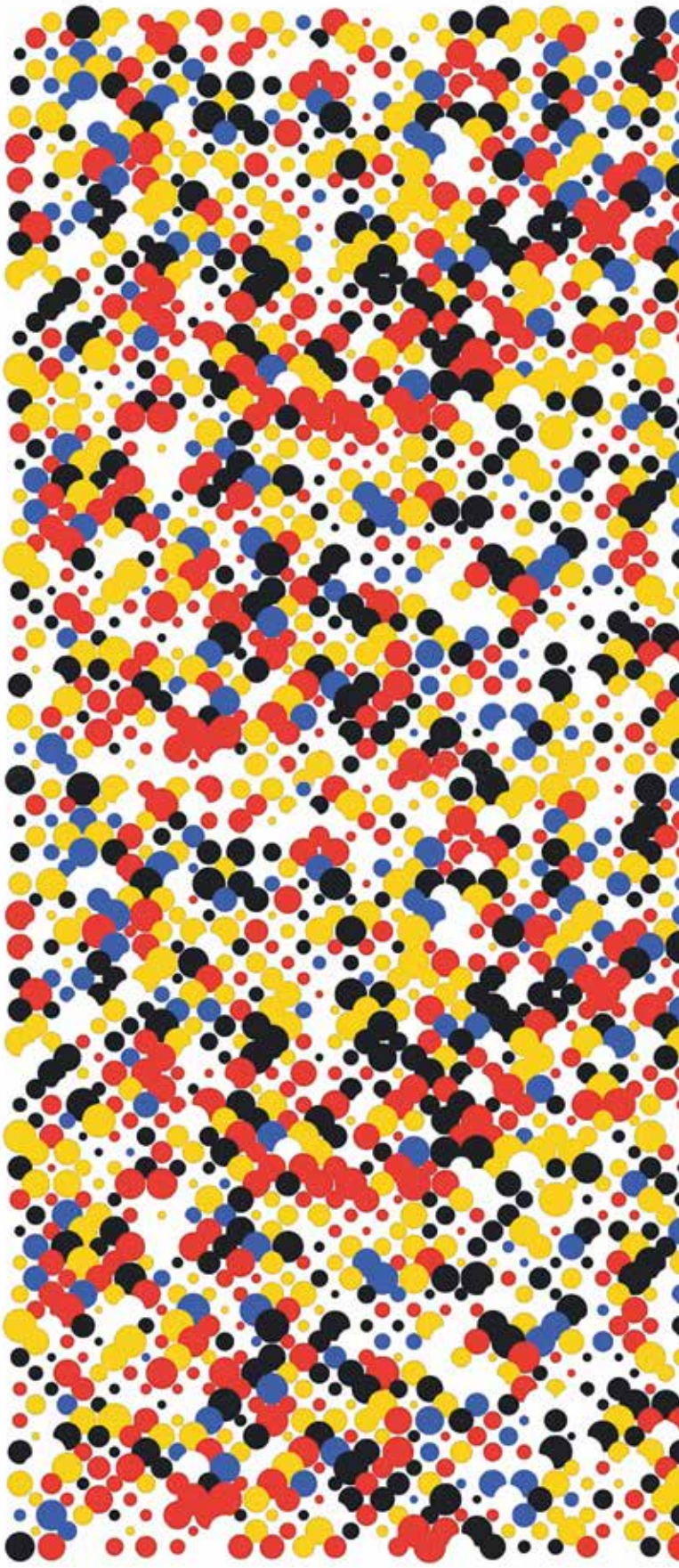
Napier's tables became a working tool for calculators for many years. According to the outstanding French scientist Pierre-Simon Laplace, "the invention of logarithms, by reducing the work of the astronomer, extended his life."

To compile logarithmic tables as a base b one can take any positive number other than 1 as the base. For example, tables of decimal logarithms (b =10), published on the advice of Napier by the English mathematician Henry Briggs, were popular among calculators.

And what did Napier himself have? One can imagine the surprise of mathematicians when it turned out much later that the base of logarithms in Napier's tables was equal to the number found by Jacob Bernoulli, i.e. $b = e$. Now, using methods of differential calculus, it can be shown that tables are best compiled if we use logarithms to the base e , which have come to be called natural logarithms. It remains to be admired that Napier guessed this long before the advent of differential calculus.

In conclusion, we note that the exponential function e^x was studied in most detail by the outstanding mathematician Leonard Euler, not only for real values x , but also for compound ones. One of the most famous relations he found is of the form $e^{i\pi} + 1 = 0$.

Here π – it is the ratio of the circumference of a circle to its diameter, and i –the imaginary unit. This equality, which unites the fundamental constants of algebra, geometry and calculus, is now perceived by many as a symbol of the unity of mathematics.



Radioactive isotopes for nuclear medicine to guard public health

Ilkhom Sodikov,
Academician

Nuclear medicine is one of the fastest growing areas of healthcare in the world. In fact, this is not just a direction only in the field of healthcare, but a symbiosis of science, technology and industry. According to Wikipedia, nuclear medicine is a branch of clinical medicine that deals with the use of radionuclide pharmaceuticals in the diagnosis and treatment of diseases. At the same time, nuclear medicine methods usually also include radiation therapy, gamma and cyberknife, proton and neutron capture therapy.

In this article we will talk about radiopharmaceuticals (RPs), their production and use in Uzbekistan. First, we will show what radiopharmaceuticals are. These are chemical substances containing radioactive isotopes, or radionuclides as they are also called, which are used in nuclear medicine to diagnose and treat diseases.

In 2023, the global nuclear medicine market reached $24 billion and, according to experts, will grow to $43 billion by 2030. Radionuclide therapy is developing the fastest, with an annual growth rate of 28%.

Nuclear medicine is mainly used for the diagnosis and treatment of cardiac, oncological and neuroendocrine diseases.

In cardiology, nuclear methods are used mainly for diagnostic purposes, to assess the functioning of the heart, especially the left ventricle, blood supply and myocardial metabolism.

The method is based on scanning radionuclides, tracking the paths of their movement, accumulation in different organs. In these cases, radionuclides make the body biochemically transparent. This cannot be achieved using other methods.

Technetium Generator - 99 m.

The absolute record holder among radionuclides used in diagnostics is technetium-99m ($^{99\,m}$Tc) (Figure 1). Today, more than 300 radionuclides are used in nuclear medicine, and almost 80% of all procedures performed worldwide using radionuclides involve technetium-99m alone. To visualize pathologies in various organs, cold kits are used, the task of which is to bring the radioactive isotope technetium-99m to the desired organ (Table 1).

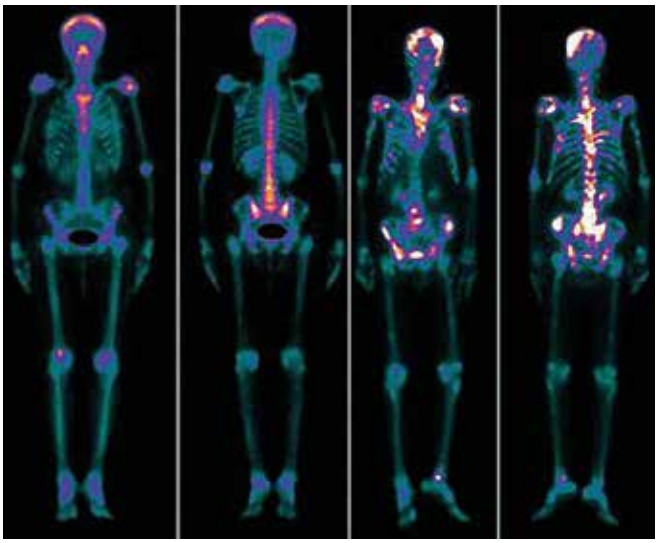
The technetium radioisotope accumulated in organs emits gamma and beta radiation, which is detected by scintillation detectors and makes it possible to see organs and pathological changes in them in 3D size (Figure 2).

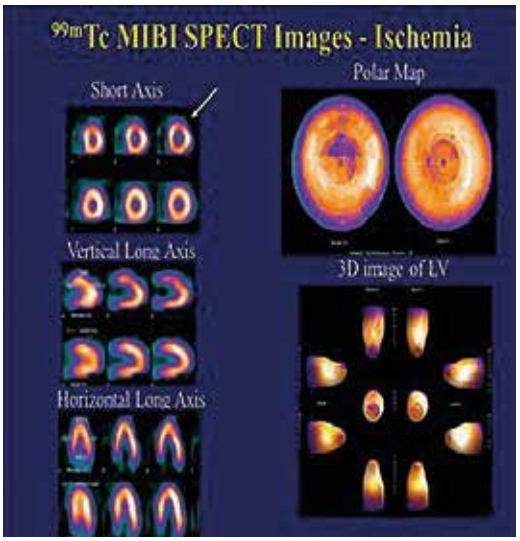
Name	International name	Diagnosed organs and diseases
Medronik, Ts-99 m	Tc-99m, Medronate	Skeletal stintigraphy
Phosphotech, Ts-99	Tc-99m, Oxigronate	Joint diseases
Pirfotech, Ts-99 m	Tc-99m, Pyrophosphate	Myocardial infarction, liver disease, ovarian disease
Technefit, Ts-99 m	Tc-99m, Phytate	Diseases of the liver, spleen
Pentatekh, Ts-99 m	Tc-99m, Pentetate	Brain, kidneys
Technemek, Ts-99 m	Tc-99m, Succimer	Kidney pathologies
Bromezida, Ts-99 m	Tc-99m, Mebrofenin	Liver, gall bladder
Technetril, Ts-99 m	Tc-99m, SestaMIBI	The cardiovascular system
Technemag, Ts-99 m	Tc-99m, Mertiatide	Coronary atherosclerosis
Karbomek, Ts- 99m	Tc-99m, DMSA (V)	Tumor imaging
Macrotech, Ts-99m	Tc-99v, MAA Lung diseases	

Table 1. Some of the cold sets for the technetium-99m generator produced by State Enterprise "Radiopreparat"

In Uzbekistan, at the Institute of Nuclear Physics of the Academy of Sciences, the Technetium-99m generator was the first among the former Soviet republics to be developed and put into production at the Radiopreparat enterprise back in the 80s of the last century. Already at that time, the technetium generator we developed was supplied, in addition to clinics in Uzbekistan, to all eastern regions of the Russian Federation, to Ukraine, and exported to Poland. To date, six clinics in Uzbekistan are diagnosing various diseases using a technetium generator.

The technetium generator is produced by two methods, by irradiating highly enriched uranium and enriched molybdenum-98. Currently, the International Atomic Energy Agency (IAEA) recommends abandoning the first method, as a dirtier product and producing more radioactive waste, and completely switching to the method of irradiating enriched mo-





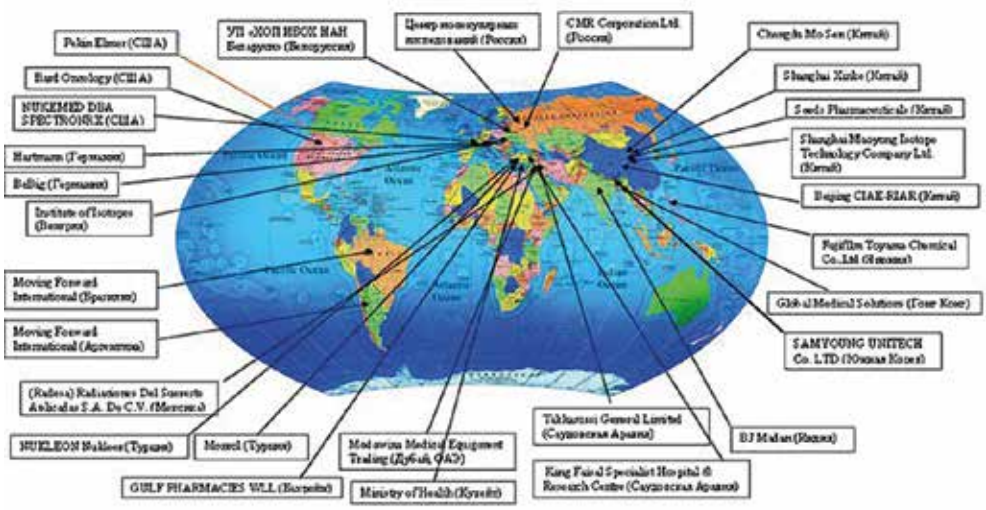
Scintigraphy of the skeleton and vascular ischemia using technetium - 99 m

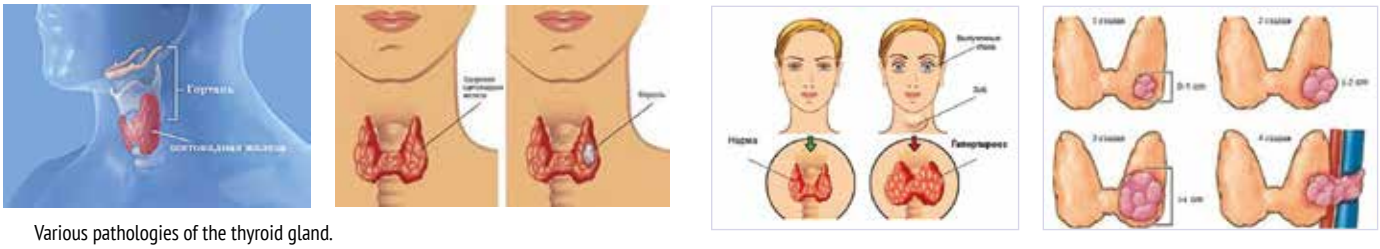
lybdenum-98. By the way, the technetium generator created in Uzbekistan was one of the first in the world obtained by this method.

Currently, the Radiopreparat enterprise at the Institute of Nuclear Physics of the Uzbekistan Academy of Sciences produces more than 60 types of pharmaceutical products based on fifteen reactor radionuclides. Among them, both substances for the production of radiopharmaceuticals and ready-to-use radiopharmaceuticals are produced. The company exports its products to fifteen countries around the world (Figure 3). The geography of product supplies includes countries in Europe, South and North America, Asia and Africa. And the export volume is more than 4 million US dollars per year.

Among them the radionuclide iodine-125 is produced, which deserves special attention . Moreover, 80% of the total world production of this radionuclide falls on the Institute of Nuclear Physics of the Uzbekistan Academy of Sciences. Small amounts of iodine-125 are produced in Canada, Russia and China. It should be noted that despite the fact that the product we produce is the most expensive in the world, all consumers prefer our products. And here's why! Because it is the purest and highest quality product in the world. Iodine-125 produced at the Institute of Nuclear Physics is 10 thousand times purer than the second purest product. This is why consumers around the world buy our products .

In 1990s our Institute was practically the only exporter of radioisotope products based on phosphorus-32 and phosphorus-33. These substances were also produced in Russia, but they were obtained in the form of inorganic phosphoric acid. And in our Institute we produced adenosine triphosphoric acid (ATP), adinosine diphosphoric acid (ADP) and adenosine monophosphoric acid (AMP), labeled with phosphorus-32, which play an important role in the synthesis of nucleic acids (DNA, RNA). In this regard, scientists around the world used Uzbek radioactive phosphorus when deciphering the human genome, which we are rightfully very proud of. Currently, phosphorus-32





Various pathologies of the thyroid gland.

and phosphorus -33 are used for the diagnosis and treatment of eye and skin cancer, as well as in biomedical research and molecular biology.

Until the middle of the last century, one of the common diseases in Uzbekistan was diseases of the thyroid gland, in particular goiter of various shapes (Figure 4). For the most part, the cause of this disease is iodine deficiency, as a result of which this disease is predominantly common in countries located far from the sea, such as Uzbekistan, which leads to iodine deficiency in the human body. Until recently, one of the common methods of treating this disease was surgery. However, recently, in most cases, surgery is replaced by radioiodine therapy. It is known that iodine accumulates in the thyroid gland and if radioactive iodine is introduced into the body, it accumulates in the thyroid gland and burns the thyroid tumor from the inside, and also treats hyperthyroidism. For this purpose, the radiodrug iodine-131 is used, the gamma radiation energy of which is ideal for the treatment of these diseases.

The Institute of Nuclear Physics of the Uzbekistan Academy of Sciences produces iodine-131 both in the form of sodium iodide substance and in the form of a number of ready-to-use preparations, and not only in the form of injections, but also in the form of oral gelatin capsules and oral solution. Today it is the most widely used radiopharmaceutical in Uzbekistan. In addition, iodine-131 is exported to Japan, the United Arab Emirates, Germany, Great Britain, Ukraine and other countries.

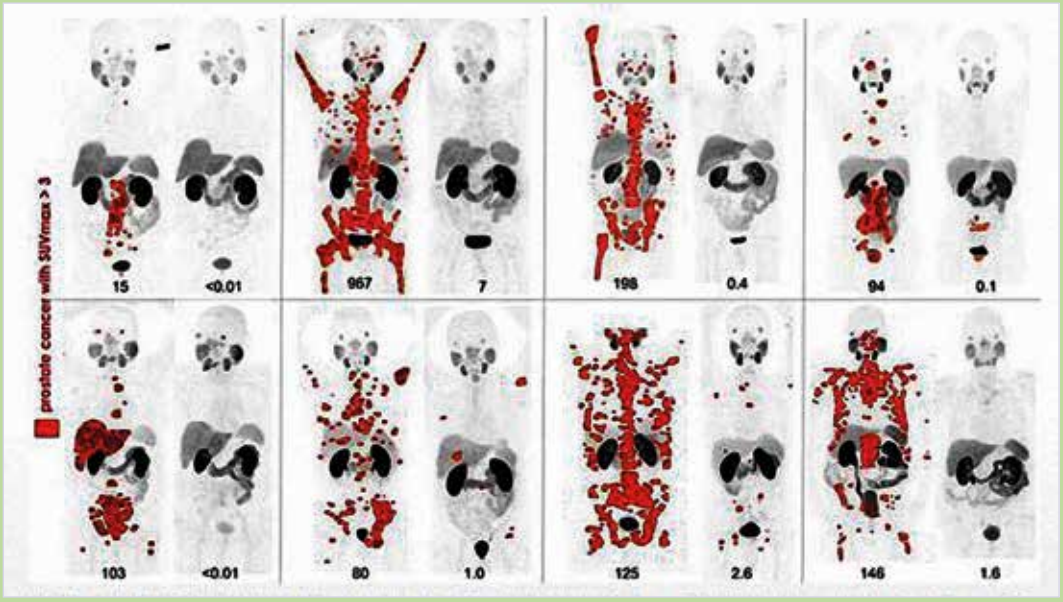
In 2018, Australian doctors published the results of using the radiopharmaceutical lutetium-177-PSMA-617 ([^{177} Lu]-PSMA-617) for the treatment of prostate cancer and its metastases (Figure 5). This photograph caused a great stir around the world and was named photograph of the year. The pictures show that numerous red spots, which are metastases of prostate cancer, visualized using the substance ^{68}Ga - PSMA 11, after three to four courses of treatment with radiopharmaceuticals [^{177}Lu]-PSMA-617 miraculously disappear. The effectiveness of the drug in some cases was more than 98%. However, Australia is located far from other countries, so going there and getting treatment is very expensive. Then, what to do with such patients in Uzbekistan?

