SCIENTIFIC RESEARCH OF THE SCO COUNTRIES: SYNERGY AND INTEGRATION

上合组织国家的科学研究：协同和一体化

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这些会议文集结合了会议的材料 – 研究论文和科学工作者的论文报告。 它考察了职业化人格的技术和社会学问题。一些文章涉及人格职业化研究问题的理论和方法论方法和原则。
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企业活动中的现代信息技术：使用实践和威慑因素
MODERN INFORMATION TECHNOLOGIES IN THE ACTIVITIES OF ENTERPRISES: USAGE PRACTICES AND DETERRENTS

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摘要。21 世纪世界经济发展的主要特征之一是信息技术的快速发展以及工业生产和社会生活的几乎所有领域的密集数字化。这种情况无疑使开展研究以确定信息技术和数字经济产品在工业生产各个部门中使用的现代趋势变得有意义。

本研究的主要目标是证实在工业生产的各个部门扩大使用现代信息技术和数字经济产品的必要性，以及确定其在生产新型工业产品方面的有前景的应用领域。

研究的结果是，对工业企业活动中实施现代信息技术的主要方向进行了分析。确定了生产信息化和数字化方面的领先行业以及工业企业活动中使用的 IT 解决方案。确定了阻碍信息技术实施的主要因素并制定了克服这些因素的建议。

关键词：工业企业、行业、现代信息技术、使用实践、阻碍因素。

Abstract. One of the key features of the development of the world economy in the 21-st century has been the rapid development of information technology and intensive digitalization of almost all areas of not only industrial production, but also the life of society. This circumstance undoubtedly makes it relevant to conduct research in terms of identifying modern trends in the use of information technologies and digital economy products in various sectors of industrial production.

The main goal of this study is to substantiate the need to expand the use of modern information technologies and digital economy products in various sectors of industrial production, as well as to identify promising areas of their application for the production of new types of industrial products.

As a result of the study, an analysis of the main directions of implementation of modern information technologies in the activities of industrial enterprises was carried out. The leading industries in terms of informatization and digitalization of production and IT solutions used in the activities of industrial enterprises have

been identified. The main factors hindering the implementation of information technologies have been identified and proposals for overcoming them have been formulated.

Keywords: *industrial enterprises, industries, modern information technologies, practice of use, deterrent factors.*

Introduction

Modern information technologies (IT), digital economy products and integrated information and analytical management systems (II AMS) are becoming increasingly important tools in achieving strategic goals and solving problems of strategic development of industrial enterprises. They are used at all levels of management of industrial enterprises of a wide range of profiles and serve as an indispensable source of obtaining various types of information. The key feature of the functioning of modern IT, digital economy products and control information systems is the significant acceleration of the search for the required information, its processing and the adoption of management decisions on this basis. In addition, they have a fairly developed functional content. It is by expanding the range of functional characteristics of information support that modern IT and digital economy products allow industrial enterprises to increase the efficiency of their activities [1]. These features of modern IT and digital economy products contribute to the successful implementation of plans for the production of commercial products, the development of new types of products, the introduction of innovative technologies into production processes, entering new markets, improving interaction with counterparties, and reducing the costs of manufactured products.

Modern IT, digital economy products and control information systems used at industrial enterprises support the implementation of management decisions. At the same time, the continuous development and improvement of their functional characteristics imposes specific requirements and conditions on the production activities of industrial enterprises. The need to take them into account leads to changes in the operating parameters of the enterprises themselves.

Thus, the further development of modern IT, products of the digital economy and II AMS entails, on the one hand, the transformation of the production activities of enterprises up to the creation of new production facilities, and on the other hand, the expansion of the range of production activities of enterprises necessitates the timely processing of increasingly large volumes of various kind of information. The latter is no longer possible today without modern IT and digital economy products. In other words, the key factor in the successful operation of industrial enterprises is the symbiosis of product production and modern IT. Moreover, with a high degree of probability it can be argued that without the use of modern IT, products of the digital economy and automated control systems, the main branches

of industrial production will inevitably rapidly degrade. This conclusion is quite obvious, since in modern industrial enterprises most of the production processes are implemented through the use of modern IT and digital economy products.

Purpose of the study

The main goal of this study is to substantiate the need to expand the use of IT and digital economy products in various sectors of industrial production, to identify promising areas of their application for the production of new types of industrial products and the main factors limiting the process of their implementation.

Materials and methods

Currently, the management of most industrial enterprises in various industries is aware of the need to rethink the role of modern IT and digital economy products in organizing the entire complex of production processes. This is due to the expansion of the functionality of modern IT and digital economy products and their presentation as a key production resource. If in the early stages of use they performed mainly a service function, today modern IT and digital economy products directly influence the introduction of innovations and the choice of development strategies for industrial enterprises in the near future. The use of a wide range of IT solutions based on cloud technologies, artificial intelligence technologies, Big Data, blockchain, Internet of things and others opens up new opportunities for increasing the efficiency of production activity models of industrial enterprises. These models use a new computing and information processing infrastructure. It involves the digital transformation of all production processes, starting with the formation of production plans, their implementation, optimizing the consumption of all types of resources, increasing labor productivity and ending with financial accounting systems, automation of document flow and interaction with the enterprise's counterparties [2].

The need for accelerated implementation of modern IT and digital economy products in the activities of industrial enterprises in all sectors of the economy is also supported by the state. In July 2017, the government approved the "Digital Economy of the Russian Federation" program, which defines the main directions for the strategic development of the Russian economy until 2025 [3]. The main provisions of this document are aimed at developing digitalization processes both on the scale of the Russian economy as a whole, and at industrial enterprises in the context of its industries.

The materials analyzed in this study were quite widely presented in the open press publications on the main directions of development of modern IT and the use of digital economy products in the activities of industrial enterprises in a sectoral context. The work also used materials from current legislative and regulatory documents regulating the introduction of modern IT and digital economy products into the activities of industrial enterprises. In addition, the study used data from

one of the consulting structures to assess the limiting factors for the development of modern IT and the use of digital economy products.

The methodological basis for the research was the methods of an integrated approach, system analysis, processing and synthesis of information.

By modern IT we will understand a set of methods and software and technological tools that combine production and technological processes through the collection, storage, processing and presentation of information. The use of IT helps reduce the labor intensity of production processes through the use of information resources. The main goal of introducing modern IT into the production sector is to create favorable conditions for its development. It is implemented by intensifying the exchange of information, increasing the efficiency of its processing and use for making management decisions at the level of all structural divisions of industrial enterprises.

Results and discussion

Many experts admit that the speed of development of modern IT and digital economy products is rapidly increasing. In the coming years it will be possible to compare it with an exponential dependence. In a very short period of time, IT has revolutionized fundamental aspects of modern manufacturing. The irreversibility of information transformation and digitalization of production processes forces industrial enterprises in all sectors of the economy to adapt as quickly as possible to the new conditions of their activities. We specify the key areas of influence of modern IT on the development of industrial enterprises.

The emergence of mobile solutions has led to the use of digital economy products such as tablets and even smartphones to organize modern production. With the advent of mobile communications and broadband Internet, it has become possible to concentrate all production management functions on wearable devices: from organizing the production process itself to providing it with the necessary resources; from personnel management to improving their competencies; from conducting marketing campaigns to searching for new contractors; from selling products to improving methods of delivery; from maintaining financial records to assessing the efficiency of production activities. It turns out that mobile solutions can be used not only to manage the production activities of industrial enterprises, but also to generate demand for manufactured products from consumers.

With the advent of cloud computing, industrial enterprises have the opportunity to transfer the functions of processing large amounts of semi-structured information and variable data packages to third parties through cloud services on the Internet. This allows enterprises themselves to focus on optimizing production processes without worrying about the possible loss of important information. The availability of cloud computing resources opens up new opportunities for development for industrial enterprises. Meanwhile, just a few years ago, such opportunities were unacceptable for most enterprises due to their high cost.

Expanding the analytical capabilities of modern IT allows enterprises to analyze increasingly large volumes of information in a short time. The result of this is a deeper understanding of consumer needs and their structuring into more specific groups, which greatly facilitates the choice of development prospects for industrial enterprises. The emergence of increasingly sophisticated analytical services as part of digital economy products and II AMS allows enterprises to segment product markets with greater accuracy and gain additional competitive advantages.

Modern IT and digital economy products have made it possible to combine the information, hardware and software necessary for the formation of II AMS. Within the framework of these systems, new software solutions are appearing every day to optimize the production activities of industrial enterprises. As a rule, these solutions are easy to implement and their cost is quite affordable, which ultimately greatly facilitates the activities of industrial enterprises.

Industrial enterprises use modern IT and digital economy products to integrate intra-production communications. The functioning of II AMS makes it possible to combine into one network the interests of different structures of industrial enterprises, ranging from production departments and financial services, to personnel management and security services. With the growing number of online transactions, the importance of financial management and security services working together to improve the security of these types of transactions increases. Through the use of encryption and individual passwords, modern IT provides reliable protection of digital information for industrial enterprises. Access to information can only be obtained by persons vested with appropriate authority. With the development of modern IT, information security standards are also increasing [4]. The introduction of biometric security systems allows you to completely abandon the use of passwords. The choice of specific IT solutions to ensure reliable protection of digital information remains with the management structures of industrial enterprises.

A noticeable rise in digitalization in 2020 was associated with an active transition to remote work and online interaction, but IT itself was actively being implemented in enterprises even before the introduction of "Covid" restrictions. This is typical for enterprises in all industries. We can note the successful implementation of IT such as digital design and modeling, business process automation systems and the Internet of Things. Technologies actively implemented by many enterprises over the past five years include: additive technologies that speed up the production of material objects (for example, 3D printers); virtual and augmented reality technologies that help in marketing and presenting the experience of using the company's product; unmanned systems; artificial intelligence (see Fig. [5]).
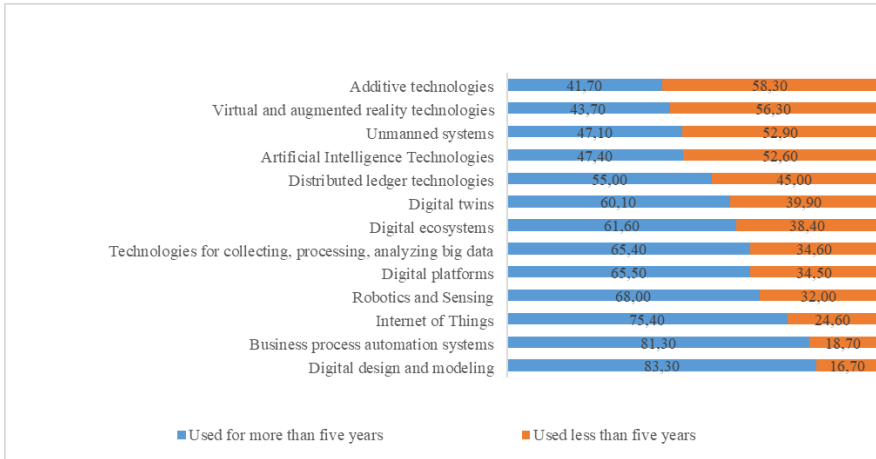
Figure. Use of digital technologies by implementation time
(% of the number of organizations using the relevant technology)

Industry profile.

In terms of industry, the greatest successes in connection with the use of modern IT, digital economy products and II AMS have been achieved by enterprises in the military-industrial complex and the aviation industry. As a rule, enterprises in these industries are introducing new IT solutions for the first time, and also using elements of the digital economy paradigm. This allows enterprises in two industries to quickly change and reconfigure production processes, modernize their products, improve production technologies, and master the production of new types of products. Enterprises in these industries are not only provided with orders, but also receive financial support from the state for their successful implementation. The main goal of introducing new IT solutions and elements of the digital economy paradigm at enterprises of the military-industrial complex and the aviation industry is to reduce the cost of manufactured products, provided that the appropriate level of their quality characteristics is ensured. This is precisely what explains the priority implementation of MES and ERP class information systems into their production activities, which allow for more accurate accounting and control of all production costs, organizing operational planning and management of production capacity utilization, tracking the progress of sales of manufactured products in the context of individual types, for each order and for the enterprise as a whole.

Enterprises in the metallurgical, oil and gas and mining industries, when introducing new IT solutions and elements of the digital economy paradigm, are

focused on creating innovative value chains for their products. To solve this problem, they actively use Data Mining, Process Mining, BigData, Blockchain technologies, as well as virtual, augmented and mixed reality (VR - virtual reality, AR - augmented reality, MR - mixed reality). Thus, we can conclude that enterprises in these industries use a more in-depth approach to solve the problem of informatization and digitalization of their production activities.

Modern IT is also used in the mechanical engineering industry. Enterprises in this industry gain additional competitive advantages from using digital information as an important production resource. Information systems for design and technological preparation of production, machine learning, increasing production efficiency, industrial Internet of Things technologies, big data analysis platforms and a number of other information resources are being actively introduced into the production activities of enterprises in the mechanical engineering industry.

Today, an increasingly wider range of IT solutions is gradually being introduced into the production activities of industrial enterprises in almost all industries within the framework of the "Digital Enterprise" concept [3]. These solutions include information systems such as CRM, ERP, PLM, as well as production preparation and management systems. A distinctive feature of the functioning of these systems is the formation of a single information space. This circumstance ensures complete digital continuity of the entire production process, starting from the moment an order is received and ending with the release and sale of finished products. The use of this kind of information systems ensures comprehensive integration of production processes throughout the entire life cycle of manufactured products.

The competitive environment in the IT field dictates the need for constant development of companies in the context of innovation. "Leaders must understand market trends and changes, especially in an era of rapid development of science and technology, when the rate of substitution of goods and services is rapidly increasing" [6]. This is clearly illustrated by the example of Nokia, which for more than 100 years has been producing various goods: from paper to rubber and cables. This company began its calling in the 90s when it released its first mobile phone. Since then, Nokia has become the leader in the mobile phone segment. However, by the end of the last century, the company was unable to reorient production and responded too slowly to the advent of touch screens and new operating systems - iOS and Android. Attempts by management to keep up with competitors or to focus on cheap push-button models were unsuccessful. In 2014, the company was forced to sell its mobile phone division to Microsoft and announced it would no longer use the Nokia brand.

The introduction of modern IT into the activities of industrial enterprises in Russia is hampered by a number of factors. Among many others, we will highlight the most significant ones [7, 8].

Technological factor. There is always a risk that too fast a pace could overwhelm departments and result in all processes being brought to a standstill. If the pace is insufficient, there is a chance that you simply will not see the desired results and benefits (simplifying business processes and increasing income). As a result, enterprises lose interest in introducing innovations. When implementing IT, an enterprise can develop its activities more slowly than its direct competitors. To avoid this, you need to carefully analyze the market and competitors. This will help determine the desired pace and speed of IT implementation. Then you can gradually increase it, closely monitoring the overcoming of other barriers.

Human factor. This barrier takes into account the conservatism of the staff, which consists in the tendency of people to avoid sudden changes, changes in the usual foundations and work rules. There is also a lack of sufficient technological competencies among employees. The transition to IT also affects corporate culture. New technologies, processes and communications will change the entire organization and its structure.

When implementing IT, the human factor plays a big role, for example:

1) insufficient support from management;

Without the active participation of the company's leadership, digital transformation may not receive the necessary support and achieve its goals.

2) fear of change;

Managers may fear that new IT will disrupt existing business processes and company structure. It is important to assess the feasibility of IT implementation, identify the pros and cons, risks and benefits of the output.

3) lack of qualified personnel;

Often, enterprises are faced with a lack of qualified specialists capable of implementing modern IT, updating or building new technological processes. This requires either new specialists or training or retraining of existing employees. There is also a financial issue associated with this point, since it will be necessary to retrain personnel or resort to outsourcing services.

To overcome this barrier, staff should be prepared in advance and key employees trained who will be able to pass on the acquired experience and skills to other specialists. It is important not to forget to upgrade to modern equipment. The implementation of IT implies not only the transition to powerful hardware, but also the use of artificial intelligence technologies, blockchain, Internet of things, etc. This will help make the approach to IT implementation close to optimal.

Financial factor. The implementation of IT requires enterprises to make significant investments in material support, the development of new processes and development strategies, and employee training. Difficulties in financing these processes can be caused by various reasons, for example, low profit margins or a lack of understanding of the return on investment of a new IT implementation project. To address this issue, budget protection and risk management plans must

be carefully developed. Practice shows that the phased implementation of IT with the development of risk models for minimizing or circumventing risks will make financing not so difficult compared to the implementation of IT in one stage.