At the Institute of Nuclear Physics of the Uzbekistan Academy of Sciences and the Radiopreparat enterprise, since 2013, when the first reliable information appeared about the prospects of lutetium-177 for the treatment of prostate cancer, research has been started on its production. Already in 2015, a technology was developed for producing the radionuclide substance lutetium chloride labeled with irrelevant lutetium-177. Since 2017, the export of this substance also began, and scientists began to work on obtaining a ready-to-use vector radiopharmaceutical Lutetium-177 PSMA-617. What is a vector drug? This is a drug that specifically accumulates in prostate cancer tumors and its metastases. PSMA is an acronym that stands for prostate specific membrane antigen. Its task is to bring the radioactive isotope lutetium-177 to cells sensitive to PSMA.

However, having received such a medicine, it cannot be used immediately. There are certain procedures between receiving the drug and its use in medical practice. These are preclinical and clinical trials; based on the results of these tests, the drug is officially registered and permission for use is issued. This process may take several years. In the same way, in June 2022, the radiodrug Lutetium-177-PSMA-617, obtained at the Institute of Nuclear Physics, was registered. And already in October 2022, this drug began to be used in clinical practice in Uzbekistan for the treatment of prostate cancer and its metastases. As of January 2024, for 15 months only in one Nano Medical Clinic in Tashkent, this drug was used to treat 50 patients, inoperable patients with stage 3 and 4 prostate cancer. Forty-six patients (92%) had a positive response after four courses of treatment with [^{177} Lu] PSMA-617, characterized by the absence of pain, normalization of PSA levels and the patient's return to social life. The average total dose of [177Lu] PSMA-617 ranged from 4500 to 5000 MBq, with an interval between courses of 5 to 6 weeks.

Here is one such example. A sick man aged about 60 years old was admitted to the clinic on a stretcher, could not move or feed independently, he took narcotic painkillers 3 times a day, the level of prostate specific antigen (PSA) was 320 ng/ml. After four courses of treatment with Lutetium-177 PSMA-617, the pain stopped, he completely abandoned narcotic drugs, the patient began to move and eat independently, and the PSA level decreased to 2.7 ng/ml, i.e. almost 120 times (Figure 6). There are dozens of such examples.

It should be noted that the drug we created, while of the highest quality, had a cost several times less than the cheapest product produced in the world.



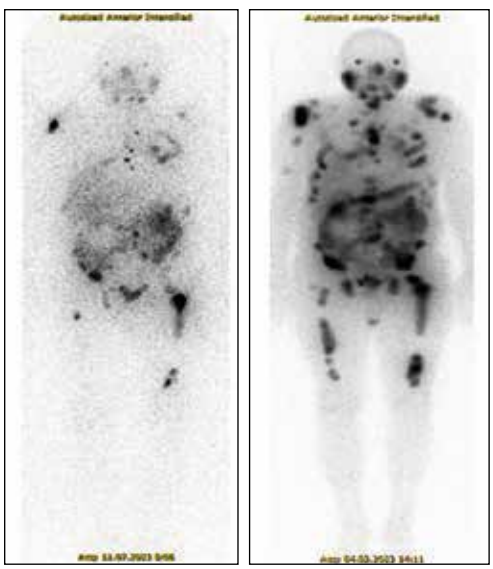
The results of the treatment of prostate cancer and its metastases at the Peter McCallum Cancer Clinic, Melbourne, Australia

The drugs effectively used in medical clinics in Uzbekistan also include radioactive Samarium-153 Oxobifor. Every year, more than 1,000 doses of this drug are supplied to hospitals in the country. This drug is used to anesthetize pain in bone metastases, as well as for tumors in remission. At the Nano Medical Clinic drug Samarium-153 Oxabifor is also used to treat breast cancer with metastases to the skeletal bones. Moreover, the cost of this drug is also the lowest in the world, approximately 45-48 times less than that of a French drug of the same quality.

* * *

The production of radioisotope products for nuclear medicine in Uzbekistan has a history of almost 50 years, and the Radiopreparat enterprise of the Institute of Nuclear Physics is one of the ten best companies in the world in this field. Currently, the registration process for another new radiodrug is underway - Lutetium-177 DOTA-TATE, which is used to treat tumors of the neuroendocrine system and lung cancer. Research is being conducted to develop a number of new drugs, including promising alpha-emitting drugs.

This gives confidence that the most advanced nuclear technologies in the diagnosis and treatment of cardiac and oncological diseases will be available to our citizens not somewhere in Germany or Australia, but right here in Uzbekistan, and at the lowest prices.



PET (Positron emission tomography) tomogram of the patient before (left) and after (right) treatment with RPP [177Lu]-PSMA-617

Green shield of the dry bottom of the aral sea

Zinoviy Novitsky,
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The environmental problem of the Aral Sea in the International Plan is among the top priorities that need to be addressed urgently. When visiting the Aral Sea zone, UN Secretary Generals Ban Ki-moon and Antonio Guterres came to the conclusion that the Aral Sea problem is a planetary problem and must be solved by everyone together.

As is known, the Aral Sea began to dry out in the 1960s, which led to a sharp process of desertification of the bottom of the former sea. Today, the area of the dried bottom is about 6 million hectares (in Uzbekistan 3.2 million hectares, in Kazakhstan 2.8 million hectares), from which about 150 million tons of salt, dust and sand rise into the air every year and are carried away to a distance up to 1000 km, and there they fall in the form of salty rain and snow. The dried bottom, together with the Aral Sea region, is a huge territory (47 thousand km^2), where intensive anthropogenic desertification occurs.

The dried out part of the Aral Sea is a young continental surface, representing an arid plain. The dustiness of the air over this plain determines the climatic development of desertification. Dust in the atmosphere intensively absorbs solar radiation, reducing its flow to the Earth's surface and causing heating of the lower layers of the atmosphere. This contributes to the occurrence of inversion in the atmosphere and inhibits the development of convective currents leading to the formation of clouds. As a result of the growing dustiness of the atmosphere, which is felt in many cities of Uzbekistan, climate discomfort increases and the amount of precipitation decreases, which leads to drought.

This phenomenon has been especially acute in recent years, when the amount of precipitation in the Aral Sea region does not exceed 90 mm per year, and the water sources used by the local population are drying up. Sandy salt storms occur in the region about 300 days a year. If we take into account that atmospheric dust can precipitate and accumulate mainly in damp areas, then the mountain ranges where Central Asian rivers originate and whose water we drink cannot be excluded. Some scientists say that salt and dust from the dried bottom settle on glaciers, so it's not difficult to imagine what awaits us in the future.

One of these extremely strong salt-sand storms occurred on May 27, 2018, when the cities of Nukus, Samarkand, Tashkent, as well as a number of cities in Kazakhstan and Turkmenistan were covered with salty dust. Similar phenomena, although on a smaller scale, occurred in previous years, which had an impact on the ecology and sanitary and epidemiological situation in the Aral Sea region. The President of the Republic of Uzbekistan Shavkat M. Mirziyoyev posed a specific question - whether we can solve this problem ourselves. The answer was clear - we can! And then, on the initiative and under the leadership of the President of Uzbekistan, a State program was developed to radically transform the Aral Sea zone through large-scale forest reclamation work on the dried bottom of the Aral Sea. The implementation of this program began on December 16, 2018 by the Ministry of Emergency Situations of the Republic of Uzbekistan.

Scientific research on the dried bottom of the Aral Sea began with scientists from the laboratory of protective afforestation and forest reclamation of the Forestry Research Institute in 1981. And to date, scientists have completed 17 research projects and published the same number of scientific recommendations, on the basis of which the forestry enterprises of the country carry out practical work and implement the above-mentioned State program. Some skeptics expressed the opinion that it was simply impossible to carry out work on such a large scale as defined in the Program. People far from reality, instead of planting forests on the drained bottom, began to propose supplying water in such quantities that the sea would be restored to its former shores, but to fulfill this condition it would be necessary to abandon irrigated agriculture, which is practically impossible to do.

We believe that it is necessary to reorient the forest reclamation work on the dried bottom of the Aral Sea, putting it on a scientifically based approach, planning, sequencing and comprehensive technological calculations. It was these main points that formed the basis of the developed State program.

A document that would reflect the real picture emerging on the dried bottom of the Aral Sea, taking into account the time period, could be the Unified Concept for Forest Reclamation Development of the Dried Seabed, including the territories of Uzbekistan

Mechanical aggregate slotting machine for furrow cutting

Photo of sand accumulation furrow in winter time

and Kazakhstan. At the same time, none of the states on their own will be able to fully solve the environmental problem of the entire Aral Sea.

The unified system for combating desertification of the Aral Sea bed, concerning Uzbekistan and Kazakhstan, should reflect the following important indicators. These are the soil salinity in the root layer, its susceptibility to deflationary processes, the type of bottom sediments, the level of groundwater and the degree of its mineralization, as well as the degree of projective cover with herbaceous and tree-shrub vegetation.

These criteria would make it possible to establish the priority of carrying out forest reclamation work on the dried seabed, select the necessary technology and assortment of desert plants, and, using calculation and technological maps, calculate the necessary costs in monetary terms. This system should be expressed in the form of many maps and one generalizing one, with a very detailed description in relation to the conditions of location and possible habitat of woody vegetation on the territory of the two states.

It would be correct if this work was carried out by scientists from Uzbekistan and Kazakhstan simultaneously on both sides of the dried bottom of the Aral Sea. This task can only be accomplished within the framework of a Regional International Project with a unified general methodology of work.

In the State Program of the country, which is now being successfully implemented on the drained bottom of the Aral Sea, methods for creating forest plantations, which were previously used only on a massive basis, have been revised. In addition, earlier, when carrying out forest reclamation work by the forestry enterprises of Uzbekistan, soil conditions were not fully taken into account, but currently we are based on new innovative methods for creating forest plantations developed at the Forestry Research Institute of the Republic of Uzbekistan. In particular, these are the principles of local, focal, pasture protection, reclamation and fodder afforestation; various methods of fixing shifting sands, etc. are also used.

Everyone knows that forests resist the greenhouse effect. I, as a forester who has been working for 50 years in the field of forest science in Uzbekistan (more than 40 of them on the dried bottom of the Aral Sea), believe that forest plantations created on the drained bottom of the Aral Sea are priceless. They are

Installation of sand retention grids

a biological factor that can return the population of the Aral Sea region to a healthy life, solve the problem of providing animals with feed, and also minimize the occurrence of deflationary processes, which has a positive effect on the purity of the air, reducing carbon dioxide and increasing oxygen in its atmosphere. Our research has shown that 1 hectare of saxaul plantings and 1 hectare of Cherkez at the age of 4 years absorbs 1158.2 kg and 1547.8 kg of carbon dioxide per year, respectively, and at the same time releases 835.4 kg and 1116.4 kg of oxygen. Carrying out large-scale afforestation works within the framework of the State program will allow us to come closer to reducing the severity of the problem of global warming. This will be a significant contribution of Uzbekistan to solving the problems and fulfilling the obligations set out in the Paris Climate Agreement.

Many countries around the world have accumulated significant experience in creating forest plantations on sand. However, when conducting scientific research on the dried bottom of the Aral Sea, we encountered great difficulties, because of the limiting factors are a strong lack of moisture, the close occurrence of salty groundwater and soil salinization . This required the development of technology and selection of an assortment of desert plants separately for each type of bottom sediment. Such technologies were developed and successfully applied in the creation of forest plantations within the framework of the State program, which made it possible to create forest plantations on an area of 1 million 730 thousand hectares during the period 2019–2023 . In this case, the following innovative agroforestry methods developed by scientists were used:

1. Cutting sand storage furrows. The essence of this technology was that in the spring a mechanical unit with a slotting machine, sand-accumulating furrows were cut to a depth of 40 cm, plus an additional slot was made in the created furrow to a depth of another 40 cm, i.e. the result was a depression of 80 cm. The furrows created in this way were completely covered with sand within 1-2 months .

The physical meaning of this process was that moisture from winter-spring precipitation collected in the furrow and penetrated into the gap, forming a reservoir of moisture that the plant could consume throughout the growing season. It is important to note that in such a sand-accumulating furrow moisture accumulates and the chemical and granulometric composition of the deposited substrate improves. This factor is very important for plants in the extreme dry conditions of the dried bottom of the Aral Sea.

2.Sand-accumulating mechanical protection made of reed. The essence of the proposed method was to retain sand on saline lands using artificial obstacles. For this purpose, we have developed a technology for using sand-retaining mechanical protection made of reeds, which was installed in the fall.

The distance between the rows of longitudinal

Saxaul seedlings planted along mechanical guards

Drilling planting pits and filling with enriched mix

protections is 5 m, and when using cellular protections, the size of the cells was 3m by 3m. By spring, sand accumulated, and in winter, due to snowfall, it was washed away and further accumulated moisture. The thickness of the blown sand was 60-100 cm. In the spring, saxaul seedlings and other salt-tolerant plants were planted on this blown sand.

3. Installation of sand-retaining gratings. One of the methods for accumulating sand on saline lands was using wooden or plastic gratings measuring 150 cm x 120 cm with cells 5 cm x 5 cm. On an area of 1 hectare, 25-30 pieces of such gratings were installed, which accumulated sand in the form of a plume. After the accumulation of sand, the gratings were removed and installed in another place, and in the place of the accumulated sand with a sand plume more than 200 cm long and 100 cm high, the sand was fixed with chemical fixatives or using mechanical protection with a distance between rows of 50 cm, followed by planting of salt-tolerant plants.

4. Drilling planting holes and filling them with glauconite and sand enriched with organic fertilizer. This method was used on salty clayey types of bottom sediments. The essence of this method is that using a motorized drill, a hole is made 80 cm deep so a chemical analysis of the soil carried out to a depth of 100 cm showed that salinity in the lower layers is very strong and unacceptable for plant roots. To prevent roots from the lower layers from penetrating into the upper layers and having a detrimental effect, we used glauconite, which was poured in a 20 cm layer at the bottom of the dug hole. The rest of the pit was filled with sand mixed with organic fertilizer, after which plant seedlings were planted.

As field experimental studies have shown, it is possible to carry out forest reclamation work on saline lands if we correctly apply the technology we have developed in advance and select the required assortment of desert plants. On clayey and loamy soils, it is

advisable to cut sand storage furrows with a trench digger with a slotting machine. On soils with an average degree of salinity, it is advisable to lay sand-accumulating mechanical protection made of reeds to accumulate sand, after which plant seedlings are planted. On these same types of bottom sediments, the method of drilling planting holes using a motorized drill and filling them with glauconite and sand enriched with mineral fertilizer is quite applicable. To create clumps (hearths) of forest plantations, you can use reusable sand-retaining portable gratings.

In conclusion, it should be especially noted that the above-mentioned innovative methods for creating forest plantations developed by domestic scientists were applied in 2019 - 2023 on the dried bottom of the Aral Sea and showed their consistency and effectiveness. At the same time, the application of one or another forest reclamation method or a combination of them in a specific area should be based on careful consideration of the types of its bottom sediments, as well as their particle size and chemical composition. Thus, an integrated intersectoral approach must be applied to solving this urgent, practically important task of combating desertification of vast areas in the region adjacent to the current waters of the Aral Sea.

The role of pheromones in ecology

Omonbek Kholbekov,
PhD (in Chemistry)

In recent years, the number of types of chemicals used against diseases and insects that harm agricultural crops has been increasing. Most of the various pesticides, herbicides, insecticides and fungicides used for this purpose, in addition to their high efficiency and ease of use, cause enormous harm to human life, flora and fauna, and, in general, to the ecology of the environment. Sometimes we see organizations active in this field extolling the benefits of using chemicals. We remember those times when we often read sentences like "Agricultural mechanization plus chemicalization..." in newspapers, magazines and textbooks. Then it was believed that chemical treatment would solve the food problem in our country, increase the productivity of agricultural crops, protect them from various diseases and attacks of harmful insects, and make the work of farmers easier. Was this really the case?

Let's look at the data to get better answers to questions like these. In fact, 90% of chemicals used to this day are not used for their intended purpose, but are distributed into the environment mainly as a result of evaporation (including the phenomenon of diffusion). Under certain conditions, from fields treated with chemicals, 50% of them can reach the atmosphere in a week. Most of these chemical compounds dispersed in the environment sooner or later decompose in the body of humans, animals and plants under the influence of light, humidity, temperature and some of them partially lose their toxic properties, some turn into highly toxic compounds.

One of the alarming aspects of the use of chemicals, which cannot be calculated in monetary terms, is that the activity of the processes that ensure the continuity of our life in nature is disrupted. Serious damage is caused to drinking water and plant life, which leads to changes in the composition of the surrounding air. It is known that in our atmosphere there is always a process of biological purification, that is, the green cover of our Earth enriches the air with oxygen (O_2) and cleanses it of carbon dioxide (CO_2). At first glance, chemicals do not seem very harmful to living nature, but they can completely stop or radically change many biochemical processes occurring in the tissues of our body.

The indiscriminate use of pesticides against harmful insects in agriculture in order to obtain a good harvest of agricultural crops, first of all, has a significant impact on the human and animal world, as well as on agricultural land, soil and beneficial insects (bees, silkworms, worms, etc.). If necessary, it is enough to mention that among our population the number of diseases of jaundice (hepatitis) is growing, and even traces of pesticides are found in breast milk. Sometimes the use of chemicals to control insect pests has had the opposite effect, such as the emergence of other species among crop pests. This process is due to adaptation, or, more precisely, the formation of addiction in insect pests to the effects of chemicals. According to available data, in recent years the number of pest species resistant to chemicals has approached 500. According to specialist scientists, if this process continues in the same way, in 70 years more than 2 thousand species of insects, considered the main pests, will adapt to exposure to chemicals.