Information security factor. The introduction of IT not only opens up broad opportunities for the development of enterprises, but also creates many threats in terms of information security. The most common one is data leakage. This risk can also be attributed to both the human barrier - enterprises always require competent specialists, and the technological barrier - they need modern software that will protect against intruders. All this again comes back to finances. To overcome this barrier, a number of preventative and basic protective measures should be implemented. Preventive protection measures include: data backup, development and configuration of an access control system, both electronic and physical, preventing the relevance of the software used, encrypting information during its transmission and storage, etc. The main protection measures include: development and implementation of national secure systems, use of certified information security tools, updating and finalization of the company's regulatory framework. The implementation of these measures should be carried out in accordance with a pre-developed plan and taking into account the specific features of the enterprise's production activities.

Each enterprise is unique in its own way. Therefore, when implementing new IT, it is important to identify all priorities, develop a phased plan, ensure reliable financing, correctly allocate resources, take into account potential risks and threats, and ensure timely completion of the project.

Conclusion

The results obtained during the research allowed us to formulate the following conclusions.

1. In modern economic conditions, the use of modern IT in the production process becomes an important factor in the successful operation of industrial enterprises.

2. Expanding the functionality of modern IT and digital economy products turns information into the most important production resource, on which the introduction of innovations in industrial enterprises and the choice of strategies for their development directly depend.

3. A brief analysis of the main directions of the influence of modern IT on the development of industrial enterprises showed that it is realized through mobile solutions, cloud computing, expanding analytical capabilities, combining information, hardware and software, and integrating industrial communications.

4. In terms of industry, leading positions in informatization and digitalization of production are held by enterprises of the military-industrial complex, aviation, metallurgy, oil and gas, mining and engineering industries. In their production activities, enterprises in these industries use different IT solutions. At the same time,

an increasingly wider range of IT solutions is gradually being introduced into the production activities of industrial enterprises in almost all industries within the framework of the "Digital Enterprise" concept.

5. Four main factors (technological, human, financial and information security) have been identified that hinder the introduction of new IT into the activities of enterprises. However, in addition to them, there are quite a lot of other factors that enterprises must take into account when implementing IT, depending on the practical specifics of their production.

6. When implementing new IT, it is important to identify all priorities, develop a step-by-step plan, ensure reliable financing, correctly allocate resources, take into account potential risks and threats, and ensure timely completion of the project.

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预测俄罗斯经济中外国直接投资的动态
FORECASTING THE DYNAMICS OF FOREIGN DIRECT INVESTMENT IN THE RUSSIAN ECONOMY

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摘要。外国直接投资是许多国家经济增长和发展的重要因素，俄罗斯也不例外。然而，自 2014 年以来，俄罗斯一直面临制裁压力，这对其经济增长产生了负面影响，包括外国直接投资的涌入。本文旨在分析制裁限制对俄罗斯经济外国直接投资流入的影响，并评估其现状和未来接收潜力。

研究结果表明，对俄罗斯实施制裁对该国经济增长和外国直接投资流入产生了负面影响。制裁的后果是造成商业环境的不确定性，增加在俄罗斯经商的成本，并降低来自不友好国家的投资者的信心。近年来，流入俄罗斯的外国直接投资大幅减少。然而，由于俄罗斯拥有丰富的自然资源、熟练的劳动力和战略位置，因此具有巨大的外国直接投资潜力。此外，俄罗斯政府已采取措施改善该国的投资环境，吸引友好国家的外国直接投资。此外，俄罗斯经济目前正在进行重大改革，包括制定与友好国家关系的新规则和彻底现代化基础设施。

关键词：外国直接投资、俄罗斯经济、投资环境、经济制裁。

Abstract. *Foreign direct investment is an important factor in economic growth and development for many countries, and Russia is no exception. However, since 2014, Russia has been under sanctions pressure, which has negatively affected its economic growth, including the influx of foreign direct investment. The purpose of this work is to analyze the impact of sanctions restrictions on the influx of foreign direct investment into the Russian economy with an assessment of the current state and the potential for their receipt in the future.*

As a result of the research, it was established that the introduction of sanctions against Russia had a negative impact on the country's economic growth and the influx of foreign direct investment into its economy. The consequences of the introduction of sanctions were the creation of uncertainty in the business environment, an increase in the cost of doing business in Russia and a decrease

in the confidence of investors from unfriendly countries. In recent years, the influx of foreign direct investment into Russia has decreased significantly. However, Russia has significant potential for foreign direct investment due to its rich natural resources, skilled workforce and strategic location. In addition, the Russian government has taken steps to improve the investment climate in the country and attract foreign direct investment from friendly countries. In addition, the Russian economy is currently undergoing significant reforms, including the creation of new rules for relations with friendly countries and a radical modernization of infrastructure.

Keywords: *foreign direct investment, Russian economy, investment climate, economic sanctions.*

Introduction

Foreign direct investment (FDI) is a critical component of modern international economic relations. Through FDI, foreign investors gain a stake in the host country's companies or assets and thus become active participants in the host country's economy. FDI brings not only financial resources, but also technology, managerial know-how and access to global markets, which can help improve the competitiveness of the host country's economy.

FDI played a significant role in the development of the Russian economic system. Russia has attracted significant amounts of FDI over the past few decades. This has led to the growth of the banking, finance and insurance sectors. FDI has also contributed to the modernization of financial and industrial-technological infrastructure in Russia. The country has made significant progress in attracting FDI by creating a favorable investment climate and increasing economic and political stability. However, today the level of FDI in the Russian economy remains relatively low compared to developed countries.

The Russian economy has faced a number of challenges in recent years, including economic sanctions, the COVID-19 pandemic and fluctuating hydrocarbon prices. According to the World Bank, Russia received $20.6 billion in FDI in 2020. This was down from a year earlier due to the impact of the COVID-19 pandemic and global economic uncertainty. In recent years, Russia has been subject to unprecedented economic sanctions from the United States and the European Union, which are affecting the flow of FDI into the country. Despite these challenges, the Russian economy remains an attractive destination for FDI due to its large consumer market, significant natural resource reserves and favorable strategic location. The Russian government has taken steps to mitigate the impact of sanctions (introducing tax incentives and initiatives to improve the investment climate, carrying out regulatory reform) and attracting FDI from friendly countries. Overall, FDI remains an important factor in economic growth and development.

In the modern Russian economy there are opportunities for FDI, especially in the field of financial technology, the development of high-tech and knowledge-intensive industries, digitalization and sustainable finance.

It is worth noting that FDI in the Russian economy has been unstable over the past decade and has been heavily influenced by external factors such as economic sanctions and fluctuations in commodity prices. Sanctions restrictions imposed against Russia by the US and EU in response to a special military operation have had a significant negative impact on FDI inflows. Many Western investors have withdrawn or reduced their investments in Russia. At the same time, many investors from friendly countries are gradually increasing their participation in this process.

Obviously, the ability to attract FDI into the Russian economy will depend on a number of factors, including geopolitical events, the country's economic performance and the government's commitment to reform.

Literature review

In recent years, a number of interesting studies have emerged regarding the theory and practice of FDI. In particular, the degree of impact of FDI on domestic investment in the economy was studied [1]. It is due to the presence of technological advantages of foreign investor companies over national companies. This can be considered a factor in crowding out national investment by foreign investors. Increasing technological gaps between countries may lead to structural distortions in global FDI. In this case, some countries will become stable net exporters of them, while others will become net net importers. Also, it is proposed to link the issues of optimizing FDI flows with the problems of achieving macroeconomic balance in the global and national economy [2].

Of significant interest are studies related to the analysis of the role of developing countries in the FDI system. So, I.V. Andronova points out that Chinese investors have serious support from the state. This ensured the competitiveness of Chinese TNCs in the global market, and the country's investment policy could lead to the displacement of European investors from the global FDI market [3].

In modern geopolitical conditions, FDI flows may change under the influence of sanctions imposed on the recipient country of investments, since, as noted by S.V. Kazantsev, the investor is forced to evaluate the various consequences of his own resistance to sanctions, as well as possible losses and benefits [4]. As the number of countries subject to economic sanctions increases, the geographic structure of FDI may change significantly. Against the background of these changes, later in the literature various aspects of investment activity in integration associations were also considered. Such activities are a preferential model and contribute to the development of the economies of the countries of the integration group [5, 6]. In general, the relevance of the problems discussed above is increasing, since with the introduction of sanctions restrictions, the approaches and models of organizing

and planning FDI on the part of TNCs are changing. This is undoubtedly reflected in the sectoral and country structure of FDI.

An important modern challenge for FDI flows is the active development of global digital platforms. Cross-border online sales platforms make it much easier for companies to enter foreign markets. In this case, there is no need to open production in these markets [7]. Therefore, the classic model of organizing foreign production based on FDI of transnational corporations is being replaced by new models. The latter are based either on a smaller volume of physical assets or are based entirely on intangible assets. This allows companies to quickly bypass traditional barriers to entering new foreign markets.

An essential aspect of FDI analysis is the impact on their dynamics and the nature of scientific and technological progress. In foreign literature [8, 9, 10] it is noted that since the 70s of the last century in the USA and EU countries there has been a tendency to increase investment in intangible assets, which now exceed capital investment in material production. At the same time, there is some evidence of the impact of increased investment in intangible assets on the transmission of monetary policy, in particular, its impact on investment and asset prices in the United States for 1990-2017 has been empirically and comprehensively studied. It has been found that for companies with more intangible assets, their investments and stock prices are less dependent on monetary policy [11]. In turn, companies with more intangible assets attract relatively less borrowed funds, since intangible assets themselves are not good collateral for debts [12, 13]. The work [14] substantiates the decrease in the response of FDI to significant changes in monetary policy by the ongoing scientific and technical progress and the growth of intangible assets in the capital structure of companies. Therefore, intangible investments need to be stimulated by instruments of fiscal policy rather than monetary policy, for example, tax incentives for R&D, as well as structural reforms aimed at supporting innovation. This approach is especially relevant for EU countries, which traditionally lag behind the United States both in terms of innovative development in general and in the context of investments in the intangible sphere.

The considered approaches contributed to the formation of a holistic view of FDI, however, in the context of geopolitical instability and overcoming the consequences of the COVID-19 pandemic, it seems necessary to supplement and clarify certain provisions related to new strategies for attracting FDI.

Purpose of the study

The purpose of the study is economic forecasting of FDI inflows to Russia. To achieve it, two interrelated tasks will be solved. On the one hand, a scientifically based assessment of the influx of FDI is given, based on the modern features of this process, and on the other hand, promising areas of investment activity are selected taking into account forecast estimates. Along with this, an important task of forecasting FDI inflows is to identify factors that have a significant impact on their

attraction. Studying the dependence of FDI on the influence of significant factors is an effective method of obtaining information about the motives for investing capital by foreign investors.

Materials and methods

The sanctions had a negative impact on the country's economy and financial system, making it less attractive to foreign investors. Despite this, some key industries, such as energy, oil production, pharmaceuticals, mechanical engineering and a number of others continue to attract significant volumes of FDI. The influx of FDI into the financial system has continued due to the various strengths and advantages that the country possesses. It is likely that ongoing efforts will be required to address the factors that influence potential investors' choice preferences and encourage increased investment.

An analysis of the threats and challenges faced by FDI in the Russian economy has revealed a number of key factors that may affect the attractiveness of the Russian market for foreign investors. These include economic uncertainty and a complex regulatory environment, which has become more pronounced in the context of sanctions imposed against Russia. A lack of transparency in the business environment and an ambiguous legal framework can pose significant risks for foreign investors. The emergence of new financial technologies and increased competition from other emerging markets may also threaten Russia's ability to attract FDI. To reduce these risks and attract more FDI, Russia needs to address these issues and create a more favorable investment climate, ensure transparency and certainty in the regulatory environment, and strengthen legal protection.

Assessing the possibilities of attracting FDI into the Russian economy is fraught with significant difficulties and uncertainties. While the Russian government has taken steps to improve the country's investment climate and attract foreign investment, ongoing sanctions and geopolitical tensions have had a negative impact on investor confidence and the business environment. In addition, the Russian economy is in the process of modernization, which poses significant regulatory and structural challenges that may pose barriers to attracting FDI. However, long-term prospects will depend on a number of factors, including the evolution of the geopolitical situation, the success of ongoing economic reforms and the ability of the Russian government to provide a stable and predictable investment environment. Overall, the trajectory of FDI in the Russian economy will depend on a complex set of political, economic and regulatory factors, and investors will need to carefully assess both the risks and opportunities before making investment decisions in this area.

Results and discussion

To create a model for forecasting the volume of foreign direct investment inflows into the Russian Federation, we will use the classical approach to estimating linear regression parameters based on the least squares method (LSM). The

construction of this regression model for the purpose of further forecasting will be carried out using the application software package for econometric modeling GRETL (GNU Regression, Econometrics and Time-series Library).

To identify the dependence of the influx of foreign direct investment, the author selected the following factors: GDP growth rate (%), GDP per capita growth rate (%), Growth rate of average monthly nominal accrued wages of employees of organizations in the economy as a whole (%), Inflation growth rate , GDP deflator (%), Expenditures on research and development (% of GDP), Population unemployment rate (%), Gross domestic savings (% of GDP), Labor force (thousand people), Accumulated investments in fixed capital with participation foreign investors (billion rubles), Accumulated investments in fixed assets with the participation of Russian investors (billion rubles), Growth rate of organizations' turnover (%), Growth rate of cash income and expenses of the population (%).

Using data from the Federal State Statistics Service of the Russian Federation and statistics from the World Bank and the Central Bank of the Russian Federation for 2010-2023. We compiled Table 1.

The first stage of the analysis is the selection of factors that most significantly influence the size of FDI, for their subsequent inclusion in the regression model equation. This step was carried out based on the P-value of the coefficients of the variables. After repeated attempts to build a meaningful model, the author proposed the use of eight variables (see Table 2).

Table 1
Initial data for forecasting

Year	FDI inflow, billion rubles	GDP growth rate (%)	GDP per capita growth rate (%)	Wage growth rate (%)	Inflation growth rate, GDP deflator (%)	Research and development expenditure (% of GDP)	Population unemployment rate (%)
2010	46308,5	4,50	4,5	5,2	14,2	1,13	7,47
2011	55967,2	4,26	4,2	2,8	15,9	0,6	6,52
2012	68103,4	3,52	3,8	8,4	8,9	1,3	5,46
2013	72985,7	1,28	1,5	4,8	5,3	1,8	5,48
2014	79030,0	0,73	-1,1	1,2	7,5	1,1	5,16
2015	83087,4	-2,83	-2,3	-9,0	7,2	1,1	5,65
2016	85616,1	0,2	-0,1	0,8	2,8	0,4	5,62
2017	91843,2	1,8	1,6	2,9	5,3	1,5	5,26
2018	103861,7	2,8	2,7	8,5	10,0	0,9	4,84
2019	109608,3	2,2	2,1	4,8	3,3	1,04	4,59
2020	107658,1	-2,7	-2,5	3,8	0,9	1,1	5,72
2021	135773,8	5,9	6,2	4,5	19,1	1,0	4,81
2022	155188,9	-1,2	-0,9	0,3	15,7	1,0	3,96
2023	172148,3	3,6	3,9	7,7	7,0	1,1	3,18

Table continuation 1

Year	Gross Domestic Savings (% of GDP)	Number of labor force (thousand people)	Investments in fixed assets with the participation of foreign capital (billion rubles)	Internal capital investments (billion rubles)	Organizational turnover growth rate (%)	Growth rate of monetary income and expenses of the population (%)
2010	22,6	75478	125	9152	121,11	113,3
2011	24,4	76952	134	11035	107,55	109,7
2012	24,5	76881	195	12586	111,96	105,9
2013	23,1	76553	197	13450	114,70	104,5
2014	22,2	76325	160	13902	104,93	102,8
2015	21,8	76588	117	13897	107,98	110,0
2016	22,9	76034	93	14748	108,21	109,6
2017	24,0	75871	87	16027	110,37	107,3
2018	20,8	75519	44	17782	111,28	104,4
2019	22,7	75398	84	19329	112,94	104,0
2020	23,5	74923	52	20393	114,68	109,9
2021	23,2	75350	65	23239	115,92	104,4
2022	22,3	74924	75	27865	117,68	109,4
2023	23,7	74327	287	31271	118,40	110,7

Source: compiled by the author based on data from the Federal State Statistics Service of the Russian Federation (https://rosstat.gov.ru/statistics/accounts) and the Central Bank of the Russian Federation (http://www.cbr.ru/statistics/?PrtId=svs).

Dependent variable - FDI inflow (billion US dollars), independent - GDP growth rate (%), GDP per capita growth rate (%), growth rate of average monthly nominal accrued wages of employees of organizations in the economy as a whole (%), rate inflation growth, or GDP deflator (%), unemployment rate (%), accumulated investments in fixed capital with the participation of foreign investors (billions of US dollars) and accumulated investments in fixed assets with the participation of Russian investors (billions of US dollars) . Let us accept the probability of erroneous rejection (rejection) of the hypothesis at a 5% significance level.