Based on the above arguments and considerations, in modern conditions the only way to protect crops from harmful insects is, if possible, to abandon the use of chemicals, or at least reduce the volume and duration of their use, and develop the use of environmentally and economically sound biological methods. Chemical methods should only be used in emergency situations, and never as an everyday remedy.

Indeed, today the protection of our nature, the protection of agricultural crops from the effects of various pests is one of the problems that requires constant attention. To solve such problems, scientists working in different fields: chemists, biologists, and agricultural specialists jointly continue scientific research. As a result of these studies, a «harmonized method» was proposed for protecting crops from pests, which is considered effective in all respects. This is a "biological method" based on the maximum avoidance of the use of chemicals through the full use of their natural enemies in the fight against harmful insects. It should be noted that the success of the harmonized method largely depends on how effectively the pests use their pheromones. In our country, scientific research in the field of studying

Pheromones-means of crop protection

insect pheromones and their use in plant protection began in 1990s at the Institute of Bioorganic Chemistry.

Let's now briefly look at insect pheromones, the history of their discovery and methods of use.

Jean-Henri Fabre, a French naturalist who lived and worked in the 19th century, spent many years observing the life of insects. One evening, one summer day in 1904, the scientist witnessed the following phenomenon in his office: he placed several female butterflies that had just emerged from the cocoon in a special mesh cage. In the evening, a male butterfly flew into this room through the open window and began circling around the cage. This incident repeated itself in the following days. The natural scientist paid serious attention to this situation and began to study its causes. What surprised the scientist was how the male butterflies made their "visit" to the females from a distance of several miles. Then the scientist hypothesized that female butterflies attract males to themselves by the "special smell" they emit.

Further scientific research in this direction confirmed the correctness of the assumptions made by J.A. Fabre. As it became known, all female butterflies existing in nature, in order to leave offspring (reproduction), at a certain period, release a special smell from their body, called "pheromone". Male butterflies, sensitive to this smell, fly from a distance of 200 meters to several kilometers.

Currently, mainly sexual, warning, marking, and location types of insect pheromones have been widely studied. Chemical scientists isolated insect pheromone and studied its chemical composition and

Practical pheromone traps use in agriculture

structure, which led to the rapid development of its artificial production and practical use.

In 1959, the German scientist Butenand was the first to isolate a pheromone from the silkworm butterfly, determine its composition and name it "bombikol". For such a significant discovery for his time, for which he spent 20 years, the scientist was awarded the Nobel Prize.

Thus, pheromones have the property of transmitting various physiological messages and are considered one of the complex manifestations of chemical ecology. Despite the fact that the amount of pheromones secreted by insects is very small (in nanograms), their chemical composition is studied using modern equipment (gas, liquid chromatographs, mass chromatographs, PMR). The difficulty of studying their structure lies in the fact that pheromones contain not one substance, but several, which consist of each other in a certain quantitative ratio. Extracting pheromones from insects, studying their chemical composition and structure, then synthesizing them in laboratories and using them on a "one's own" principle made it possible to widely use them in protecting crops from harmful insects. At the same time, they help to determine the stages of insect development, the size of their population and, on this basis, determine the time of application of biological control measures. Currently, the structure of pheromones of the cotton boll worm and rootworm, which are the main pests of cotton in our country, has been studied in detail, and recommendations have been developed for their widespread control using synthetic pheromones.

So, how do we study the composition and structure of insect pheromones, and by what methods are synthetic pheromones obtained? To conduct re-

search in this area, first of all, joint scientific research by chemists, biologists and agricultural specialists is necessary. Preliminary research begins with a study of the place occupied in nature, living conditions and many other physiological and biological characteristics of a harmful insect, which, under certain conditions, causes significant economic damage to agricultural crops. In general, there are several ways to chemically analyze this particular pheromone, for example, removing a special organ that produces a special odor, blowing air through it and collecting it in a special container at a low temperature using organic solvents (such as pentane, ether, methylene chloride). Then, with the help of modern "ultrasensitive" physicochemical equipment, its structure is determined and, finally, chemists carry out its synthesis. Although work on the production of synthetic pheromones began a long time ago, great success has been achieved in this area. For example, while the structure of about 150 insect pheromones was studied worldwide before the 1980s, now the number is approaching 500. It is interesting to note that while in the early stages of such research, to study the structure of an insect pheromone it was necessary to collect from nature and to study from 10,000 to 50,000 insects, now only 50-100 insects are collected for this, because modern "sensitive" equipment has the ability to quickly reveal their "secrets".

Finally, it should be noted that synthetic pheromones obtained in laboratories have enormous potential for protecting flora from harmful insects and preserving the ecology of the environment. In fact, although pheromones are chemical compounds in nature, the amount used is in milligrams (one thousandth of a gram). It can be seen that this amount does not have any effect on the ecology of the natural environment. Thus, pheromone-based ecological advances contribute greatly to the development of biological methods. With their help, recommendations are developed on pest control measures by timely identifying types of harmful insects in nature, preventing their reproduction, and determining the time and extent of damage to crops. Based on the data obtained, the economic efficiency of the measures used is calculated.

It can be seen that the use of pheromones in a harmonized method of plant protection leads: *firstly* , to a sharp reduction in the use of chemicals and, finally, to their complete abandonment, *secondly,* to maintaining the ecological purity of the environment, *thirdly,* to maintaining the nature of beneficial insects, *fourthly,* to facilitate the work of farmers and, most importantly, to increase the economic efficiency of this method.

The use of synthetic pheromones prepared by chemists as practical pheromone traps is the most preferred method. In this case, the main means consists simply of a trap (in the form of a triangular prism), a piece of rubber (dispenser) soaked in pheromone and adhesive paper. The device is assembled immediately before use; for this, adhesive paper and a dispenser with pheromones are inserted into the trap. The device assembled in this way is suspended at a height of 15-20 cm above the plant in the cultivated fields, and the smell of pheromone begins to spread from it due to the phenomenon of diffusion. For example, in cotton fields, traps are placed 1 week before the expected appearance of pests. Depending on the number of butterflies caught in the trap, it is calculated whether it increases or decreases, and measures to combat them are developed. This method of control is convenient for agricultural workers because, in addition to convenience, it costs them less than chemicals. Therefore, they note that they will make every effort to continue scientific research in this area in collaboration with chemists, to study insect pheromones that cause significant damage to agricultural crops in our country, and in the future to preserve the environment of our mother nature, and providing our communities with high-yielding organic products.

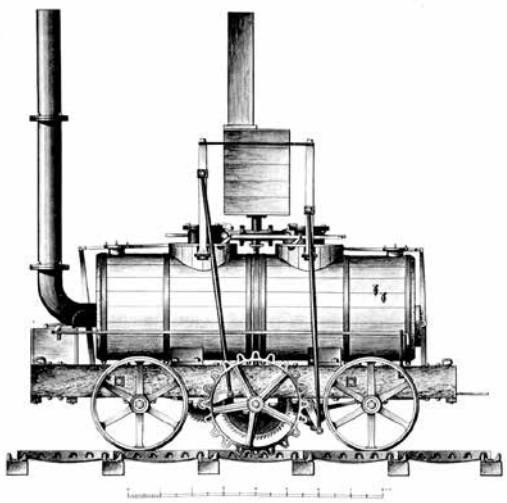
It is safe to say that biochemists will continue to use the method of protecting crops harmonized with the help of pheromones in preserving the ecology of the environment.

Practical pheromone traps (in the form of a triangular prism) - a pheromone-impregnated piece of rubber (dispenser) and adhesive paper

From the history of railway transport

Sherzod Fayzibaev,
Professor

Historically, the origin of railway transport is due to the creation of the steam engine. The predecessor of the modern steam locomotive was the world's first twin steam engine, created in Russia in 1762 by engineer and inventor I.I. Polzunov. The steam locomotive, which uses a steam engine as a power plant, was the main type of railway locomotive for a long time, for more than 130 years during the 19th - 20th centuries. It played a crucial role in the formation and development of locomotive engineering and railway communication in countries around the world. Steam locomotive construction began to develop simultaneously at the beginning of the 19th century in a number of European countries, as well as in America. And only, starting from the middle of the 20th century, steam locomotives began to be gradually replaced by their successors - diesel locomotives and electric locomotives.



Assistant machinist, Tashkent Railroad, Bashorat Mirbabaeva. 1940 r

Thus, the first steam locomotives that found practical use on small lines of industrial mining enterprises in England were built by the English engineer George Stephenson in the period 1814–1828. Other mechanical engineers tried to build steam locomotives even earlier before G. Stephenson, but their versions could not become prototypes for creating production-ready locomotives.

The English mining engineer and inventor Richard Trevithick, using his achievements in improving the steam engine, built a self-propelled carriage powered by a steam engine in 1801. And on March 24, 1802, R. Trevithick received a patent for a high-pressure steam engine, which became the first patent issued for the invention of a steam locomotive. And this first steam locomotive became the prototype for further developments of all known steam locomotives in the world. In 1804, this locomotive transported iron ore at Pen-y-Darren (South Wales) weighing 25 tons, covering a route of 14.5 kilometers at a speed of about 8 km/h. This achievement proved that a steam engine with smooth wheels could successfully move on metal rails, similar to horse-drawn carts that transported goods along rail tracks.

In 1811, the Englishman John Blenkinsop, a mining engineer and inventor, thinking that the grip of smooth wheels with rails was not enough to ensure efficient movement of a steam locomotive on smooth rails, built a steam locomotive that had a gear wheel that coupled with a rack laid along the track.

In 1825, G. Stephenson, at the world's first locomotive-building plant in Darlington (England), built a steam locomotive called "Locomotion" for use on the 40 km long Stockton-Darlington Railway, which was built at that time. The successful operation of this world's first public railway contributed to the popularization of this new mode of transport. This event gave impetus to the subsequent widespread construction in various countries of the world of railways, locomotive factories and steam locomotives themselves. Subsequently, in 1829, G. Stephenson built his improved and most famous steam locomotive, called the "Rocket". All the main elements of this locomotive, including a box-shaped firebox, a boiler with smoke pipes, devices for creating artificial draft with exhaust steam and others, were then used on prototypes of other locomotives. George Stephenson, who played a major role in the development of steam locomotive construction in the world, when asked "Who invented the steam locomotive?", modestly answered: "The steam locomotive is the invention of not one person, but of a whole generation of engineers and mechanics." And this judgment was absolutely correct.

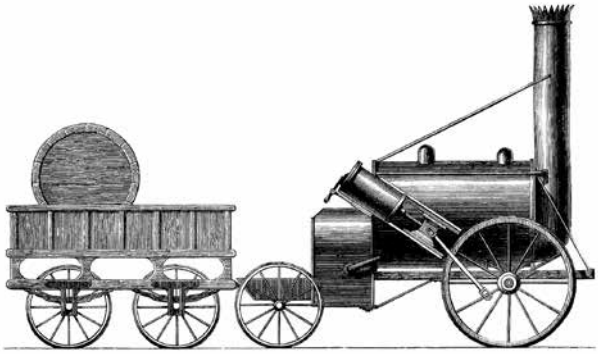
The first steam locomotive in Russia was built by serf skilled craftsmen, father and son Yefim and Miron Cherepanov in 1833 at the Demidov factories in Nizhny Tagil. This steam locomotive, called the "Dilijan Steamship", transported a train weighing 3.2 - 3.3 tons at a speed of 13 - 16 km/h and was used to transport ore from the Copper Mine to the Nizhny Tagil Plant. The second steam locomotive, built by the

Cherepanovs in 1835, could carry a load of 16.4 tons at a speed of 16 km/h.

However, these English and Russian locomotives were intended for the transportation of goods, and in the 1880s in Europe, the lack of steam locomotives to transport passengers began to be felt. We had to get out of the situation by attaching 2 freight locomotives to the train. But the frequent use of such double traction was economically unprofitable, because one train was served by two locomotive crews, and it was also unprofitable purely technically. However, in 1914 the number of steam locomotives used per 100 km of railways was 64 in England, 54 in Belgium, 47 in Germany, 35 in Italy, 33 in France, and 30 in Russia.

In the 19th century the main type of passenger steam locomotives in Russia were **P series locomotives** of various modifications, which with trains weighing up to 300 tons reached speeds of up to 70 km/h, or **D series**, the speed of which reached 90 km/h. But by the end of the 19th century, they no longer satisfied the needs of the first railways in Russia. The straightness of many railways being built was a favorable condition for achieving high speeds of steam locomotives. A steam locomotive was required that could pull a train weighing 400 tons with a single traction at a speed of 80 km/h.

To fulfill these requirements in the 1890s, the famous mechanical engineer, Professor N.L. Shchukin created a steam locomotive using the then unusual axial formula **1-3-0.** This locomotive had a two-cylinder double steam expansion engine ("compound"), which was then widely used. The steam locomotive of N.L. Shchukin gave the name to the **N series** (as moving along the Nikolaev railway) and during the period from 1892 to 1914 it was produced in quantities of about 1000 units, becoming one of the most popular passenger steam locomotives of that time in Russia.



Since 1896 Nevsky Plant began production of steam locomotives of type **1-3-0** series **Ya** suitable for suburban passenger service**.**

Simultaneously with the locomotives of the **1-3-0 axial formula**, steam locomotives of the 2-3-0 type were created, the so-called "Ten-wheelers". A biaxial support bogie, rotating around a vertical axis, best fit the locomotive into the curve of the railway track, and at high speeds of the locomotive, it increased the stability and safety of the train. The first steam locomotives built according to this scheme were the **A** and **J series locomotives,** and from 1890 to 1909, 500 steam locomotives of these series were built. Based on the J **series** in 1907, a powerful passenger steam locomotive of the **K** series was created at the Kolomensky Machine-Building Plant, in which for the first time the boiler was raised to a greater height above the rails, the firebox was moved outside the frame, and a steam superheater was used to increase efficiency. In the period before 1917, 16,064 steam locomotives were built in Russia. It should be noted that in Russia and the USSR the most popular (3000 units) were passenger locomotives of the axial formula **1-3-1** series **C** and **C** U.

By the 1930s over the years, steam locomotives of these old series met the needs of the country less and less, so in 1932, more powerful locomotives based on the American Tb series were developed, including **the FD cargo** series ("Felix Dzerzhinsky") and passenger **IS** ("Iosif (Joseph) Stalin"). The powerful **IS** series locomotive could transport trains weighing up to 1000 tons, while its speed reached 115 km/h.

However, in the early 1950s production of steam locomotives gradually decreased and was completely discontinued in 1956, the last serial passenger locomotive in the USSR was the **P36 steam locomotive**. Currently, steam locomotives are used to a limited extent, mainly in third world countries. And in European countries, the USA and Russia, steam locomotives serve primarily to transport and entertain tourists.

The start date of the construction of the first railway in Russia is considered to be May 1, 1836, and this single-track road, 25 versts (26.5 km) long, was called "Tsarskoye Selo", it began in St. Petersburg and ended in Tsarskoye Selo and Pavlovsk. On October 30, 1837,

Railway station. Samarkand

the opening of the Tsarskoye Selo railway took place, when the Provorny steam locomotive set off by rail for the first time from St. Petersburg to Tsarskoye Selo. Steam locomotives for this first railway in Russia, opened for public use in 1838, were ordered abroad. In the first years, up to 600 thousand passengers traveled along this railway, but in 1841 their number increased to 2.5 million people, and the average speed of the train was 33 km/h, and the maximum speed was 58 km/h. Based on the experience of operating the Tsarskoye Selo railway, on February 1, 1842, Emperor Nicholas I issued a Decree on the construction of the St. Petersburg – Moscow railway, and its construction began in 1843, which was the basis for the start of Russian industrial locomotive building. The first steam locomotives for this road were built in 1845 by the Aleksandrovsky plant (St. Petersburg), including freight types 0-3-0 and 1-3-0, passenger types 2-2-0.

At the insistence of mechanical scientist P.P. Melnikov, this railway used a gauge of 5 feet (1524 mm), which became standard for all railways in Russia. To overcome water barriers, 8 large and 182 medium and small bridges were constructed. 34 stations and 2 terminals were also built in Moscow and St. Petersburg. On November 1, 1851, the St. Petersburg – Moscow railway was opened. On this day, the first train on a double-track railway departed from St. Petersburg and arrived in Moscow 21 hours 45 min later. In 1852, a fast passenger train covered the distance from St. Petersburg to Moscow almost twice as fast - in 12 hours.

The government decided to build new railways to the Volga region, the most important grain-producing region in Russia. Thus, in 1874, the Morshano-Syzran railway was put into operation, ending at the Batraki station, and in 1877, the Orenburg railway (via Samara), starting from the same station. For the development of railway communication, the construction of a bridge across the Volga River was urgently needed. The project of the Syzran Bridge was developed by N.A. Belelyubsky, a professor of the St. Petersburg Institute of Railways. The construction of this bridge near Batraki began on August 17, 1876 and ended on August 30, 1880. The Syzran Bridge had a length of 1.5 km - 13 spans of 111 meters each. With the opening of the Orenburg Railway, a convenient route appeared for transporting Russian goods to Asian markets, as well as for exporting raw materials from Asia. And only 77 years later, in 1957, already during the USSR period, the construction of a second railway track on

the Syzran Bridge was completed to ensure continuous movement of trains in both directions.

The construction of railways in Russia continued actively, so on May 19, 1891, construction began on the Great Siberian Route to Vladivostok (Trans-Siberian Railway), more than 8 thousand km of railways were laid along this route. At the end of the 19th century, the great Siberian river Yenisei seemed an insurmountable obstacle to the builders of the Trans-Siberian Railway. Professor L. Proskuryakov undertook to solve the problem. In 1895, he drew up a project for a railway bridge across the Yenisei River in the Krasnoyarsk region. And just 3 years later, the first production tests of this bridge took place, and on March 28, 1899, the first passenger train passed through the Yenisei River. In 1900, this building, along with the Eiffel Tower, was awarded the Grand Prix and gold medal of the World Exhibition in Paris "For architectural excellence and excellent technical execution." UNESCO called the Krasnoyarsk railway bridge "the pinnacle of human engineering." This bridge is also mentioned in the "Atlas of Wonders of the World" (1991, USA). And today the Trans-Siberian Railway is the longest (9288.2 km) and fully electrified railway in the world.

A number of important roads were also built from Russia to the Turkestan region, which made it possible to connect Europe with the countries of Central Asia. As a result of the government's organizational decisions, in 1880 rails were laid from Mikhailovsky Bay on the Caspian Sea to Molla-Kara – this line became the first section of the future Trans-Caspian Railway. In September 1881 this steel road has already reached Kyzyl-Arvat (now Serdar). In July 1885, the laying of sleepers and rails from Kyzyl-Arvat to the east began, and by the end of 1886 the railway was laid through Ashgabat and Merv (now Mary) and reached the Amu Darya. With the construction of the bridge across the Amu Darya, the construction of the Trans-Caspian Railway continued further in the possessions of the Bukhara Emir, through the territory of present-day Uzbekistan. And already in 1888, the first trains could travel from the coast of the Caspian Sea to Bukhara and Samarkand.

The construction of the Trans-Caspian Railway was such a large-scale event that it inspired the famous writer Jules Verne to create an entire novel called "Claudius Bombarnac" (it was first published in 1893). True, Jules Verne himself never visited those places, but he anticipated the future development of the railway from Central Asia to China.

The construction of the Trans-Caspian Railway ended in 1899, when it was carried out to Tashkent and Andijan. By that time, the Transcaucasian road stretched from Krasnovodsk (now Turkmenbashi) in the Caspian Sea to Andijan in the Fergana Valley for more than 2.5 thousand km. The Central Asian railway from Russia to Tashkent became convenient, but

traveling along it had to be made with transfers - from train to ship - through the Caspian Sea, and then back to the train. Therefore, at the beginning of the twentieth century, the creation of a railway from Orenburg to Tashkent began; it was built in a fairly short time, and in 1906 the line with a length of more than 2.2 thousand km was completed.

Thus, the Turkestan region and the region of Central Asia were firmly connected by rail with Russia. In 1909, the region's railways transported more than 3.4 million tons of cargo and almost 3.6 million passengers. In the second decade of the 20th century, the construction of new railways in this region was carried out by private companies. Thus, in 1912, the Emir of Bukhara approved the start of construction of the Kagan-Karshi-Termez railway line, and in 1916 it was brought to Termez on the Russian-Afghan border, which also opened up a faster route to India.

Thus, at the turn of the 19th-20th centuries, the primary foundation was laid for the further formation in the 20th – 21st centuries in Central Asia of a modern railway network, which is currently electrified and serves the interests of the countries of Central Asia, including independent Uzbekistan.

It should be noted that the construction of steam locomotives and the creation of railways, which occurred over the past century and a half, became the basis for the development of modern land transport communications, which connected most countries of the world with numerous road networks. And therefore, it is not by chance that the period of development of railway transport from the creation of the first steam locomotive and the first railway tracks to the widespread development of the Earth's space by rail in various countries of the world can rightfully be called the century of steam locomotives and railways.

Steam locomotive 1-5-0 SO17-2349

History of drones - stages and milestones of development

The history of the creation of drones dates back to 1907. Drones were originally primarily used for military operations, but are now being used in the commercial and entertainment industries, as well as in civilian sectors of society. Today, various types of drones are rapidly gaining popularity. The word "drone" was borrowed from the definition of "wasp" to refer to the first remote-controlled aircraft used for military purposes to destroy warships. The term "drone" was coined in honor of the queen bee or "queen" of bees. The term "drone" can be described in aeronautics as a drone or an uncrewed aircraft. A drone can only fly

Quadcopter designed by George De Bothezat, making descent at McCook Field after remaining airborne for two minutes, 45 seconds. Picture from Edison National Historic Site archives

Winston Churchill and the Secretary of State for War waiting to see the launch of a de Havilland Queen Bee radio-controlled target drone, 6 June 1941

if it is controlled by an operator on the ground or a "home" aircraft. Drone control was first used on the Fairey Queen airship in the 1920s, and then on the De Havilland Queen Bee target aircraft in the 1930s.

The world's first quadcopter was created in 1907 by two brothers Jacques and Louis Breguet. At that time they worked with Nobel laureate Professor Charles Richet. A truly exciting discovery, but one with problems from the start. It took four people to hold it down and it flew just two feet off the ground.

The first military drone was tested in 1917 during World War I, and was known as the Ruston Proctor Aerial Target. It was the first radio-controlled unmanned aircraft in history and was based on Nikola Tesla's radio-controlled technology. It was designed to act as a flying bomb that could be safely carried into enemy territory. It was ultimately never used in combat, but later led to the creation of the Cattering Beetle for use in war. During World War II, Reginald Denny created the first remotely piloted aircraft. It was called the Radioplane OQ-2 and was the first drone to be mass-produced in the United States. This was an important milestone in the production of military drones.

Modern military drones. The first country to create a military drone in 1973 was Israel. It was developed and introduced into drone technology after the 1973 Arab-Israeli War, when the air force suffered heavy losses. Israel is currently one of the world's largest exporters of drones. Aerotime.aero's article, "The World's Best Military Drones and Their Capabilities in 2024," highlights the most efficient, intelligent, and combat-ready drone options. The main focus is on factors such as characteristics, durability, weapons and the current status of each specific software variation.

We will describe a number of specific modern variants of drones for various military purposes.

1. The MQ-28 Ghost Bat, developed by the Australian company Boeing, is an off-road vehicle equipped with artificial intelligence and capable of interacting

Boeing MQ-28 Ghost Bat

with sixth-generation fighters and bombers. With a range of more than 2,000 nautical miles and a combat radius of 900 miles, this Loyal Wingman is equipped with onboard sensors to facilitate intelligence, surveillance, target acquisition and reconnaissance (ISTAR) operations and tactical warning missions. The MQ-28 Ghost Bat is expected to enter service with the Royal Australian Air Force (RAAF) by 2024–2025, with four examples already assembled.

2. BAE Systems Taranis/Dassault nEUROn - two in one: similar in their characteristics and capabilities, but developed separately based on a partnership of European manufacturers led by the British defense conglomerate BAE Systems and the French Dassault Aviation. These two technology demonstrators are among the most advanced flying stealth ultra-high frequency aircraft (UAVs). Their goal is to deliver up to two tons of highly regulated European explosives to high-risk areas and defend against enemies on the ground and in the air.

3. The XQ-58A Valkyrie is the next logical step in the evolution of drones to support fighter aircraft. This option is based on direct control of manned drones or on-board artificial intelligence. It can ex-

. XQ-58A Valkyrie

Bayraktar TB2

plore the battlefield, engage the enemy, and sacrifice itself to protect manned aircraft. Being almost as effective as manned fighters, it also has the advantage of being cheap and easily replaceable, allowing the military to create all types of drones capable of penetrating any enemy defense. Although the prototype is currently in testing, the Valkyrie is expected to make its first flight soon.

4. Sukhoi S-7 Okhotnik-B - Russia's first stealth combat drone, is a continuation of the MiG project called "Skat". The Su-70 Okhotnik drone is powered by an AL-31 turbojet engine and is expected to fly at a speed of 1,000 kilometers per hour and cover a distance of 6000 kilometers. But what sets this UAV apart from other similar aircraft is its size: it can carry almost 3 tons of weapons and has a range of 6,000 km. There are currently two operational prototypes of the Okhotnik B.

5. Bayraktar TB2 is a combat unmanned aerial vehicle capable of performing autonomous flights. Manufactured by Turkey and intended primarily for the Turkish military, more than 600 units had been produced by 2023. Equipped with an advanced suite of sensors, the Bayraktar TB2 is designed to engage other targets, such as drones and missiles, that are beyond the range of defense systems.

If we summarize the development of drones, it should be noted that the history of the creation of drones began in 1907 and continued during the periods of the 1st and 2nd World Wars. With the help of modern technology, the drone industry has developed rapidly and its developers have achieved significant results. Various modifications of drones are mainly used for military operations, but they are currently being successfully used in the commercial and entertainment industries, as well as in the civilian sector of society.

As drone technology advances, these unmanned aircraft could become smaller and lighter, fly faster and quieter, have more powerful batteries, better fuel efficiency and flight time, and better optical and electronic capabilities.

It can be said that the future is truly bright for these drones, and their amazing potential capabilities have yet to be fully realized.

Source: Aerotime.aero and Tipfordrones.com.

International red cross and red crescent movement in the service of humanism

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As is known, with the acquisition of independence and sovereignty, Uzbekistan is comprehensively developing international relations. Many state and public organizations of Uzbekistan are active participants in international cooperation in the political, economic, scientific, educational, cultural and humanitarian spheres. For example, the Red Crescent Society of Uzbekistan (hereinafter referred to as RCS of Uzbekistan) is an active participant in the well-known International Red Cross and Red Crescent Movement (hereinafter referred to as the IRCRC Movement) and a full member of the International Federation of Red Cross and Red Crescent Societies (hereinafter referred to as the IFRCRC Societies).

In this regard, the authors of this article, having worked for many years in the RCS of Uzbekistan and directly participating in the implementation of humanitarian programs of the International Movement of RC and RC, show readers of the magazine "Fan va Turmush" how this International Movement originated, became and developed, what humanitarian tasks it solves and what functions it performs. The role of this Movement and the National Societies of the RC and RC of the countries of the world, including the RCS of Uzbekistan, in promoting humanitarian values and implementing its mission in the world community is shown.

Thus, the birth of the International Movement of the RC and RC took place already in the middle of the 19th century in European countries - England, France, Italy, Switzerland, Russia and others, where units of nurses were created to provide medical care to the wounded on the battlefield and sick soldiers.

A well-known example of the manifestation of sisterly mercy during military battles is the activity, Florence Nightingale, she, along with 38 nuns and sisters of mercy, went to the region where the Crimean War broke out (1854 - 1856). They carried out work to assist wounded warriors directly in the field, in hospitals, temporary hospitals and nursing teams. As a result, over 6 months, the mortality rate among wounded English soldiers decreased by almost 19 times.

Feats of arms made Florence Nightingale a national heroine in the Crimean War. In honor of Nightingale a medal named after "Florence Nightingale" was established, which is an honorary and highest award given to nurses of mercy of all countries for dedication and courage in providing care to the wounded and sick, both in military and in peacetime.

The founder of the International Movement of the Red Cross is the International Committee of the Red Cross. Initially, this humanitarian organization with the name International Committee for Relief of the Wounded was created on February 17, 1863 in Geneva on the initiative of the famous Swiss entrepreneur and public figure Jean-Henri Dunant. This Committee was created thanks to the ideas of Henri Dunant, who in 1859 witnessed the terrible consequences of one of the bloodiest battles of the 19th century - the Battle of Solferino, when 9 thousand wounded soldiers were left to die without help on the battlefield. This

Florence Nightingale (1820-1910), organizer of the Sisters of Charity nursing unit

Henri Dunant (1828-1910) - founder of the Red Cross

deeply shocked Henri Dunant, and he appealed to the residents of nearby villages to help these unfortunate people – both his own and the enemy soldiers.

Upon returning home, Henri Dunant writes the book "Memoirs of Solferino" (*Un Souvenir de Solferino*), in which he naturalistically describes that terrible side of the war, which was not customary to talk about in those days, and proposes the creation of a Society for the Relief of the Wounded. Thanks to his efforts, the International Committee for Relief of the Wounded was soon founded.

In October 1863, the Committee convened the first International Conference, which was attended by representatives of 14 countries and four charitable organizations. At the International Conference, resolutions were adopted and principles of humanitarian work were developed, and a draft of the distinctive protective emblem of the Committee in the form of a red cross on a white background was approved. The conference also appealed to all states to form voluntary committees to provide assistance to sick and wounded soldiers, and to grant neutral status to medical and nursing personnel. These units became known as National Red Cross Societies, and the Committee began to develop the legal basis for their activities.

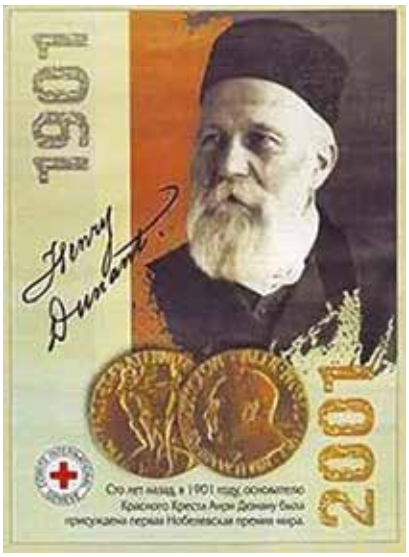
As a result of the International Conference of 1863, which approved the principles of the Red Cross, the following year an International Assembly was held in Geneva, with the participation of representatives of 16 countries, which formulated the first international Geneva Convention of 1864 - "Convention for the Amelioration of the Condition of the Wounded and sick people in the Armed Forces on the ground." This Convention included provisions guaranteeing the improvement of the destiny of wounded in land war, neutrality of medical personnel and equipment. The Convention also adopted the identifying protective emblem of the International Committee, a red cross on a white background, representing the reverse of the colors of the Swiss national flag, in recognition of the role of its citizens in the creation of this world humanitarian organization, and laid the foundation for international humanitarian law. The protocol approving the first Geneva Convention was signed by 12 states on August 22, 1864 and was later adopted by almost all countries of the world. Thus, the beginning of the activities of the Red Cross was laid.

Henri Dunant is recognized by the world community as the initiator of the creation, on the basis of this Committee, of a world impartial and neutral humanitarian organization - the International Committee of the Red Cross (hereinafter - ICRC). For his role in the founding of the Red Cross and the initiation of the Geneva Convention, Henri Dunant became the first laureate of the Nobel Peace Prize approved in 1901, and his birthday, May 8, is celebrated around the world as International Red Cross and Red Crescent Day .

Here it is necessary to make an important digression regarding the emergence and approval of the Red Crescent as the second equivalent emblem of the International RC and RC Movement. So, during the Russian-Turkish war of 1876-1878 the Ottoman Empire stated that it respects the red cross that protects enemy hospitals, but chooses a red crescent on a white background as a protective sign for its hospitals, as the reverse arrangement of the colors of the Turkish flag. In order to preserve the lives of wounded Turkish soldiers, the ICRC gave permission to use this red crescent emblem on a white background. Later, many states chose to use the protective emblem of the Red Crescent, which was approved in 1929 when the next Geneva Convention was signed.

In 1949, taking into account the experience of two world wars, the provisions of the first Geneva Conventions were expanded and the 4 Geneva Conventions were adopted, extending legal protection to victims of wars on land and at sea, as well as prisoners of war and civilians injured in the zone of armed conflict. These 4 Geneva Conventions of 1949 form the basis of international humanitarian law and the activities of the International Movement RC and RC, which includes 3 of its components:

Henri Dunant - "Memories of Solferino" (Un Souvenir de Solferino)



1. The first component, the International Committee of the Red Cross (ICRC), is a private, independent organization of a group of Swiss citizens selected by co-optation (their number is limited to 25 members). The ICRC operates in times of war or armed conflict when the intervention of a neutral organization is necessary. As the custodian of the Geneva Conventions and the principles of the Red Cross, the IRCC promotes their adoption by the governments of newly formed countries, and also works to develop international humanitarian law and officially recognizes the new Red Cross and Red Crescent Societies as participants in the International Red Cross and Red Cross Movement. The ICRC has achieved great success in implementing large-scale humanitarian programs in various regions of the world, especially in times of war. For its active humanitarian work, the International Committee of the Red Cross has received worldwide recognition, and is the only international organization that has been awarded the Nobel Peace Prize three times (1917, 1944 and 1963).

Red Cross organizations were originally formed as a result of the war. However, after the end of the First World War, the question arose about providing humanitarian assistance to people who suffered from natural disasters and catastrophes in peacetime. In this regard, to carry out humanitarian activities in peacetime, such an organization was created in 1919 – League of Red Cross and Red Crescent Societies, which was later renamed into the International Federation of the Red Cross and Red Crescent.

2. The second component of the International Movement of the RC and RC is precisely the International Federation of the RC and RC. The main objective of the International Federation was to improve the health of the population of countries that had suffered the severe trials of the World War I, as well as to strengthen and create new National Societies of RC and RC. The main activities of the International Federation are: - support for the humanitarian activities of the National Societies of RC and RC; - coordination

O'ZBEKISTON QIZIL YARIM OY JAMIYATI

UZBEKISTAN RED CRESCENT SOCIETY

ОБЩЕСТВО КРАСНОГО ПОЛУМЕСЯЦА УЗБЕКИСТАНА

of their work to provide assistance in case of natural and man-made disasters and epidemics; - assistance to refugees and displaced persons outside conflict zones.

3. The third component of the International Movement is the National Societies of the RC and RC of 193 countries of the world, which are also actively involved in general humanitarian activities, carrying out international programs and providing assistance to the most vulnerable groups of the population and people in need.

All three components of the International Movement of RC and RC have a single Supreme advisory body - the International Conference of RC and RC, held every 4 years. The work of the Conference involves not only these 3 components of the Movement, but also the States Parties to the Geneva Conventions of 1949. The International Conference reviews the activities of the Red Cross and the implementation of the provisions of the Geneva Conventions, adopting, if necessary, additions to them. Thus, at the International Conference in 1965 in Vienna (Austria), 7 Fundamental Principles of the International Movement of the RC and RC were adopted and humanity, impartiality, neutrality, independence, unity, voluntariness, and universality are characteristic of its activities.

As for the spread of the mission of the humanitarian Movement of KC and KC to the territory of Uzbekistan, this began in 1890 in connection with the creation of the Turkestan District Administration of the Russian Society of RC in Tashkent, which operated until 1922. Then, on November 14, 1925 in Samarkand, which was then the capital of the country, the Red Crescent Society of Uzbekistan (hereinafter referred to as the RCS of Uzbekistan) was created, which became part of the Union of Societies of the Red Crescent of the Soviet Republics. In subsequent years, the RCS of Uzbekistan carried out extensive humanitarian work. Over 3,500 primary organizations of the Society were created, which played a significant role in the medical and social preparation of the population, which was especially important during the coming World War II.