Table 2
Analysis of regression model variables using LSM

Variables	Coefficient	Art. error	t-statistic	P-value
const	−41,1752	14,4856	−2,780	0,0214
GDP growth rate (X1)	−37,6174	4,03276	−9,080	7,94e-06
per capita GDP growth rate (X2)	39,0191	4,08051	9,926	3,81e-06
accumulated investments in fixed capital with the participation of Russian investors (X3)	0,004808	0,000823055	5,566	0,0003

accumulated investments in fixed capital with the participation of foreign investors (X4)	−0,038351	0,0104080	−3,765	0,0045
growth rate of average monthly salary salaries of employees of organizations in the economy as a whole (X5)	0,295713	0,121193	2,523	0,0326
inflation rate (X6)	0,198128	0,0824025	2,303	0,0467
unemployment rate (X7)	−4,917060	1,71455	−3,016	0,0146

To build a more accurate forecast, all eight variables were tested for stationarity using the Augmented Dickey-Fuller test (ADF test) and KPSS. Based on their results, the stationarity of the observed time series of all variables was proven and it was determined that these series do not contain a trend. The test proved the significance of all variables.

The next stage of analyzing the influence of factors on FDI is assessing the quality of the resulting model (see Table 3).

Table 3

Results of regression analysis of the model using LSM

Secondary manager variables	0,218647	Statistical deviation of dependent variables	18,93419
Amount sq. leftovers	239,1129	Statistical error of the model	5,154425
R-square	0,958314	Corrected R-square	0,925892
F(7, 9)	29,55718	P-value (F)	0,000016

The percentage of error that is allowed in the regression model is determined by the P-value parameter; it should be less than 0.05, which means that the model error level should not exceed 5%. In the constructed model, P-value = 0.000016, which allows us to conclude that the model as a whole is significant. Also, if you pay attention to the coefficient of determination (R2), you can also conclude that the model is good, since the value reaches 95.8%. The coefficient of determination shows the proportion of variation in the resulting trait under the influence of the factors being studied. Thus, about 96% of the variation in the dependent variable is taken into account in the constructed model and is due to the influence of seven selected factors. The Standard error parameter contains sample standard deviations for each coefficient of the regression equation and standard errors of the coefficients. If the standard error is greater than the absolute value of the regression coefficient, the coefficient is insignificant. In the above model, the standard error is 5.154, which is lower than the regression coefficient (R-square = 0.958), therefore, according to this criterion, the constructed model is reliable.

The next step is to check the feasibility of the prerequisites for constructing a regression model using LSM for the absence of multicollinearity and autocorrelation of the residuals, for the normality of the distribution of residuals and for the presence of homoscedasticity, as well as checking the specification of the model. As a result of the analysis, the following test results were obtained (see Table 4).

Table 4

Checking the feasibility of the prerequisites for building a regression model using LSM in the GRETL program

Multicollinearity	
GDP growth annual	191,716
GDP percapita growth annual	222,623
Zarplata rost	4,671
d_Inflation GDP deflator annual	1,383
Un employment total of total 1	7,932
d_Investicii v osn kapital	2,027
Vnytrennie kapitalov l	7,162
Breusch-Pagan test for heteroskedasticity Null hypothesis: no heteroscedasticity	
p-value	0,942374
White's test for heteroscedasticity Null hypothesis: no heteroscedasticity	
p-value	0,691207
Ramsey test (RESET) Null hypothesis: specification is adequate	
p-value	0,941306
Durbin-Watson statistics Null hypothesis: there is no autocorrelation of residuals	
p-value	0,948517
Lewing-Box Q-statistic Null hypothesis: there is no autocorrelation of residuals	
p-value	0,057
Test for normal error distribution Null hypothesis: errors are normally distributed	
p-value	0,548437

When building a forecast based on a regression model with multicollinear factors, it is necessary to evaluate the situation based on the magnitude of the forecast error. If its value is satisfactory, then the model can be used despite multicollinearity.

A key prerequisite for constructing a model using the LSM method is also the condition of homoscedasticity. The Breusch-Pagan and White tests proved

the presence of homoscedasticity, since the calculated P-value (0.942 and 0.691, respectively) in each test performed turned out to be greater than the probability of error, that is, the null hypothesis of the absence of heteroscedasticity was accepted.

Let's carry out the Ramsey test (RESET), which is used in econometrics to test the functional form (specification) of the model. Since the P-value (0.941) is greater than the probability of error, the null hypothesis about the adequacy of the specification is accepted, which indicates that the functional form of the given model is acceptable. The test proved the correct choice of the type of connections and relationships between the elements of the model, as well as the correct choice of essential variables and parameters.

An important prerequisite for constructing a qualitative model using LSM is the independence of the values of random deviations from the values of deviations in all other observations, that is, the absence of autocorrelation of residuals. The absence of autocorrelation of residual values ensures the consistency and efficiency of estimates of regression coefficients. Let's check the presence of autocorrelation of the residuals using the Durbin-Watson and Lewing-Box tests. The calculated P-value in both tests (0.949 and 0.057, respectively) is greater than the error rate, thus there is no autocorrelation of the residuals in the model.

When analyzing the quality of the model, it is necessary to test a number of statistical hypotheses using the Fisher and Student tests, which can be used in the case when the residuals are distributed according to the normal law. Analysis of the normality of the distribution of residuals showed a value (p-value = 0.548437) that is greater than the probability of error, that is, the residuals are distributed normally.

Thus, as a result of testing the feasibility of the LSM assumptions when assessing the reliability of the regression model, the author proved their feasibility and the correctness of the model. The regression coefficients found based on the system of normal equations are unbiased, effective and consistent, which allows us to proceed to the regression equation and the interpretation of its coefficients for the variables:

$$y = -41,175 - 37,617 \times X1 + 39,019 \times X2 + 0,0048 \times X3 - 0,0383 \times X4 + 0,2957 \times X5 + +0,1981 \times X6 - 4,9171 \times X7 \tag{1}$$

The coefficients of the regression equation can be interpreted as follows: with an increase in the growth rate of GDP per capital by 1%, the amount of FDI increases by 39.019 million rubles, and with an increase in the growth rate of the country's GDP by 1%, it decreases by 37.617 million rubles. With an increase in accumulated investments of "Russian" origin in fixed capital by 1 million rubles, the influx of FDI into Russia increases by 4.8 thousand rubles. Increase in accumulated foreign investment in fixed assets by 1 million rubles. causes a drop in FDI inflows by 38.3 thousand rubles. With an increase in the growth rate of average

monthly nominal wages by 1%, FDI inflows increase by 295.7 thousand rubles, and with an increase in the growth rate of inflation by 1% - by 198.1 thousand rubles. An increase in the unemployment rate in Russia by 1% causes a decrease in FDI inflows into the country by 4.9171 million rubles. Consequently, the analysis carried out using LSM revealed the main dependencies and patterns of formation of the amount of FDI inflow into the Russia.

Conclusion

Based on correlation and regression analysis of the forecast model in relation to data for the Russian Federation, a high degree of dependence between GDP and FDI in the country for 2010-2020 was identified. and a forecast model of FDI inflows into the Russian economy was built for the period from 2021 to 2023. The dependent variable was FDI inflow (billion rubles), and the independent variables were the GDP growth rate (%), the growth rate of GDP per capita (%), the growth rate of the average monthly nominal accrued wages of employees of organizations in the economy as a whole (%), GDP deflator (%), unemployment rate (%), accumulated investments in fixed capital with the participation of foreign investors (billion rubles) and accumulated investments in fixed capital with the participation of Russian investors (billion rubles).

In the constructed model, about 96% of the variation in the dependent variable is taken into account and is due to the influence of seven selected factors, which indicates the good quality of the constructed model. As a result of checking the feasibility of the LSM assumptions when assessing the reliability of the regression model, the author proved their feasibility and the correctness of the model. The regression coefficients found based on the system of normal equations are unbiased, effective and consistent. Thus, the analysis of the influx of foreign direct investment into Russia using the LSM revealed the main dependencies and patterns of formation of the magnitude of their inflow.