All the work of organizations and activists of the RCS of Uzbekistan during this period were aimed at

helping the front and wounded soldiers. The Society's activities during the war included mass training of nurses for the needs of the front and sanitary squads for evacuation hospitals. The RCS of Uzbekistan involved workers in the ranks of donors; organized public assistance to the population affected by military operations and evacuated to Uzbekistan; patronized war invalids, families of victims, as well as orphanages and children of besieged Leningrad; participated in mass preventive and anti-epidemic measures. In 1941-1945 the RCS of Uzbekistan trained 8,054 nurses for the front, who carried the wounded from the battlefield, provided them with first aid, cared for them in field hospitals, and, if necessary, gave their blood. 22,658 sanitary guards and 1,382 nurses were trained for the rear hospitals of the RCS of Uzbekistan. Many members of the RCS of Uzbekistan were awarded state awards for their military work. And four of our fellow countrymen were awarded the Florence Nightengale Medal for their valor - the highest award of the International RC Movement for nurses. After the end of the war, the RCS of Uzbekistan was mainly engaged in promoting a healthy lifestyle, sanitary work among young people and free donation; they provided 98% of the blood bank of Uzbekistan.

The most significant period in the development of the RCS of Uzbekistan began in 1991. After the declaration of independence of the Republic of Uzbekistan, in May 1992 the first President of Uzbekistan Islam Karimov signed the Decree "On the Red Crescent Society of Uzbekistan", and a legal basis was created for giving the RCS of Uzbekistan the status of a National Society. In 1995, the RCS of Uzbekistan was recognized by the ICRC and accepted as members of the International Federation of the RC and RC.

The RCS of Uzbekistan includes the Karakalpakstan Republican, 12 regional, Tashkent city and Railway organizations, 188 city, district and 2656 primary organizations have been created, uniting 1.3 million members and more than 38 thousand volunteers. Like all national societies of other countries, the RCS of Uzbekistan is a public organization that plays a supporting role in the state and assists its bodies in the humanitarian and social sphere. According to the Charter, the RCS of Uzbekistan is independent and autonomous; it can initiate the adoption of legislative acts. Thus, the RCS of Uzbekistan initiated the adoption in 2004 of the Law of the Republic of Uzbekistan "On the use and protection of the emblems of the Red Crescent and Red Cross."

The most important area of activity of the RCS of Uzbekistan is preparation and response to emergency situations; it is included in the state system of protecting the country's population during emergencies. RCS of Uzbekistan regularly participates in exercises of the Ministry of Emergency Situations of the country to provide first aid and evacuate the affected population. Centers for medical and social assistance to people in need have been created and operate in the regions of the country, and first aid training is being conducted. The "Mehr Shafqat" service operates in the RCS of Uzbekistan, which employs 190 visiting nurses, and has also created a mobile camp for 100 families, which can be quickly deployed in any region of Uzbekistan. At each regional organization and at the headquarters of the Society in Tashkent, warehouses for bedding, household and other supplies necessary in case of emergency have been created. The RCS of Uzbekistan participates in the implementation of a number of current humanitarian programs - providing humanitarian assistance to people in need in Uzbekistan, as well as in countries affected by natural and man-made disasters.

Over the years of independence of the country, the RCS of Uzbekistan has significantly strengthened its potential, ranked among related National Societies of the world and is an active participant in the International Red Cross and Red Crescent Movement, fulfilling its humanitarian mission in accordance with the Fundamental Principles of this International Movement.

The Red Crescent Society of Uzbekistan

Relationships in the art of Central Asia and China in the early Middle Ages

Sayera Asatullaeva,
doctoral student

Cooperation between the Republic of Uzbekistan and China has long roots associated with the history of the functioning of the Great Silk Road and dates back more than 2 thousand years. The achievements of science and art of other peoples, as well as religions such as Buddhism and Islam, which had a great influence on Chinese culture, penetrated into China through Central Asia.

The development of trade through the Great Silk Road contributed to the development of diplomatic relations between countries. The Sogdians played a special role in the development of diplomatic and trade contacts on the Great Silk Road.

The Sogdians, one of the most ancient peoples of Central Asia, created, without exaggeration, a great civilization, the influence of which was felt to one degree or another across the vast steppes of the Eurasian continent from the Caspian Sea to the Pacific Ocean. Another proof of the influence of the Sogdians is that the Sogdian language served as the main language on the caravan roads of the Great Silk Road in Central Asia.

Successful trade and income from it contributed to the rapid development of cities in Sogd and the intensive development of Sogdian culture. As the number of cities grows, handicrafts also develop, and the number of artisans increases.

Artistic metal processing of gold, silver and bronze was one of the crafts in which Sogdian artisans were especially successful. In artistic and household products zoomorphic subjects prevailed, reflecting a complex system of worldview and aesthetic preferences of a given ethnic group.

The value of Sogdian crafts was high and their metal products were widely sold. Sogdian vessels - mostly silver - have been found in various regions of Asia, from southern Russia to areas of Central Asia beyond Sogdiana and China. In Central Asia, only three treasures of Sogdian toreutics are known. One of them was found in Kyrgyzstan, and the other two were found in Uzbekistan.

In addition to vessels, Sogdian craftsmen also made entire sculptures of people and animals from silver. The most famous zoomorphic sculptures include silver figures of deer. For example, a figure of a silver deer was found in a looted tomb in Tibet, which today is kept in Chicago. The sculpture of a man of Sogdian craft includes the figure of a horseman, which is kept in the Armory Chamber in Moscow.

Being at the crossroads of the Great Silk Road, and having the opportunity to get acquainted with the works of the craft schools of Iran, Byzantium, China and India, local craftsmen borrowed the subjects they liked, reproducing them in their products. Many Sogdian metalworking forms and methods influenced Chinese metalworking. This influence increased during the reign of the Tang Dynasty (618-907), which took control of most of the Great Silk Road.

It is worth noting a very interesting fact that gold and silver imported from the Sasanian and Sogdian regions became objects of reverence for the royal nobility of the Tang dynasty. The ruling class of the Tang Dynasty inherited and developed the mysterious concept of gold and silver that had existed since the Han Dynasty. This was the main reason for the flourishing gold and silver industry in the Tang Dynasty. Alchemists of the Han Dynasty advocated the concept that "gold and silver as food utensils can lead to immortality" and believed that using gold and silver as food utensils could prolong life. This idea was still very popular during the Tang Dynasty, so finding and owning large quantities of gold and silver vessels became a common desire of emperors and nobles.

Recently, a large number of finds of Tang silver and gold found in northern China indicate that Tang toreutics is influenced by the of foreign culture, primarily Persian and Sogdian.

Sogdian cup. 7th century AD. Sogd-Fergana

Chinese cup of the Tang period. Late 7th century AD. China

As B. Marshak notes, considering the influence of Tang China on Sogdian art, that in the 7th, 8th and early 9th centuries ties with China were close and there was a strong Central Asian influence on Chinese toreutics. And the opposite influence was manifested in the details of the ornament, such as the image of clouds, lotus buds, etc.

According to the typological analysis of B. I. Marshak in his outstanding work "Sogdian Silver", Sogdian silver is generally divided into three schools: A, B, C. Of these, especially school C, judging by their attributes, especially the details of their ornamentation and technique most likely close to Tang silver, created under Chinese influence. One of the criteria for determining the traditions of Sogdian toreutics and dividing them into schools was the comparison of toreutics products with materials of local use that could not be exported. These are mainly ceramic products that were similar to silver products. B.I. Marshak paid attention to those features of Sogdian ceramics that imitated the techniques of working on silver products.

School C, which reflects the connections of Sogdian art with steppe (Turkic) and Chinese (Tang) art, includes products from the 7th to the 9th centuries. This list mainly includes small mugs. The peculiarity of the mugs lies in their ring-shaped cast handles, the top of which is filled with images of animals or people.

Using an example, let us consider the influence of toreutics objects from Sogd on China (Fig. 1). A Sogdian silver cup with elephant heads on a ring handle probably dates back to the 7th century CE and is housed at the Freer Gallery of Art Washington, DC, USA.

The cup with a ring handle, (Fig. 2) depicting birds, animals and a vine, was made in China, probably in Xi'an province, dating back to the early Tang dynasty, late 7th century.

During the Tang, we can see the "transformation and unification" of Sogdian and Chinese techniques, blossoming into new cup forms. The Chinese copy follows the general outline of its Sogdian prototype, but is more compact and has a simpler ring. However, its patterns are more complex. Instead of the abstract S-shapes of the Sogdian vessel, the Chinese one is covered with chased and ringed designs of wild animals frolicking among grapes and foliage.

This Chinese octagonal gold cup with handle (Fig. 3) is carved with eight musicians holding various musical instruments, which demonstrates a typical Sogdian artistic style.

Early versions of footcups of this type reached China by the early 6th century. Over time, the popularity of these exotic imports among the Chinese elite grew. Faceted cups with a thumb rest were discovered in a late 7th century Chinese imperial hoard at Hejiakun, Xi'an (Fig. 3). Founded about 3,100 years ago, Xi'an, which today is the capital of the Chinese province of Shaanxi, has served as the capital of 13 dynasties in Chinese history. It was from here that the envoy of the Western Han Dynasty, Zhang Qian, began his journey to the western regions through Central Asia.

The Freer Gallery cup was also believed to have been discovered in China . These cultural relics are a vivid reflection of the exchange, integration and innovation of Chinese culture and foreign cultures along the Silk Road.

It should be noted here that some similar forms were found in Tibet, but these cups had a wider neck and a small rounded stem. In addition, Tibetan vessels did not have faceted walls. Tibetan craftsmen drew inspiration from Chinese and Sogdian models to create their original artistic concepts.

In conclusion, it is worth noting the clear influence of Sogdian metal products on Tang China. Thanks to exports via the Silk Road, as well as the work of Sogdian craftsmen in China, the Chinese were inspired by Sogdian metalworking techniques. We see this on a variety of metal products from the Tang period.

Chinese octagonal cup of the Tang period. The end of the 7th century A.D. China

A new stage in the development of craftwork in Uzbekistan

Nafosat Egamberdieva,
doctoral student

All-round support for traditional crafts, as well as promoting the country's cultural image in the international arena is important in increasing the potential of national tourism. From this point of view, research work carried out in various countries of the world in the field of support and development of handicrafts is also relevant for Uzbekistan.

The development or decline of crafts directly depends on the political and economic situation of the country, the social status of the population and cultural development. It is known that the abolition of private property in Soviet times had a negative impact on traditional folk crafts. Many types of crafts and products were lost, some of them were industrialized. First, artels were created, then combines, factories, plants.

As you know, the decorations are designed according to the approved sample according to the drawing of the Chief Artist. In accordance with the division of labor, each worker performed a specific task. During the reconstruction period, efforts were made to realize national identity and restore traditions. In particular, traditional crafts began to be restored. Especially in the first years of Independence, the demand for handicraft products increased. On the one hand, this was an attempt to restore traditions, and on the other, it was the reason for the formation of private property. But the main incentive was the increase in demand for national handicraft products due to the economic situation of the country and the situation of the population. Later, when the country's economic situation improved somewhat, crafts began to be seen mainly as a means of attracting tourists, as an example of national value. And what is important, the state has always supported artisans. In particular, they were provided with tax benefits and their validity period was extended.

It will not be an exaggeration to say that the development and growth of crafts occurs in the era of New Uzbekistan. Since 2017, important things have been done in a short period of time that had not been done in the previous ten years. A number of Resolutions of the President of the Republic of Uzbekistan and regulatory legal documents of the government were adopted. This has created unprecedented opportunities for artisans. In 1991-2016, 4 regulatory documents relating to handicrafts were adopted in our country (3 Resolutions of the President of the Republic of Uzbekistan, 1 Resolution of the Cabinet of Ministers), and in 2017-2024, 15 documents were adopted (3 Resolutions and 3 Decrees of the President of the Republic of Uzbekistan , 6 Ministerial Resolutions, etc.). This is clear evidence of the care of the state and the great attention paid to craft activities in recent years. Each document created the basis for hundreds of thousands of citizens to provide themselves with work, improve their lives and hope for a brighter future.

At the initial stage of Uzbekistan's national independence, handicrafts were mainly considered as a national value, a way to attract foreign tourists, but in subsequent years it was considered as a direct economic basis and an industry that increased the well-being of the people. Of great importance in the further development of craft activities is also the Decree of the President of the Republic of Uzbekistan dated June 12, 2023 No. PF-91 "On measures to attract the population to crafts and create favorable conditions for the development of craft activities."

In recent years, holding international festivals and exhibitions has occupied an important place in the activities of artisans. International festivals dedicated to music in Shakhrisabz , the art of *bakhshi* in Termez, the "Silk and Spices" festival in Bukhara, and "Atlas Bayram" in Margilan are regularly held. It is noteworthy that they are attended by representatives of culture and art from many countries of the world,

scientists and specialists known for their scientific work and practical activities in this direction.

The first International Handicraft Festival under the auspices of UNESCO was held on September 10-15, 2019 in the city of Kokand. Assignment this city by the World Crafts Council status «cities world artisans» has become high recognition Uzbek folk applied art on the international stage.

Such noble deeds aimed at preserving and developing world folk art and Uzbek national crafts, which are an integral part of it, are important in uniting our efforts and capabilities in this direction and for transferring this priceless wealth to future generations.

Currently, it is becoming a tradition to hold the International Handicraft Festival in the city of Kokand and the International Pottery Forum in the city of Rishtan every two years. In 2021 the 5th Kokand festival was canceled due to pandemic Covid-19. But already on September 21-23, 2023, the II International Handicraft Festival was held at a high level.

On May 3-5, 2024, the II International Festival of Gold Embroidery and Jewelry was held in Bukhara.

Another important aspect is that these international festivals and forums are held not only in the form of competitions and exhibitions of masters, but also on a large scale. In particular, scientific conferences are organized within the framework of each festival or forum. At these conferences, scientists, artisans, businessmen and manufacturers from all over the world exchange views on various industry issues. Following the results of the conference, the participants' appeal to the country's leadership is accepted. It recommends priority directions for the development of handicrafts, solutions to various problems and conclusions of scientists. This will be important in determining the prospects for the development of handicrafts in subsequent years.

Festivals, forums and exhibitions serve the development of crafts, help artisans produce their products, promote the sale of products on foreign and domestic markets, the development of tourism and the exchange of experience. This event is also of great importance for the region where it is held. For example, in 2019, when the 1st International Handicraft Festival was held in Kokand, there were big problems with accommodating guests. Today, international hotels and restaurants have been built to accommodate tourists, and other tourism-related industries have also been developed. In this sense, such events serve to develop the city's infrastructure. The festival is rapidly developing not only foreign but also domestic tourism.

Major international events have the following goals:

Development of national crafts and large-scale promotion of them among young people;

Promotion of handicraft products at the national and international level;

Creation of platforms for mutual cooperation, ex-

change of ideas and experience among local and international experts;

Providing income-generating opportunities for local communities, women and youth in traditional crafts;

Supporting the development of domestic and foreign tourism in the region;

Increasing youth interest in crafts by holding events and competitions among the local population;

Creating a platform for international cooperation and artisans.

International festivals and forums organized in the field of crafts become a real holiday for our people. As part of the events of these forums, various cultural programs are organized: – parade of national costumes; – competitions in national sports; – concerts of masters of art, etc. The events held are widely covered in the media of our country, as well as abroad. This will allow more interested people to attend the festival.

Currently, the schedule for such international events has been developed based on the proposals of the Tourism Development Committee and is planned so that they do not interfere with each other.

Moreover, despite the lack of direct connections with artisans, they themselves also participate in such festivals as “Maqom”, “The Art of Bakhshi”, “Magic of Dance”, “The Spring of Boysun” with an exhibition of their products.

All this allows us to improve the forms and directions of development of domestic handicrafts and enhances the international image of Uzbekistan and its population.

Reflection of festive themes in the works of composers of Uzbekistan

Venera Zakirova
PhD, senior researcher

Among the numerous themes and images embodied in the music of composers of Uzbekistan, there are those that deeply and expressively reflect the inner nature, character, and originality of the national musical art, and are its integral spiritual and intellectual part. We are talking about festivity as a special form of perception of life, personifying ideological attitudes rooted in society, that is, optimism, faith in a bright future, the desire for prosperity, wealth, well-being. From time immemorial, the Uzbek people, like the neighboring peoples of the Muslim East, treated nature with special reverence and attention, praising its strength, beauty, wealth, and worked for its prosperity, in order to avoid famine.

The tradition of glorifying spirits, deities, "controlling", according to ancient beliefs, natural elements, was reflected in rites, rituals and holidays, as well as in ancient forms of art - dances, music, theatrical performances, which in those days existed in unity, i.e. the art itself was syncretic in nature. The primitive holiday was full of magical, symbolic signs and actions, and the main reason for its celebration was the achievement of material abundance (this explains the connection of ancient holidays with work, agriculture, social and family life). "As characteristic features of the primitive holiday, researchers note mass participation, gaiety, non-solemnity, and the presence of a connection with the idea of fertility and reproduction." The connection with primitive religions, Zoroastrianism, and various cult rituals and ceremonies has been preserved in the life of the Uzbek people for thousands of years. "In the 9th – 10th centuries in Maverannahr, in the 10th – 12th centuries in Khorezm, holidays, ceremonies, rituals and related theatrical and spectacular performances received a certain rise."

Holidays have always occupied an important place in the life of the people, as they allowed a person to free himself for some time from daily worries and plunge into an atmosphere of general fun, to feel like a participant in collective actions that unite people.

With the emergence of composing creativity in Uzbekistan in the 20th century, the theme of festivity firmly entered the figurative world of compositions of various genres, from vocal and instrumental miniatures to large symphonic and musical stage canvases. It manifested itself especially expressively in such genres as concert, overture, song, and in some cases in opera and ballet. The reasons why composers turn to holiday themes can be very different. This is the desire to convey in music pictures of holidays widely celebrated in our country (for example, Navruz), which have an ancient history and retain a spiritual connection with the way of life of the peoples of antiquity. As a rule, most of these holidays are associated with the image of nature, agriculture, where human work, his love and caring attitude towards the surrounding world are glorified.

In addition, festivity in the works of domestic authors is a symbol of a cheerful, optimistic worldview as a contrast to the trials and cataclysms that the 20th


National Symphony Orchestra of Uzbekistan

century brought to humanity and which continue to arise today. This is a kind of departure from reality to that carefree and bright world of dreams, which the modern generation feels and attracts less and less, but which has been preserved in works of art, literature, and folk dances, and therefore represents great value and significance, attracting attention of creative people.