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俄罗斯就业服务机构活动的改善
IMPROVEMENT OF THE ACTIVITIES OF EMPLOYMENT SERVICE BODIES IN RUSSIA

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摘要。实现每个人潜能的国家目标涉及特殊就业服务活动，旨在为劳动公民的持续职业发展创造制度条件，以及获得新职业和提高其资格的可能性。国家"人口统计"项目规定对就业中心进行现代化改造，并在此基础上建立社会中心。大流行后公民的职业就业和社会适应问题尤其严重。有必要扩大在各地区建立商业中心及其在地方一级的代表处的做法，这将扩大吸引额外财政资源的可能性。

关键词：就业服务、融资、劳动力市场、职业培训、就业、社会和商业中心。

Abstract. The national goal of realizing the potential of each person concerns the activities of special employment services aimed at creating institutional conditions for the continuous professional development of working citizens, as well as the possibility of obtaining new professions and improving their qualifications. The national project "Demography" provides for the modernization of employment centers and the creation of social centers on their basis. The problem of professional employment and social adaptation of citizens after the pandemic is especially acute. It is necessary to expand the practice of creating business centers in the regions and their representative offices at the local level, which will expand the possibility of attracting additional financial resources.

Keywords: Employment service, financing, labor market, vocational training, employment, social and business center.

Employment of the population is one of the most important indicators of the socio-economic well-being of society, ensuring the formation of income and a certain standard of living, influencing the demographic characteristics of the country, creating conditions for the implementation of professional knowledge, skills and abilities of the employee. This is due to the variety of factors affecting the labor

market - demographic, economic, social, organizational and technical, national and ethnic, administrative and legal. [1] To these should be added the migration policy in relation to workers arriving in the country and leaving abroad, which in certain periods can have a significant impact on the labor market.

Specific features of the Russian labor market and employment of the population, which developed in the 90s of the twentieth century and have survived to this day, are very actively studied. The attention of scientists is focused on informal employment [2], on employment in rural areas of different regions of Russia [3], on forecasting the labor market and adjusting the state employment policy [4]. There are not enough works devoted to the issues of the relationship between passive and active employment policies [4], but their authors raise an important question about the need to change the existing model of state regulation of this sphere. The authors see the main problem in a significant imbalance in favor of funding unemployment benefits, which for a number of reasons has lost its original meaning and often does not stimulate the search for work. At the same time, it is difficult to agree with the proposal to abolish unemployment benefits in favor of social support for low-income able-bodied people due to the significant informal employment in the country.

The budget reform, launched in 2001, implied a change in the public finance management system in order to achieve the basic principles of its construction. The development of principles and mechanisms for financial support of the employment service activities correspond to the main directions of reforming the budget process in the Russian Federation. [5]

The current financing scheme from the main administrator to the recipient of material support within the framework of the state service in the field of employment of the population is the most optimal and allows excluding the participation of intermediary organizations.

As a result of the disruption of labor supply and demand, the labor market continued to experience difficulties in 2021, gaining slight momentum, but without returning to the level that existed before the pandemic: in 2020, the number of employed people living in extreme or moderate poverty increased. This unfavorable trend has negated the hard-won development gains of the pre-pandemic years and reversed the progress made. [3]

In accordance with Article 152 of the Budget Code of the Russian Federation, Rostrud is a participant in the budget process, and accordingly ensures the preparation of the draft budget (draft budget and medium-term financial plan), submits it with the necessary documents and materials for approval by legislative (representative) bodies, ensures the execution of the budget and other powers determined by the Budget Code of the Russian Federation.

Rostrud forecasted funds in 2022 to support employed people and pay benefits to unemployed citizens during the spread of coronavirus infection, and therefore

it was not possible to establish the incidence rate of COVID-19 among citizens in the constituent entities of the Russian Federation, as well as the number of citizens left without work due to the suspension or termination of activities of a number of enterprises.

In this regard, there is a tendency to adjust the volume of federal budget funds allocated for the payment of benefits to unemployed citizens upwards and was made four times.

The largest share in the structure of federal budget expenditures in 2023 was the payment of benefits to unemployed citizens in the amount of 197.2 billion rubles, or 96.1 % of the total expenditure. Federal budget expenditures on this payment in 2020 are 3.8 times higher than expenditures in 2022. [3]

Federal budget expenditures to ensure the functioning of the Rabota Rossii platform in 2023 amounted to 0.6 billion rubles, or 0.3 % of the total expenditures and 6 times more than the 2022 expenditures.

Federal budget expenditures in 2023 for the modernization of employment centers were carried out in the form of subsidies and amounted to 0.3 billion rubles, or 0.1 % of the total expenditures and 0.3 billion rubles less than the corresponding expenditures in 2022. [6]

Federal budget expenditures in 2022 for the implementation of additional measures to attract labor resources were carried out in the form of subsidies in the amount of 0.4 billion rubles, in 2023 0.5 billion rubles are provided, which is 25 % more than the corresponding expenditures in 2023.

In 2023, expenses for financing the retraining of women during maternity leave for a child under 3 years of age were carried out in the form of subsidies in the amount of 0.8 billion rubles; since 2022, these expenses have been carried out within the framework of the federal project "Employment Assistance" of the National Project "Demography".

In 2023, financial support for the powers of the Russian Federation in the field of employment of the population, transferred for implementation to state authorities of the constituent entities of the Russian Federation through inter-budget transfers, was carried out in the form of 5 subsidies, 1 subvention and 1 other inter-budget transfer. [7]

According to the Accounts Chamber, there is a risk of failure to achieve the result under the Federal Program "Employment Assistance" in terms of the number of citizens who have completed vocational training (plan - 168.8 thousand people), since as of October 1, 2023, only 153.2 thousand people started training, and 22.4 thousand people completed training (13.3 % of the planned number of trained citizens). [7]

At the same time, financial execution as of September 1, 2023 amounted to 9.6 billion rubles, or 95.2 % of the approved funding volume (10.1 billion rubles).

Expenditures on financing in the field of employment, aimed at implementing measures to retrain enterprise employees in 2023, were carried out in the form of subsidies from the federal budget to the budgets of the constituent entities of the Russian Federation in the amount of 0.2 billion rubles, or 0.1 % of the total funds (6 times less compared to the corresponding period of 2021).

Since 2023, retraining of employees of enterprises is not carried out due to the termination of the implementation of the federal project "Support for employment and increasing the efficiency of the labor market to ensure growth in labor productivity" the effect of the relevant measures, since the very fact of training or retraining of certain categories of citizens does not mean that they will find a job after retraining in the relevant profile. [8]

The creation of a new target model of employment centers (hereinafter referred to as EC) is planned until 2025 through the gradual introduction of uniform standardized requirements.

In order to monitor the situation on the labor market, professional orientation of the population, registration of the unemployed and payment of benefits, relevant employment agencies have been formed at the level of territorial entities. Work on the modernization of employment service agencies in the pilot subjects of the Russian Federation has been underway since 2023.

In the Tashlinsky District of the Orenburg Region, the State Budgetary Institution "Employment Center of the Tashlinsky District" operates under the jurisdiction of the Ministry of Labor and Employment of the Orenburg Region. The institution's activities are aimed at forecasting and monitoring the economy's need for appropriate personnel, effectively regulating processes related to labor resources, and assisting in the employment of the population.

As part of the implementation of an active employment policy, the Employment Center of the Tashla District carries out the following functions aimed at ensuring employment in the district:

1) organization of public works - active policy includes measures to organize public works. In 2023, 11 contracts were concluded with enterprises and organizations of the Tashla District. According to the employment center, unemployed citizens go to public works, where wages are approximately 5.0 thousand. A person participating in public works receives a salary from the employer for his work and unemployment benefits from the employment center at the same time;

2) interaction of the Employment Center of the Tashla District with employers - the formation and development of the labor market largely depend on the level of interaction between the employment center and employers represented by enterprises, organizations, institutions. Today, more people are fired than are hired, even without taking into account the size of the layoffs that occur at the initiative of the employer. According to the current legislation, employment centers have re-

sponsibilities only to the state and the population represented by the unemployed. But, ignoring the problems of enterprises or vocational education institutions, it is impossible to effectively fulfill their responsibilities either in relation to the state, whose economy is experiencing a crisis, or in relation to the population, for which there are not enough jobs for the same reason;

3) assistance in vocational training of unemployed citizens and the unemployed population - unemployed citizens have the right to free vocational training and advanced training services at the direction of employment service agencies. It is carried out in educational institutions of vocational and additional education or in other educational institutions in accordance with the agreements concluded by employment service agencies. The amount of funds spent on organizing these works is 363.3 thousand rubles, of which: 115.0 thousand rubles from the federal budget, 248.3 thousand rubles - from employers' funds.