Whatever the ideological and artistic concept behind a musical work, in most cases the holiday is interpreted as a collective image, as a certain emotional state experienced by a person in connection with a certain event in life. Many overtures by composers of Uzbekistan were created in a similar vein, in which the theme of festivity is dictated by national traditions. These are the overtures of M. Tajiev, F. Nazarov, R. Abdullaev, Kh. Rakhimov, M. Bafoev, A. Mansurov, M. Atajanov, the concert overture of M. Makhmudov and others.

A festive and upbeat character is inherent in a number of works based on the traditional genre of "Shodiyona". Contemporary composers of Uzbekistan are attracted to this masterpiece of folk music by the bright expressive musical language of the play, which, combined with the dance rhythm, gives the music a perky, cheerful mood. The colorful figurative, expressive and intonation features of this piece formed the basis for such works as "Festive" for two pianos (1981) by Rumil Vildanov, various works called "Shodiyona", created by Alexey Kozlovsky, Khabibulla Rakhimov, Rustam Abdullaev, Oydyn Abdullaeva. With all the originality of each musical opus, the unifying principle in them is a colorful, full of enthusiasm and joy, youth and love of life, a generalized image of the holiday - a symbol of the unity of the national spirit of the people, their cultural community.

Along with a similar philosophical attitude to festivity, a different approach can be traced in Uzbek composers' work, a different interpretation of the topic under consideration, namely when the work deals with a specific folk celebration that has important historical significance in the life of modern society. One of the widely known and beloved, since ancient times, is the holiday of resurrecting nature, the spring equinox Navruz. Pictures of Navruz can be found in dozens of works by Uzbek composers. These are musical-stage, vocal-choral, symphonic, chamber instrumental, songs, romances. Navruz scenes in Uzbek operas, such as "Zebunniso" (1986) by S. Jalil, "Alisher Navoi" (1990) by M. Burkhanov, "Omar Khayyam" (1994) and "Al-Farghani" (1998 and in the 2nd edition of "The Sky of My Love", 2008), by M. Bafo-

Uzbek State Philharmonic Orchestra

ev, “Sadoqat” (2015) by R. Abdullaev have great scenic and emotional expressiveness.

Each of these opera performances reveals a colorful picture of a national holiday, accompanied by songs and dances. An important attribute of these scenes are numerous treats in the hands of the artists, symbolizing a rich harvest and, of course, the hard work of the people who have been farming for thousands of years. In the opera “Alisher Navoi” by Burkhanov there are two numbers related to the festive theme - these are the choruses “Navruz” and “Oygul”, in which the solemn-epic and lyrical-pastoral images of the spring holiday are revealed. A rather indirect depiction of the picture of Navruz is presented in the opera “Zebunniso”. A different matter is the opera “Omar Khayyam” by Bafoev, where a separate scene dedicated to Navruz is included in the general outline of dramatic development. It has a large three-part composition: the chorus “Bulbul Bulayin” – colorful choreographic number “Dance of Girls with Tulips” – choir “Omon Yor”.

“Navruz” (1983) by Ikram Akbarov, which is a bright choreographic suite, is dedicated to the calendar-ritual holiday. Each number of the suite shows the main types of local melodic and dance samples of our country. Brightness and good spirits during the holiday are also inherent in another composition by I. Akbarov, or rather one of the parts of the vocal-symphonic pictures “Walks around Tashkent” (2006). Embodying the image of a modern city in music, the composer could not ignore this national holiday - it occupies such an important place in the life of modern society. The sixth part of the cycle, called by the composer “Spring Festival (Navruz)”, opens with inviting exclamations of brass instruments, accompanied by an elastic rhythm of percussion, which is based on traditional roots and directly reflects the image of Spring and festive festivities.

One cannot ignore one of the iconic works both in the work of Akbarov himself and in the composer’s work of Uzbekistan as a whole. This is his first symphony “Navruz” - a work highly appreciated by domestic musicologists for the innovation that has occurred with the symphony genre in our country. First of all, we are talking about transforming the classical cycle and rethinking the function of each of its parts. The lyrical and contemplative sphere is brought to the fore in Akbarov’s symphony, in which “two complementary themes are compared: deeply meditative and graceful song and dance.” In fact, the festive atmosphere is most expressively revealed in the fourth part, which represents a dynamic and life-affirming finale. Thus, the composer showed in the music of the symphony not so much Navruz itself , but the beauty of nature awakening after a winter “sleep”, fragrant with spring flowers, symbolizing the beginning of a new year, a new life, instilling hope in the hearts of people for a bright future.

A number of works related to the theme of Navruz were created by Rustam Abdullaev. This is the Second piano concert “Navruz Tunes” (1989), “Navruz taronalari» for symphony orchestra (1991), «Navruz» hymns» for choir and orchestra (1993), «Navruz qushig’i» for voice and piano (1997), «Frescoes of Navruz» for piano (1998). As you can see, almost all of these works were written by the composer during the years of Uzbekistan’s independence, when one of the oldest holidays became national and acquired state status, acquiring an even deeper meaning for modern society, especially in educating young people in the spirit of patriotism and love for the Motherland . It is no coincidence that in the music of these compositions, musical folklore occupies a special place, in particular, Abdullaev’s appeal to Khorezm traditional music, filling each score with a special coloring of sound and a close connection with national culture.

Festive themes are inherent in many ballet performances, in particular, in the ballet “Shahida” (1939, composer F. Tal) in the second scene there is a dance of girls with mulberry branches, symbolizing the spring festivities. In the ballet “Gulandom” (1940, composer P. Rakhimov), the main action takes place during the celebration of Navruz. The idea for the performance arose from the composer in connection with the trip of the famous Tamara Khanum to Khorezm in 1934, which is why the music is full of Khorezm musical folklore and local folk dances, for example, *lazgi*. The holiday scene opens the first act in the ballet “Amulet of Love” (1969, composer M. Ashrafi), filling the performance with a boundless feeling of love for the native land and the carefree life that surrounded the main characters.

The richness and diversity of interpretation of holiday themes in the music of composers of Uzbekistan is a certain philosophical category that is directly related to the figurative world of the works of domestic authors in its broadest sense. It (festivity), in fact, is one of the most important semantic features of the music of Uzbek composers, symbolizing their aesthetic views and understanding of the purpose of art - to give people joy, taking them away from the everyday life and routine of our lives.

It is this kind of work that is in demand both among performers and among listeners, which indicates the similarity of people’s spiritual and intellectual needs for music that fills with light, hope, spiritual harmony, gives strength and inner optimism.

Priceless values of movie characters

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It seems that everyone has the right to express an opinion, say a word, criticize and analyze the film created. The reason is that cinema is a widely popular art form among the people. Its popularity is due to the fact that cinema originated in the process of synthesis, mastering the means of expression of art forms that appeared before it, such as fine arts, music, literature, theater, and dance. Today, many filmmakers use the popularity of cinema to spread their ideas and ideology. Cinema has become the most effective visual weapon in the modern era of globalization. In our age of ideological wars, young people can be protected from unusual foreign influence only by firmly adhering to national values, customs and traditions.

Actors Razzak Khamroev (as Usta Sharif) and Ikroma Boltaeva (as Halima). A still from the movie "Mahallada duv-duv gap"

The Uzbek people are distinguished by their ancient culture and rich creative potential. Examples include such customs and traditions as folk epics, legends, narratives, folklore, lullabies and holiday songs, tales, proverbs, wonderful tales, as well as multifaceted traditions that have been passed on from mouth to mouth for many centuries. It is not for nothing that examples of folklore penetrate into all types of art, showing the wisdom and intelligence of the people. It is folklore that can clearly demonstrate the national characteristics of peoples.

President of the Republic of Uzbekistan Shavkat Mirziyoyev, in his speech at the opening ceremony of the International Art Festival "Bakhshi" in Termez on April 10, 2019, said: "At present, in the era of globalization, when the negative influence of "mass culture" and show business, which has become a commercial tool, is increasing, it is not a secret that attention and interest in folk art, which is the source of any national culture, is unfortunately weakening. In reality, the art of folklore, so to speak, is the infant song of humanity. The fact that this unique and great event has today become just a cultural monument, forgotten in many places, needs protection, and is also the bitter truth of our time." - he said.

From the speech of the head of the state who is concerned of disappearance of unique folklore, it is clear that the preservation of national values, preservation and the development of classical art, which is our spiritual treasure, rare samples of folk creativity, its impeccable transmission to the future generations becomes obligation and duty of scientists, artists, state and public figures. This indicates the need for studying almost century-old experience of folklore and cinematic arts, amplification attention to ideological and artistic criteria, special attention to reproduction films that contain ideas to glorify human values.

The first event of creation, formed in the mythological imagination of mankind, back in primitive times, had a syncretic character, as a reflection of the unity of perception of words, actions and images that arise in people . For example, the first examples of folk art arose as a result of the synthesis of words, actions and images. Fine arts, music, dance, literature, and later theater and cinema, the genetic roots of which were nourished by myths and legends and adopted plots and motifs from them, created harmony with folklore. For example, cinema adopted plots and fables from folklore, gave events figurative meaning, used them as symbols, emblems and distinctive signs.

Films such as "Maftuningman", "Mahallada duv-duv gap", "Suyunchi", "Revolt of the Daughters-in-Law", "Chimildiq" describe themes typical to our identity, psyche, our values, traditions, customs and rituals. One can watch them over and over again. Such films are watched in a new way and with a different feeling every time. The reason is that these films are based on sincerity, simplicity and Uzbek flavor.

When will cinema become "exciting and desir-

able"? You will watch with admiration those films where the characters are close to you by nature, if their actions do not irritate you, if their words are sincere and simple. Today, some filmmakers rightly believe that heroes created according to Western models , their luxurious houses, selflessness, false beauty, cruelty, quarrels in dialogues, are completely removed from the Uzbek mentality, and that this can be regarded as disrespect for our national values. No matter how hard we try, such screen works made in imitation of Western films will not penetrate into our identity. They may be a one-time spectacle, but it's not worth much more than that.

On the contrary, it is necessary to create films glorifying folklore, national values, customs and traditions, which, like a mirror, show the past, present and future of each nation. These films should glorify our national values, which have become human qualities, such as love for the Motherland, respect for elders, respect for children, loyalty, kindness and compassion for loved ones. In fact, we can see the true image of an Uzbek woman, mothers, grandmothers in such characters as "Grandma Mekhriniso" (L. Sarimsokova's character in the film "Mahallada duv-duv gap") - she is good-natured, modest, noble and honest, like a grandmother "Farmonbibi" (in the film "Revolt of the Daughters-in-law" the character of T. Jafarova) is the soul of a child, hiding behind hardness, kind-hearted and fair, like grandmother Anzirat (the character of Z. Sadrieva in the film "Suyunchi") - purposeful, decisive, wise, intelligent and businesswoman.

In Uzbek families, a woman, mother, grandmother - is the central figure, she is the source of strength and mood of family members. The creators of domestic films, understanding the same philosophy, portrayed Uzbek women as sensible and open, sincere, devoted, and with a high spirit. This tradition is especially evident in the films of such directors as Sh. Abbosov, Yu. Azamov, L. Fayziev, A. Khamroev, M. Abzalov, Yu. Rozikov, K. Kamalova , Z. Musakov, Zh. Kasimov.

Актрисы Лютфихон Сарымсакова (в образе Мехринисо) и Холида Исхакова (в образе Сайёры). Кадр из фильма «Об этом говорит вся махалля».

Events described by Shukhrat Abbasov in the film "Mahallada duv-duv gap", take place in one of the mahallas of old residential parts of Tashkent. The film talks about the construction of modern high-rise residential buildings, and there is a desire to increase the interest of residents in these buildings. The film raises a social problem. But this was shown with Uzbek grace, without deviating from national traditions. The film takes place in a mahalla of construction workers, with members of their families. The social and everyday problems raised in the film are based on the love story of master Sharif and his daughter Sayora, mother Mehrikhan, as well as her son Azimjon, who is completing his studies in architecture in Moscow, and the warehouse manager Arslan and his son Umarjon.

Despite the fact that more than eighty years have passed, this film is watched with the same interest as the first time and each time with new emotions. The reason is that the filmmakers approached its creation from the point of view of the people. Both the plot and characters are familiar to us. A girl named Sayyora, after finishing her studies, goes to work at a cannery at the request of her parents, but does not stop singing, at the behest of her heart. Mehrikhan wants to marry her son to her neighbor Sayyora, and her son Azimjon enters into an alliance with his classmate Aziza. And Oiposhsha also wants to marry his son Umarjon to Sayyora, but he is in love with his colleague Umida. There is no exaggeration, falsehood, or fiction in the film. The kindness and humanity of simple and sincere people are depicted, and eventually the happy families move into the newly built house next door.

Shukhrat Abbasov wanted to make his fea-

Actresses Ikroma Boltaeva (as Halima) and Kholida Iskhakova (as Sayyora). A still from the movie " Mahallada duv-duv gap"

The movie "Kelinlar quzgaloni". 1985 y

ture-length debut film in a purely Uzbek flavor, with a palette of national characters. That is why he asked Abdullah Qahhor to translate a short script from Russian into Uzbek. Despite treatment in the hospital, the writer could not refuse the director and perfectly completes the work in two hours. This is how the film “Mahallada duv-duv gap” was born; there is no unnecessary fragment, episode, frame or character line in the film.

The films “Suyunchi” and “Revolt of the Daughters-in-Law,” released one after the other, are among the rare works that glorify our national values and centuries-old traditions, brought to the fore.

These traditions in national cinematography also continued during the years of independence. Directors such as K. Kamalova, Y. Ruzikov, Zh. Kasimov, Y.

Actors Sanat Devonov (as Sharif) and Turgun Azizov (as Bakir). A still from the movie "Maftuningman"

Tuychiev used folklore and oral folk art in their films. And directors must create films about worthy heroes so that we can be proud of them, while preserving our traditions and priceless values.

The movie "Suyunchi". Starring Zainab Sadrieva (as grandmother Anzirat)

How the "consumer basket" was formed in the Turkestan governship-general

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The economic stability of any society is determined by a number of standard indicators, for example, such as the availability of essential goods and their availability to the majority of the population. In this sense, standards for per capita consumption of goods developed in each individual country or society by a team of politicians, economists, sociologists and other specialists are indicators of the socio-economic stability of a particular society. In this case, the well-known consumer basket shows how developed the economy of a particular country is. All these standards and criteria were developed and put into practice in the leading economies of the world in the 20th century and in the beginning of 21st century. What can be said about the cost of living or the consumer basket in relation to the countries and territories of the second half of the 19th century and early 20th century, in particular in the Turkestan Governorship-General.

This study is an attempt to analyze a certain imaginary prototype of the consumer basket, its composition and criteria for the formation of the subsistence level in 1860's – 1910's in large cities of the Turkestan Governorship-General. According to industry experts, GDP is measured as the total output of goods and services in the economy, as well as the total income they generate. For clarity, it is necessary to study the GDP in the Russian Empire, as a country that completely determined the vector of economic development of Turkestan after its conquest in the 1860's for decades until the October takeover of 1917. We provide information from the work of the American researcher Robert Allen, which compares GDP per capita in different countries of the world between 1820 and 2008 in US dollars as of 1990. From these data we selected the figures for 1820 and 1913 for the Russian Empire for comparison with other countries, including developed countries in Europe. For example, in 1820 and 1913, respectively, GDP per capita in Russia was 688 and 1488, in Great Britain - 1706 and 4921, in the Netherlands - 1838 and 4049, in the rest of Western Europe - 1101 and 3608, in northern European countries - 898 and 2935, USA - 1202 and 5233. All these countries were at that time one of the most highly developed industrial countries. As Robert Allen further

A trade caravan

Chorsu. Samarkand

writes, the GDP of the above countries is estimated in 1990 US dollars, which allows for comparisons of total production volumes across time and space.

In order to objectively highlight GDP indicators in a variety of regions, we present data from other countries. For example, in abovementioned 1820 and 1913 the GDP of Argentina was 712 and 3524, Japan - 669 and 1387, China - 600 and 552, sub-Saharan Africa - 415 and 568 respectively. The average GDP figures for the above years around the world were 666 and 1524, respectively, in 1820 and 1913.

Analysis of data on the GDP of the Russian Empire in comparison with its long-time competitors from Western Europe, primarily Great Britain and France, does not favor the former in terms of colonial policy. The lag in economic development from its competitors in the form of GDP indicators clearly indicates a more than obvious “low start” in the ability of the Russian Empire to develop and modernize not only its colonies, which undoubtedly was the Turkestan Governorship-General, but also the inner provinces of the metropolis itself. In terms of GDP, the Russian Empire lagged behind Great Britain by almost 2.5 times in 1820 and 3.3 times in 1913, and behind the rest of the countries of Western Europe by 1.6 times in 1820 and 2.4 times in 1913. By the way, the Russian Empire achieved its greatest economic development only in 1913. We presented all this data so that the reader has an idea of what place the Russian Empire occupied among economically developed countries and what modernizing potential it had in relation to its territo-

Bread seller

Grain bazar

rial acquisitions that period.

From the second half of the 19th century, the Russian Empire began to actively develop and modernize the Turkestan Governorship-General. New cities and parts of large cities in the region appear, designated in official documents of the colonial administration as Russian Tashkent, New Margelan, Kagan, administrative buildings, barracks, banks, etc. were built. The so-called Russian Turkestan was gradually being drawn into imperial modernization projects: in the 1880s, a railway was built, which significantly reduced the time of delivery of people and goods to and from the metropolis to Turkestan. Large trading houses, branches of Moscow and St. Petersburg banks were opening in the cities of Tashkent, New Margelan, Samarkand and other cities, lending credits to the population was developing, etc. There was a change in the product range; there was a craving among Turkestanis for products and goods of higher quality, manufactured in factories in the central parts of the Russian Empire and European countries.

The colonial administration tried to record all these changes and compiled reports on a regular basis for the Ministries of the Interior and Finance of the Empire.

On the initiative and direct leadership of the colonial authorities in the city of Tashkent and the administrative centers of three indigenous provinces, namely the Syrdarya, Samarkand and Fergana provinces of Turkestan Governorship-General, the reproduction of statistical data was established, annual materials on foreign and domestic trade, import and export of consumer goods were published, and stock exchanges operated. On an ongoing basis on the pages of periodicals, in particular in the "Turkestanskie Vedomosti" and its version "Turkiston viloyatining gazeti" adapted for the local public publishes prices for consumer goods, food products, as well as prices for building materials and services of various types of workers and specialists on a regular basis.