In order to simultaneously carry out the functions of such important facilities in the Tashlinsky District as a law firm, training and consulting centers and a financial platform for employment of the population, it is recommended to organize a Social and Business Center (SBC). It is planned that this social and business center (SBC) will work closely with the employment service, district administration and business structures in order to continue to provide real support to promising small businesses. Thanks to the financial assistance of the enterprises themselves and business partners, it is possible to create additional jobs in various sectors of the economy, such as trade, carpentry and other important industries. This will not only reduce unemployment in the district, but also improve the skills of the working population, which in turn will have a positive impact on the competitiveness of small businesses in the market.

Targeted efforts to attract investment and introduce innovative technologies will lead to the improvement of production processes, which will make the products of local enterprises of higher quality and in demand. Particular attention should be paid to small manufacturing enterprises, since their development is the key to sustainable economic growth and improved social well-being.

Educational and consulting programs will play a major role in the implementation of these plans, allowing entrepreneurs and their employees to receive relevant knowledge adapted to modern requirements. The SDC will also become a venue for various exhibitions and business meetings, which will create new opportunities for business cooperation and exchange of experience. Accompanying support from experienced specialists of various specialized organizations will simplify access to state subsidies and benefits provided to support beginning and existing entrepreneurs. This will increase the level of trust in state institutions and ensure the most efficient use of the resources provided.

Thus, interdepartmental cooperation, combining the efforts of government agencies, business structures and society, will become a guarantor of sustainable

development and prosperity of the district, facilitating the implementation of the most promising projects and initiatives of small businesses.

As a result of its activities, there will be a real decrease in the number of unemployed citizens in the Tashla district, that is, the SDC will assist the state policy in the field of employment. It is necessary to engage as many unemployed people as possible in a business that provides a certain income, including entrepreneurial activity.

In addition, the SDC assumes the creation of a mechanism for financing those wishing to start a business, as well as training all those wishing in entrepreneurial skills.

At the initial stage, the creation and equipment of the Center should be carried out at the expense of the budget of the Tashla district and potential interested investors. Further, the current expenses of the Center could be covered by paid services, without overloading the already very limited budget of the district, that is, the main costs of maintaining the Center should be covered by its own entrepreneurial activities.

It is planned that the SDC will operate in contact with the employment center, consult the unemployed on the selection of types of entrepreneurial activity that are economically viable and needed by the Tashlinsky district, and also give recommendations on the preparation of business plans and organizational and legal forms of entrepreneurial activity - for these and other services, receiving due remuneration.

Another form of optimization of the employment center may be the restructuring of its activities into a personnel center, which will closely cooperate with educational institutions and vocational training centers, which will allow it to quickly respond to changes in the economy and labor market requirements. This partnership will make it possible to organize retraining and advanced training programs that will help job seekers quickly adapt to new conditions and find suitable work.

Particular attention should be paid to supporting the most vulnerable categories of citizens, including young people, people with disabilities and those who have been unable to find work for a long time. Specialized support and employment programs will be developed for these groups, including mentoring, internships and social projects. This will not only increase their chances of a successful career, but also significantly improve their quality of life.

To assess the effectiveness of the personnel center, analysis and feedback systems can be implemented, allowing for prompt adjustments to processes and improvements in the quality of services provided. Regular satisfaction surveys, monitoring of employment and career growth of clients will help to create strategies aimed at increasing the level of employment and well-being of the population. As a result of all these transformations, employment centers can turn from

simple intermediaries into powerful personnel agencies that play a key role in the development and adaptation of the labor market to new realities. Their activities will ensure the creation of a dynamic, efficient and fair labor market, where the needs of employers and job seekers are harmoniously combined. Thus, today's employment landscape is a complex but well-integrated system, which is served by professionally oriented and technologically savvy personnel agencies.

The employment service plays a key role in regulating the labor market and ensuring social stability. Within the framework of its activities, programs are implemented to promote employment of citizens, vocational training and retraining, as well as social protection of the unemployed. One of the important aspects is support for temporarily unemployed citizens by providing unemployment benefits and social assistance.

The regulatory framework for financing employment of the population is currently based on an integrated system of regulatory legal acts. Among them:

- legislative acts, which include federal laws, government decrees and presidential decrees, which set the general framework and principles for regulating employment. These acts establish the rights and obligations of employees and employers, determine the mechanisms for financing and monitoring the implementation of legislation in the field of employment;

- by-laws supplement and specify the provisions of legislative acts, including instructions, orders and methodological recommendations of various ministries and departments. These documents describe in detail the procedures and mechanisms for implementing employment programs, establish requirements for organizations involved in employing the population, and determine the procedure for providing financial support to unemployed citizens;

- component programs adopted at the regional and municipal levels play an important role in the implementation of state employment policy at the local level. These programs are developed taking into account the specifics of the regions and are aimed at solving local employment problems.

At the municipal level, in order to optimize the work of the employment service, it is recommended to create a social and business center that combines the functions of all the necessary institutions for the implementation of powers and financing for regulating the situation on the labor market.

The integration of digital platforms and a personalized approach will ensure clarity and convenience of interaction for all parties: applicants, employers and partners. This transformation will turn the employment service into a key element of state support, capable of effectively coping with the challenges of the modern labor market and financing its activities.

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高等职业教育与技能型人才培养关系研究
A STUDY ON THE RELATIONSHIP BETWEEN HIGHER VOCATIONAL EDUCATION AND THE CULTIVATION OF SKILLED TALENTS

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摘要.本项研究致力于深度剖析高等职业教育与技能型人才培养间的紧密联系。借助对相关理论及实践的细致分析，展现高等职业教育在技能型人才培育过程中的关键作用，并给出进一步优化的策略及建议。
关键词: 高等职业教育；技能型人才；培养关系

Abstract. This study conducts an in-depth analysis of the close relationship between higher education and the cultivation of skilled talents. Through a detailed analysis of relevant theories and practices, it demonstrates the key role of professional higher education in the cultivation of skilled talents, and puts forward strategies and suggestions for further optimization.
Keywords: higher vocational education; skilled personnel; training related.

1. Research Background

With the rapid development of the economy and the continuous upgrading of the industrial structure, the society's demand for qualified talents is growing. As an important channel for cultivating qualified talents, the status and role of vocational higher education are becoming increasingly prominent. Looking around the world, countries are actively promoting the reform and development of vocational higher education to meet the new requirements of economic and social development.

In this era full of opportunities and challenges, the rapid changes in science and technology have further increased the demand for skilled personnel. With the emergence of new technologies such as artificial intelligence, big data, and the Internet of Things, traditional industries are constantly being transformed and emerging industries are constantly emerging. This requires skilled personnel to not only have solid professional skills, but also have innovative thinking, interdisciplinary knowledge, and good adaptability. Vocational higher education must keep

pace with the times and constantly adjust teaching content and teaching methods to meet society's demand for new skilled personnel.

At the same time, the in-depth development of economic globalization has made the international talent competition increasingly fierce. All countries are doing their best to improve the quality of their higher vocational education in order to attract and cultivate more outstanding and qualified talents. On the one hand, all countries actively participate in international cooperation and exchanges, introduce foreign educational concepts and high-level teaching resources, and improve the internationalization level of their higher vocational education; on the other hand, some countries have also increased their investment in higher vocational education, improved teaching capabilities, improved the quality of teachers, and provided students with a better learning environment and development opportunities.

In addition, society's perception of skilled personnel is also gradually changing. In the past, people often believed that skilled personnel had limited career opportunities and low social status. However, as the important role of skilled personnel in economic construction becomes increasingly prominent, society's recognition of them continues to increase. More and more people are beginning to realize that talented people can also excel in their own fields and make great contributions to society. This change in concept will further promote the development of higher vocational education, attract more students to choose vocational education, and cultivate more outstanding skilled personnel for society.

2. Vocational higher education plays an important role in cultivating qualified talents.

2.1. Carry out targeted vocational education.

The vocational higher education system combines market demand and industry development trends to set up specialized vocational courses so that students can systematically master vocational knowledge and skills. For example, in the fields of mechanical engineering, electronic information, nursing, etc., colleges and universities work together with enterprises to jointly formulate talent training plans to ensure that what students learn is closely integrated with the needs of enterprises.