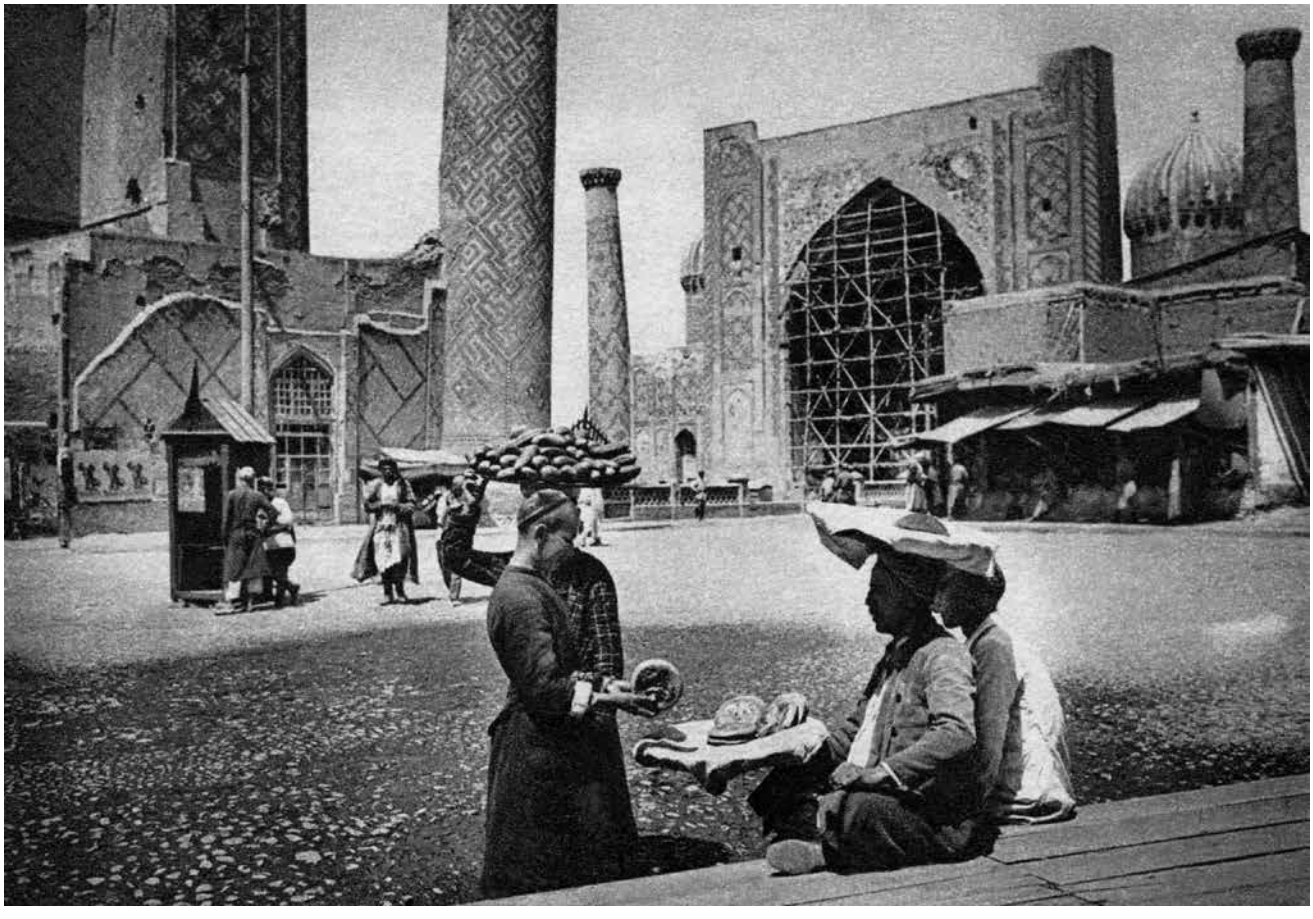
Being well aware of the absence of such concepts as "consumer basket" and "minimum living standards" and their inapplicability in relation to the second half of the 19th century, we will still try to recreate a certain prototype of these standards in the form of an elementary set of goods and services with the help of which we can imagine the economic situation of peoples, who once inhabited the Russian Turkestan.

All artisans worked personally at home or at the market. At the same time, their earnings depended mainly on the material they processed and their specialty. Blacksmiths received net earnings per day from 40 to 60 kopecks, a weaver of simple silk fabrics - from 20 to 40 kopecks, a craftsman making the basis for weaving silk fabrics earned 40 kopecks, a weaver of cotton fabrics from 15 to 30 kopecks, a tanner from 40 to 70 kopecks and so on.

For greater clarity and to determine the socio-economic position of an artisan tanner, we will try to calculate the average annual earnings of one independent master artisan and a hired worker who worked directly under his supervision.

If one master craftsman and one worker could process up to 300 pieces of calf skins in a year with a cost of raw products of 300-450 rubles, and the cost of marketable products was 480-600 rubles, then from this amount the hired worker was paid wages of up to 70 rubles, land and other taxes amounted to 40-60 rubles and as a result, in the hands of the artisan-handicraftsman, without taking into account the depreciation of production tools and other additional expenses, there remained an annual income of approximately 80-100 rubles. Of course, this amount, with 5-10 members in each artisan's family, was a meager income and could not provide even the minimum need for the artisan's basic means of subsistence. Of course, this small episode does not give a complete picture of the cost of living and the consumer basket of artisans, but the whole picture is formed of component parts. In the following parts of this study we will try to cover a wide range of issues related to the formation of the so-called "consumer basket" in the Turkestan Governorship-General, such as prices of food stuff, building materials, services, etc.

At Registan Square. Samarkand. Photo: 1929-1930.



Modern Tashkent mosques: traditions and innovations

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Shahzod Xushvaqov

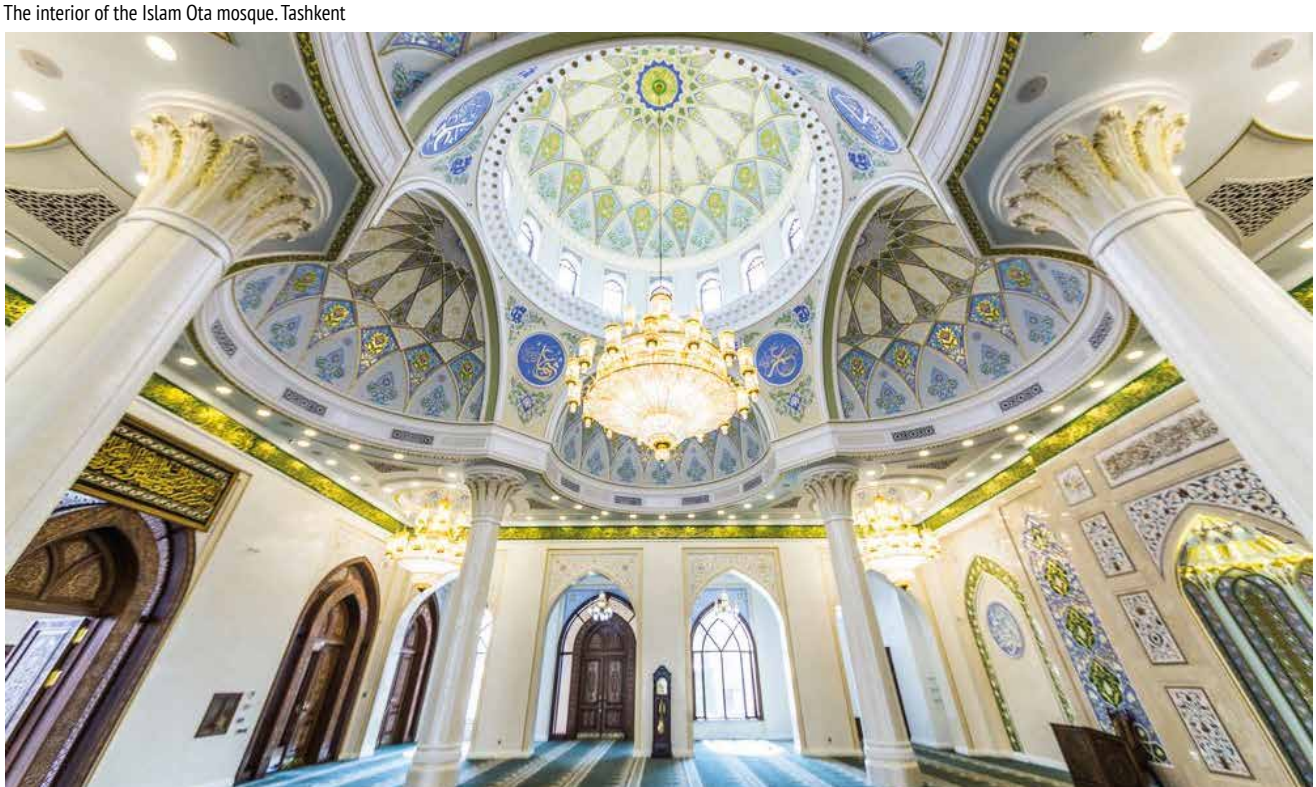
Since the end of the twentieth century, the modern architecture of Tashkent has been actively renewing and reconstructing ancient mosques, and building new grandiose mosques. During the years of independence, many modern mosques were built in almost all cities of Uzbekistan, including the capital city of Tashkent. Among public buildings, mosques, considered religious buildings, are of particular importance due to their architectural structure and stylistic solutions for interior design. Modern mosques are built at the expense of the state and with the support of sponsors. Their architectural appearance and solution are also different.

Today, Tashkent mosques can be divided into two groups according to architectural style and design features. The first are Sheikh Zainiddin (2011), "Abdullah ibn Mas'ud" (2015), "Islom Ota" (2016), which preserved the architectural styles of medieval traditional mosques in Central Asia, as well as "Muhsimkhon Tora" (2017-2018), "Ubay ibn Ka'ab" (2017-2018), "Firdavs" (2019), "Siroj Solih" (2020-2021), "Eshon Bobokhon" (2020-2021), "Dar us-Salam" (2020 -2021) and others. Such mosques have one or more domes located on top of a square or rectangular building filled with tall minarets on all four sides, and a pillared porch in the courtyard. Moreover, the mosque includes traditional architectural parts, such as a *mihrab*, *minbar*, minaret and bathrooms for ablutions.

Mosques built in the high-tech style have a modern appearance, do not lose their main functional functions and differ from traditional mosques in architectural form, size, interior colors and general composition. These include the Sheikh Ziyovuddin Khon mosque (2022), the Hasankhon Qori mosque in the Qatortol-1 quarter, as well as new types of mosques being built in the Mirzo Ulugbek, Chilanzor and Shaykhontokhur districts. The fact that similar mosques were built in the Namangan region ("Yusufkhon o'gli Qosimkhon", 2021) had a positive impact on the development of the city's infrastructure.

The architecture of the complex of Sheikh Muhammad Sodiq Muhammad Yusuf (architect Abdukakhhor Turdiev), opened in 2018, is made in Central Asian style. The territory of the mosque consists of a prayer hall, women's prayer room, ablution rooms, a minaret, 3 entrance gates, the Sog'alli Ota mausoleum, an assembly hall, external and internal fountains, and a mosque stage. The sleek appearance of the towers, tapering from bottom to top, and the use of the blue dome style indicate that they were built in a traditional way. The architectural style with two towers next to the entrance portal with a square courtyard is

The interior of the Islam Ota mosque. Tashkent



Sheikh Zainiddin Mosque (Kukcha Mosque). Tashkent

reminiscent of the construction technique of Central Asian mosques.

This traditional approach can sometimes vary depending on the location of the building and the method of worship. The courtyard part of the mosque has an open porch extending on both sides and connected to the main prayer hall. Against a white background, the predominance of gold in the interior is noticeable. The main prayer hall is divided by a series of two-part columns. The capitals of the columns use the *muqarnas* design style with additional colors. In the center there is a *mihrab*, next to it is a *minbar* made of wood carvings. The pulpit is made of wood in carving style. The *mihrab* is also very modest, only the surfaces of the pattern are decorated with gilding. On both sides of the *mihrab* there are decorations with verses from the Holy Qur'an, characteristic of our symmetrical national interiors.

In the overall interior of the mosque, except for the interior decoration of the dome, all other decorations show serenity through the use of gold on a white background. Chandeliers placed on the ceiling with yellow color on a white surface are in harmony with the interior decoration. The ceiling is divided into rectangular sections between rows of columns, and under the main dome the architectural design is represented by a rectangular octagonal base, continuing with the dome vault. Natural light flows in and out through a series of circular windows around the chandelier-free dome. The interior of the dome tapers towards the center and is distinguished by light and elegant patterns. In appearance, the Sheikh Muhammad Sodiq Muhammad Yusuf Mosque is an example of a religious architectural structure that embodies national traditions.

Next to this mosque, the reconstructed Ubay ibn Ka'ab mosque impresses with its unique appearance. During the reconstruction, the architecture of the mosque was completely preserved, only finishing work was carried out again. As a result of the external and internal reconstruction, the facade is decorated with false arcatures, and the upper part of the arches is decorated with turquoise-cobalt tiles. Unlike other mosques, this mosque has two *mihrabs*. The main *mihrab* is located under the largest dome in the form of a room. We can also find this type of *mihrab* as a separate room in the Suzuk Ota Mosque. The interior of the dome, where the *mihrab* of the Ubay ibn Ka'ab mosque is located, is very luxurious and, due to its size, gives the impression of a flowing candle. This dome decoration makes effective use of *muqarnas* with gold plated embellishments. The windows of the chapel are arched, and their decorations are repeated in the middle.

The interior of the dome, where the *mihrab* of the mosque is located, is large and luxurious. It gives the impression of a flowing candle due to the fact that it is decorated with gold patterns. The pulpit is made of wood with a traditional three-stage shape. The ceiling of the mosque is made of small domes, with hollow decorations left open to allow natural light to enter. The second part of the *mihrab* contains Islamic and Greek motifs from a combination of gold, red and blue colors. In the mosque, the pillars of the columns are made with *muqarnas* capitals, and the inside of the arches is decorated using a changing rhythm of different colors. Similar decorations are used in almost many mosques. Wood carvings are also fully used in the interior of the mosque, as can be seen on the ceiling between the entrance and the arches. The use of a carpet in the mosque on a blue background with a large image of a Turkish tulip adds luxury to the interior.

In the interior architecture of these two mosques we see that national traditionalism is used in harmony with non-traditional styles. But in the modern process, the construction of mosques in a non-traditional style is also increasing, taking into account the location of the area, in terms of convenience for the

population and the use of a form proportional to the design of nearby skyscrapers.

In the Mirzo Ulugbek district, the Sheikh Ziyovuddin Khon mosque was rebuilt in a new style, and in the Chilanzor district, a small Hasankhon Qori mosque was built. The Tepa Mosque is located in the IT-Park area and has acquired a unique new look, worthy of modern buildings in all respects. The building has 12 large corner panoramic windows with a metal structure. Glass construction in this approach was also used in the Minor Mosque. The circumference of the dome is decorated with lamps, and the ceiling forms a set of lamps in a circle. Due to the lighting, the ceiling creates the impression of spaciousness. A wooden ribbon-shaped panel along the width of the building is connected to the altar. Part of the *mihrab* is made of square tiles of gray marble, and inside it, at a certain depth, a sharp repeating shape is formed, illuminated by lights. The basement part represents the *mihrab* of the prayer room; wooden panels with patterns are used here, and figured lamps in a wider form are included in the interior. Such modern mosques occupy a special place in the architectural style of mosques, but also have a special atmosphere in Islamic architecture. As a medium for prayer, unadorned architecture can also provide spiritual peace. The emptiness in this environment can foster greater greatness.

First of all, when a believer enters the courtyard of a mosque, he spiritually adapts to this environment. Today it is this aspect, that is, the disappearance of parts of the garden in many mosques, that limits some features. The main features of the mosque are the sannat space: the concept of *minbar*, *mihrab*, minaret and toilet (fountains in ancient times), which is fully implemented in modern mosques. But there are cases of excessive priority in decorating the mosque space. Modern, non-traditional style mosques put an end to these problems and introduced this unique style to society.

The minarets of mosques built on the initiative of sponsors can be seen in the example of the minarets of Abu Sahi, Siroj Solih, Islamobod, Dar us-Salam and other mosques. The external decoration of the towers is covered with marble slabs. Geometric and floral patterns are carved on their surface using high technology. It has become a tradition to decorate the minarets of newly built mosques with two- and three-storey porches. They express geometric patterns and traditional Islamic forms.

In 2022, a magnificent mosque building was erected next to the Abu Sahi complex. This mosque is visited by more than 10,000 believers, considering the area of the inner and outer courtyard. What sets the new mosque apart from others is the presence of a fountain in the courtyard, as well as a women's bathrooms for ablution and prayer rooms in the basement of the building. This approach attracts people's attention, since it has not previously been observed in mosques in Tashkent, and appears as a sign of special attention to women in modern society. The mosque is decorated with 2 high main and 8 conventional minarets. During the construction of these minarets, imitation of the minarets of other Muslim countries was also used.

The minarets of the Siroj Solih Mosque also resemble the minarets of Turkish mosques. These minarets are built on both sides of the mosque building, and each level of the three-tier (level) minaret has porches with conventional gratings. The outside is covered with marble slabs carved in geometric patterns. The upper part of the minaret is shaped like a moon - a symbol of Islam. This style is found in mosque minarets in Malaysia, Indonesia and Turkey. The 4 tall minarets of the Islamobod Mosque, newly built in 2022, were also designed on the model of the minarets described above. Many of the newly built mosques in Tashkent are decorated not only with minarets in the traditional style, but also in high-tech mosques, the minarets are built in a unique way. As an example, we can mention two unusually shaped minarets of the new mosque named after Sheikh Ziyovuddin Khon ibn Eshon Bobokhon in the Chilanzor district.

Naturally, any building built in each period and in each region has similar architectural and structural form and its inherent aspects. Because every architect, working on a building project, creates a unique work inspired by the art of other cultures. The project also incorporates elements from historical buildings

Mihrab of the Siraj-Salih Mosque. Tashkent

to create new forms and appearances.

In the external and internal decoration of newly built mosques in Tashkent, the creativity of masters of painting, calligraphy, wood carving and jewelry is of great importance. Among such artists is Hakim Inagomov, a master craftsman who was awarded the honorary title "People's Master of Uzbekistan" in 2015. The newly built and renovated mosques of Sheikh Zainiddin (2011), Abdullah bin Mas'ud (2015), Islom Ota (2016), Muhsim Khon Tora (2017-2018) in Tashkent reflect the contribution of this master artist. From his works it is clear that the master used several types of carving art.

Interior of the Islamabad mosque. Tashkent

Today, Khakim Inagomov teaches about 30 of his students the complex and unique techniques of this art, preserving the traditions of the "master-apprentice" school of the art of Uzbek stucco carving, and the existing forms and styles make due contribution to it, passed on from generation to generation. Master artists M. Sagatov, A. Rakhimov, S. Saidakhmedov, A. Nurmatov, M. Rustamov, Z. Sagatov, Zh. Ashurov, J. Ashurov, S. Mirzaakhmedov educate young, talented students and teach them the secrets of their profession. As masters of the profession, they teach their students that "before creating stucco decor for mosques, it is necessary to pay great attention to the compositionally careful and correct construction of patterns under the dome, *mihrab* and columns, based on the general layout of the building in accordance with the interior."

The composition of stucco decorations under the dome of the Siroj Solih mosque consists of 4 semi-domes connecting them with sails-*muqarnas*. At the top of the dome there are round windows filled with stucco, which look like a white semi-column. If 99 names of Allah are written on the domes of some mosques, here it is a special composition, several verses of the Holy Qur'an are skillfully placed near the base of the dome. These poems were also created according to the sketches of the calligrapher Habibullo Solih. According to the creative approach of the stuc-

IInterior of the Ubay ibn Kaab mosque. Tashkent

co master, just as dots are placed at the end of verses in the Holy Book, at the end of each verse written on the wall, delicate stucco works with small patterns are obligatory points.

Painting is an art form that enhances the creative work of traditional stucco carving and enlivens it by giving it color. The skillful artist Dilshod used the traditional colors of the art of painting to paint the stucco decorations of this mosque. The main background is light, small Islamic motifs are made in purple and yellow tones, verses of the Qur'an are made in golden color. In the process of painting the stucco, Dilshod, drawing on his creativity, decorated the *muqarnas* in the dome with additional floral patterns in accordance with the composition. The unique combination of art samples of several master craftsmen adds aesthetic pleasure to the overall appearance of the mosque. The artist Dilshod decorated the interior of the Eshon Bobokhon and Dar us-Salam mosques with many stucco carvings.

The newly built Islom Ota Mosque (2016) is also decorated with precious wood carvings. Several skilled craftsmen took part in creating the wooden carvings of this mosque, and each creative work is unique. The columned ceiling of the porch in the courtyard of the mosque is decorated with carved wooden samples, the author of which is master Toyir Faizullaev, who continues the traditions of the Tashkent school of wood carving. The composition has thick mesh patterns carved around the ceiling and circular Islamic patterns are carved into the rectangle in the central area. The 7 large doors in the hall are the work of such masters as Sirojiddin Rakhmatullaev, Toyir Faizullaev, Qahramon Valiev, Abdumajid Abdurahmonov, who continue the traditions of the Tashkent school of wood carving. Although the majestic doors are decorated only with Islamic motifs, each piece has a unique shape and artistic appearance. The carved minbar located in the right mihrab part of the hall is one of the works of T. Faizullaev.

Today, the mosques of Tashkent and the creativity of the masters in them are the reason for the development of Islamic art in the country. Artists who preserve traditions in decorating mosques are successors of apprentice masters, and masters who introduce new designs and styles lay the foundations for the creation of schools of a new method. The new mosques of Tashkent are unique monuments that not only preserve the traditional style of architecture of Central Asia, but also are an example of new forms and reflect the synthesis of various architectural traditions. These mosques contain unique works of art by folk artists of Uzbekistan, incorporating new forms and styles.

Apple has revealed what will be in the new iOS 18

Apple has presented a new operating system iOS 18. It will feature app optimization features, a new way to transfer money by holding phones against each other, and a new design of the app 'Photo'.

Apple unveiled new features for its iOS 18 operating system on Monday, June 10 at its annual Worldwide Developers Conference (WWDC) (the event was streamed online).

A new way to transfer money – Tap to Cash – is expected to appear in it. The function will allow you to transfer funds to another Apple Pay user in the immediate vicinity without having to give them any of your details. To use it, you need to bring your smartphone to the recipient's device and select the option to send money. Once confirmed, Apple Cash will withdraw the funds from the account and transfer them to the other user's account. There will also be many changes to personalize the iPhone for the user: the ability to change the color of application icons when enabling the dark theme in the settings, move application icons freely on the screen and personalize them with different colors. It will also be possible to set separate authentication for each application by password, Face ID or Touch ID. The design of the app 'Photo' will change. The new look is designed to make it easier for Apple device owners to control and customize frequently used settings. So, clicking on the «Filter» button, you will be able to sort photos by people on them, days, trips and others. There will be a new cataloging principle in the iPhone mail application.

Apple has also introduced satellite capabilities to the app iMessage. Those who are not on a cellular or Wi-Fi network will now be able to send and receive messages. The feature will be available on iPhone 14 and the following models updated to iOS 18. A similar feature appeared on Google Pixel and Samsung Galaxy smartphones last year. Also on iPhone with the new version of the operating system will be available the use of own artificial intelligence of the company Apple Intelligence, and later this year in some countries - Chat GPT from Open AI The latter will be available to Apple users for free. In addition, new 'smart' home control features will be available; the calculator will have the option to write by hand with a stylus. It is expected that iOS 18 will be available to users in September. Which of the new features will be available in Russia is still unknown. Apple stopped official shipments of its devices to Russia after the start of the special military operation in Ukraine and suspended certain services, including Apple Pay.

The company also unveiled new operating systems for the Mac, iPad, Apple Watch, Apple Vision Pro mixed reality glasses.

Source: https://www.rbc.ru/technology_and_media/10/06/2024/6667473b9a7947452027f38d

Cotton variety "An-Bayaut-2"

The President of the Republic of Uzbekistan Sh.M. Mirziyoyev at the meeting with the workers of Jizzakh region in 2022, taking into account that large areas were sown with the cotton variety “AN-Bayaut-2” in the 2000s in the Jizzakh region, which had high indicators of yield and early ripening, as well as the fact that contractual obligations for the supply of cotton raw material by farms of the region were fulfilled with excess, gave an instruction to restore this variety of cotton.

Pursuant to the instruction of President Sh.M.Mirziyoyev, scientists of the Uzbekistan Academy of Sciences and the Institute of Genetics and Experimental Plant Biology carried out the following works to restore the cotton variety "AN-Bayaut-2" and reproduce of seed stock of this variety.

Due to the expiration of the patent for the cotton variety "AN-Bayaut-2" and other reasons, the sown areas of this variety were sharply reduced.

According to the order of President Sh.M. Mirziyoyev, by the efforts of the leadership of the Academy of Sciences and the Institute and personally Doctor of Agricultural Sciences, Professor A. Narimanov on February 10, 2023 in the Intellectual Property Agency under the Ministry of Justice repeatedly received the certificate № MGU 44816 for the trademark and service mark of cotton variety «AN-Bayaut-2».

In order to prepare the initial original seeds of the AN-Bayaut-2 cotton variety and expand the sown area by involving the variety in reproduction, an elite seed production facility was organized in the “Guliston Saikali” cotton-textile cluster of the Gulistan district of the Syrdarya region. The main goal is to increase the volume of high-quality cotton seeds of the “AN-Bayaut-2” variety and expand the acreage for sowing next 2024 in the specified elite seed farm.

Also, works on growing seed cotton was carried out on 625 hectares of cotton farms in the Sharaf Rashidov district of the Jizzakh region.

In this year's season under extremely hot temperature conditions, the shattering rate of cotton variety "AN-Bayaut-2" planted in cotton-textile cluster "Guliston Saikali" of Gulistan district of Syrdarya region was 20-25% less compared to other cotton varieties. The fields planted with this variety were irrigated only once.

As a result, the yield of cotton variety «AN-Bayaut-2» was 42-44 centners per hectare. Also, in the areas adjacent to the site where the cotton variety «AN-Bayaut-2» was planted, the yield of other varieties amounted to 33-35 c/ha.

Due to early ripening, yield and high quality of fiber, as well as resistance to diseases, soil salinity and hot temperatures of early ripening, drought- and salt-tolerant, adapted to machine harvesting, high-quality fiber variety «AN-Bayaut-2» planted in Jizzakh and Syrdarya regions, farmers of Gulistan and neighboring districts and regions are already now ordering its seeds.

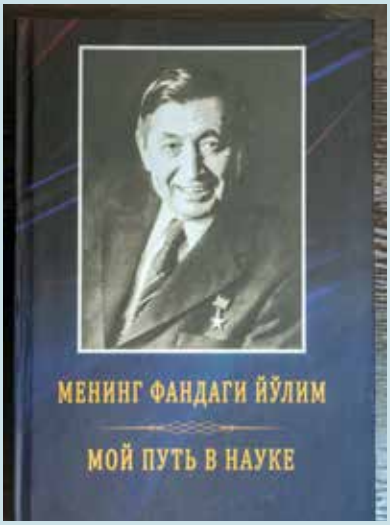
The early ripening period of this variety and a number of other positive characteristics show that it can be planted in the Republic of Karakalpakstan and northern regions to achieve high yields.

Biobibliography of the scientist
Prominent scientist and statesman,
Academician Sayyora S. Rashidova
Managing editor Prof. N.R. Ashurov

"Fan" Publishing house. 2023

In the biobibliography dedicated to the 80th anniversary of the birth of Rashidova Sayyora Sharafovna, highlights the main dates of her life and work as a prominent chemist, Honored Scientist of the Republic of Uzbekistan and statesman - she worked as the Commissioner of Oliy Majlis (Parliament) for 17 years of the Republic of Uzbekistan for Human Rights (Ombudsman), Academician of the Uzbekistan Academy of Sciences, Doctor of Chemical Sciences, Professor, organizer and director of the Institute of Chemistry and Physics of Polymers of the Uzbekistan Academy of Sciences, author of more than 630 scientific works, including 27 monographs and textbooks, scientific supervisor of 34 doctoral, candidate and PhD dissertations. The book is a continuation of previously published biobibliographies of famous scientists of the Republic of Uzbekistan and will be useful to scientists, government officials, historians of science, as well as young specialists.

The bibliography was published in Uzbek and Russian.



Abid Sadykovich Sadykov
My path in science
Managing editor, Academician Sh.I.Salikhov

“Fan ziyosi” Publisher. 2023

The book “My Path in Science” consists of two sections and is dedicated to the 110th anniversary of the birth of the outstanding Uzbek scientist - chemist, Hero of Socialist Labor, Academician Abid S. Sadykov. The first section of the book includes personal memories of A.S. Sadykov, written by himself about his childhood, youth, studies at school and at the Central Asian State University (SASU, now the National University of Uzbekistan), the beginning of scientific and pedagogical activity, work as a professor and head of a laboratory in SASU, as rector of SASU and at the Uzbekistan Academy of Sciences, as well as about the specifics of scientific activity and relationships with colleagues - scientists and employees. The second section was written by a group of students, colleagues, associates, friends and successors of the scientific activities of Academician A.S. Sadykov, with memories of him by prominent scientists and members of the public, including his creation of a domestic scientific school in bioorganic chemistry and the Institute of Bioorganic Chemistry of the Uzbekistan Academy of Sciences, now named after Academician A.S. Sadykov, about his work as director of this Institute, as well as for 18 years in the high post of President of the Uzbekistan Academy of Sciences, his election as an Academician of the USSR Academy of Sciences, as well as about the most significant scientific research and high personal qualities of A.S. Sadykov, as a universally respected person and a widely known scientist. The book will be useful to scientists, government officials, historians of science, as well as young specialists.

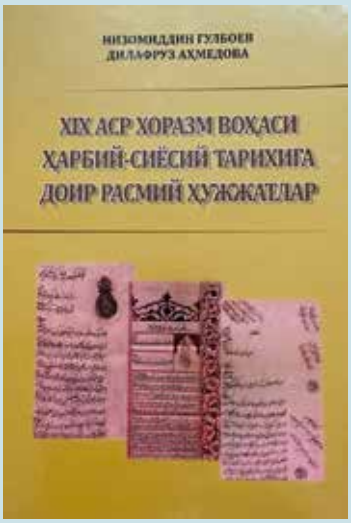
The book was published in Uzbek and Russian.

A. Rajabov, M. Ibragimov
Renewable energy sources and technologies for their use
Managing editor, Academician R.A. Zakhidov

“Fan va texnologiyalar” Publisher. 2022

This textbook was prepared and published by leading specialists of TIQXMMI - MTU (Tashkent Institute of Irrigation and Agricultural Mechanization Engineers – National Research University, TIIAME - NRU) and is intended for university students in agricultural, technical and energy specialties. The textbook outlines the basics of using renewable energy sources, methods for assessing the potential of solar and wind energy, and analyzes the corresponding energy devices. The energy and technical parameters of power plants are considered, the theoretical foundations are outlined and practical examples of their use in the field of agricultural production are given. The problems of transmission and storage of energy generated by renewable sources, as well as the theoretical foundations of the integrated use of traditional and renewable energy sources, are considered. The textbook will also be useful for doctoral students, independent researchers and practicing engineers working in these areas.

The textbook was published in Uzbek.



Nizomiddin Gulboev, Dilafruz Akhmedova
Archival documents on the military-political affiliation of the Khorezm oasis of the 19th century.

"Nurafshon business" Publishing house. 2020

The monograph presents materials from official archival documents from the fund I-125 of the National Archive of Uzbekistan. Documents stored in the fund "Palace Office of the Khiva Khanate", dedicated to the military history of the Khorezm oasis during the reign of the Kungrad dynasty, the political situation in the region in the 19th century, as well as some aspects of diplomatic relations between the Khanate of Khiva and Afghanistan. The monograph, along with the presented scientific and theoretical analysis, contains general content, translations of Turkish and Persian documents into Uzbek, original texts of documents, their transliterations and photocopies in Latin.

This monograph will be of interest to a wide circle of historians, orientalists, Turkologists, political scientists, diplomats and representatives of military historical sciences.

The monograph is published in Uzbek.

A writing boy – a «printer» of the 18th century

In the early 1770s, Swiss watchmaker Pierre Jaques-Droz designed an incredible thing for his time. The craftsman created an automaton – a programmable android in the form of a boy-writer, capable of outputting words and sentences of up to 40 characters with a goose pen.

The watchmaker named his creation «Calligrapher».

The appearance of the device is deceptively simple. A small barefoot boy, the height of a five-year-old child, sits at a wooden table and holds a pen. It's easy to mistake him for a toy doll. But inside lies a true marvel of engineering. 6000 moving parts work in concert to power the writing machine.

The calligrapher doesn't just write words. It turns its head to the inkwell, dips a goose quill into it, and shakes it to prevent blots. Pierre Jacques-Droz, the famous watchmaking pioneer, was born in 1721 in La Chaux-de-Fonds, Switzerland. He became a skillful creator of animated clocks with singing birds and fountains, musical clocks, as well as a brilliant master of automatic mechanisms – automatons. «Writing Boy» was the first automatic doll created by the master in 1773.

The body of the «automaton» was made of wood, the head – of porcelain, which took the clockmaker 20 months to make. Clockwork boy deduced goose pen on a blank sheet of paper phrases (something like «I love you, my city» or «Pierre-Jacques Droz – my inventor»), blotted the paperweight ink, thoughtfully looked at what was written, and then threw the leaflet and began to write again.

Droz arranged the premiere of «Boy» in Paris in 1774 – at the court of Louis XVI, who had just ascended the throne, «live» doll made a sensation.

Puzzle. History of the game

Puzzle is a logical game, a mosaic consisting of many parts of various shapes. The history of the appearance of puzzles dates back to the 1760s. John Spilsbury is considered to be the inventor of puzzles, about whom very little is known. He was born in 1739, studied under the royal geographer at the court of the British King George III, and served as a cartographer and engraver. He made his invention as a very young man, he was just over twenty. One day, John Spilsbury, as a member of the Royal Geographical Society, decided to diversify his geography lessons for his students and tried to paste black and white engravings depicting a map of England and Wales onto a thin wooden panel, and then cut it into small pieces of bizarre shapes. Each such piece contained a little geographical information, and by collecting the necessary fragments, the student studied geography. In 1766, such a map became a new textbook in geography and was published under the title Map of England and Wales, Divided into Counties. Over the next two years, Spilsbury developed similar maps of Europe, Asia, America, Ireland and Scotland. But John Spilsbury did not have time to fully enjoy the money and fame; he passed away at the age of 30. One of Spilsbury's puzzles has survived to this day and is in the British Museum. The 19th century made its own adjustments to the fate of folding pictures: by the middle of it, thanks to the widespread use of cardboard stamping in America, puzzles became significantly cheaper and more accessible. Instead of black and white pictures, color ones appeared.

Massive success came to puzzles when the American company Parker Brothers opened the first factory production of puzzles in the form that is familiar to us today. In 1908, the brothers released the Leisure collection, which became very popular due to the introduction of several innovations. For the first time, instead of geographical puzzles, art reproductions appeared. Cardboard puzzles attached to each other much better and were several times cheaper. Now they were a mosaic consisting of a certain number of elements. When they were combined, a single picture was created, which was depicted on the packaging.

Джон Спилсбери

In the 1950s, the passion for puzzles flared up with renewed vigor, largely thanks to the German company Ravensburger, which began offering puzzle lovers large puzzles with a number of pieces from 1000 to 5000. The company's largest puzzle was included in the Guinness Book of Records: the classic Ravensburger puzzle map has 32,256 elements. The weight of the “puzzle giant” is 17 kg, and the area is 10.5 square meters. Can you imagine the size of the room required to assemble it? How long does it take?

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Madina Kasymbaeva - an embroiderer who revived the traditions of Tashkent hand embroidery, against the background of a suzane - tog'ora - palak, created by her in 2023

Index: 1407

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