This close cooperation is not only reflected in the creation of talent training programs, but also extends to all aspects of teaching. In the design of course content, the school and enterprises jointly discuss and integrate real enterprise projects into research, allowing students to experience real work scenarios and problems in the learning process. In addition, teachers regularly go to enterprises to conduct research and teach, understand the latest industry dynamics and technological trends, so that teaching content can be updated in a timely manner. At the same time, the school also invites technical experts and enterprise representatives to serve as part-time teachers at the school, and with their rich practical experience, they can teach students practical skills and problem-solving methods.

In addition, the school will also offer special courses and training programs based on the needs of enterprises. For example, it will offer specialized advanced courses to meet the technical requirements of specific enterprises, or provide further training opportunities for enterprise employees to enhance the professional level of the enterprise, which not only meets the talent needs of enterprises, but also provides students with more learning and practice opportunities.

2.2. Strengthen the connection between practical teaching.

Practical training is a feature of vocational higher education. Through internships, practical training, graduation projects and other practical links, students can apply theoretical knowledge to actual operations and improve their ability to solve practical problems. At the same time, practical training can cultivate students' professional qualities and professional ethics so that they can better adapt to the work environment.

In order to further strengthen the role of practical learning as a link, the school continues to increase investment in internship facilities. Modern laboratories and training bases are built, equipped with modern equipment and tools to provide students with good internship conditions. At the same time, the school has also cooperated with enterprises to build a number of off-campus internship bases, giving students the opportunity to intern in a real working environment. During the internship, the school hired professional teachers and company managers to guide students to ensure that students are fully trained and updated.

2.3. Promote the integration of industry and education.

Vocational higher education actively promotes the integration of industry and education and establishes close cooperative relations with enterprises. Enterprises provide schools with training facilities, equipment and technical support, and schools train target talents for enterprises, achieving mutual benefit and win-win results between schools and enterprises. This cooperation model not only improves the quality of talent training, but also promotes the development of the industry.

In addition, the school is actively exploring new models and mechanisms for the integration of industry and education. For example, the establishment of industrial colleges closely combines production, research and development, and corporate teaching to achieve the integration of industry, education, and research. Or the implementation of modern apprenticeship pilot projects allows students to practice on the job and master skills under the guidance of corporate mentors to achieve true integration of work and study. These innovative models have injected new vitality into the development of higher vocational education and provided a broader platform for the cultivation of qualified talents.

In short, vocational higher education provides a reliable guarantee for the training of qualified talents by opening specialized vocational education, strengthening teaching practice links, and promoting the integration of industry and education.

Vocational higher education will continue to deepen reforms, constantly innovate talent training models, and cultivate high-quality skilled talents for future economic and social development.

3. Requirements for vocational higher education to cultivate qualified talents

3.1 Optimizing the education planning system

In the teaching model with technical talents as the main body, the planning of course content and teaching methods is particularly important. With the rapid growth of social economy and the continuous renewal of industrial structure, vocational education has brought unprecedented opportunities and challenges for the cultivation of high-quality technical talents. Therefore, we must ensure that the course structure is closely linked to the continuous growth of the industry and seek innovative and diversified teaching strategies that meet the requirements of modernity and progress.

The course content should not only cover the relevant basic theories, but also extend to a wide range of practical teaching and training activities. For example, the mechanical manufacturing major should cover core courses such as the basics of mechanical design, material mechanics, and processing technology, and design practical courses such as numerical control skills, 3D printing technology, and robot programming to improve students' working methods and solve practical problems. Such a course design idea can not only help students lay a solid theoretical foundation, but more importantly, improve students' practical skills through on-the-job practical training, so that they can stand out in the future labor market. When designing course content, we should pay close attention to the latest technologies and development trends in this field. Today, global technological changes and industrial changes are developing rapidly, and advanced technologies such as artificial intelligence, big data, the Internet of Things, and intelligent manufacturing have put forward higher standards and expectations for professional education. In order to cultivate technical talents that meet the needs of modern society, when developing educational content, it is necessary to carefully study the development of new technologies, adjust and update educational courses in a timely manner, and integrate new course resources related to new technologies. For example, for information technology majors, course content can include big data analysis, artificial intelligence foundations, Internet of Things technology, etc., so that students can master advanced technical tools and application scenarios .

3.2 Strengthening the construction of teaching staff

Teachers are the key elements in talent cultivation. Vocational colleges should vigorously strengthen the construction of the teaching staff, hire corporate experts and technical experts with rich practical experience, encourage teachers to intern in enterprises, and improve teachers' practical teaching level.

First, establish a teacher training and development mechanism. Schools can regularly organize teachers to participate in professional training and academic exchanges to improve teachers' teaching level and professional quality. At the same time, schools can encourage teachers to participate in enterprise technology research and development and project cooperation to improve teachers' practical ability and innovation ability. Second, establish a teacher evaluation incentive mechanism. Schools can establish a scientific and reasonable teacher evaluation system to comprehensively evaluate teachers' teaching level, practical ability and scientific research performance. At the same time, schools can also set up a teacher reward fund to reward teachers with excellent academic performance, strong practical ability and fruitful scientific research results, so as to stimulate teachers' enthusiasm and creativity.

3.3 Improve the evaluation mechanism

Establish a scientific and complete assessment mechanism to comprehensively and objectively evaluate students' learning outcomes and professional skills. The assessment methods should be diversified, including examinations, practical classes, project completion, etc., to better reflect students' comprehensive qualities and abilities.

In order to improve the evaluation mechanism, higher vocational colleges can take the following measures. First, establish a diversified evaluation index system. The evaluation index system should include students' academic performance, practical ability, innovation ability, teamwork ability, professional quality, etc., to fully reflect the students' comprehensive quality and ability level. Secondly, adopt diversified evaluation methods. Evaluation methods should include exams, practical classes, projects, work displays, interviews, etc., to give full play to students' subjective initiative and creativity. In addition, schools can establish a student self-evaluation and mutual evaluation mechanism to allow students to participate in the evaluation process and improve students' self-awareness and self-monitoring ability. Finally, establish an evaluation feedback mechanism. The school should promptly feedback the evaluation results to students and teachers so that students can understand their learning situation and shortcomings, so as to adjust teaching methods and strategies in time. At the same time, teachers can also adjust teaching content and methods according to the evaluation results to improve teaching quality and teaching effectiveness. 4. Conclusion

Vocational higher education has a very close relationship with the cultivation of skilled talents. Vocational higher education provides an important platform and guarantee for the cultivation of skilled talents. The cultivation of skilled talents is also conducive to the continuous development and improvement of vocational higher education. In the future development process, we should further strengthen the reform and innovation of vocational higher education, continuously improve

the quality of talent cultivation, and provide strong talent support for economic and social development.

In summary

Vocational higher education has a very close relationship with the cultivation of skilled talents . Vocational higher education provides an important platform and guarantee for the cultivation of skilled talents. The cultivation of skilled talents is also conducive to the continuous development and improvement of vocational higher education. In the future development process, vocational higher education should further strengthen reform and innovation, continuously improve the quality of talent cultivation, and provide strong talent support for economic and social development.

With the continuous progress of the times and the rapid development of science and technology, vocational higher education is facing more and more opportunities and challenges in cultivating qualified talents. On the one hand, the rise of emerging industries has put forward higher requirements for qualified professionals, which not only requires solid professional skills, but also requires innovative thinking, teamwork and interdisciplinary knowledge. Vocational higher education should keep pace with the development of the industry, adjust the professional settings and curriculum system in a timely manner, introduce advanced technologies and concepts, and provide students with more targeted and practical education.

In short, higher vocational education and the cultivation of skilled talents complement and promote each other. In future development, we must fully recognize the importance of higher vocational education, continuously strengthen reform and innovation, improve the quality of talent cultivation, cultivate more high-skilled talents for economic and social development, and contribute to the realization of the Chinese dream of the great rejuvenation of the Chinese nation.

现代白俄罗斯共和国普通中等教育和爱国主义教育博物馆
MUSEUM OF GENERAL SECONDARY EDUCATION AND PATRIOTISM EDUCATION IN THE MODERN REPUBLIC OF BELARUS

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摘要。本文更新了现代白俄罗斯共和国普通中等教育机构博物馆的教育潜力。特别强调年轻一代的爱国主义教育，这与博物馆教育学直接相关。
关键词：博物馆；爱国主义；历史记忆；白俄罗斯人民的传统价值观；家庭传统的延续性。

Abstract. *In the article, the authors update the educational potential of museums of institutions of general secondary education in the modern Republic of Belarus. Particular emphasis is placed on the patriotic education of the younger generation, which is directly related to museum pedagogy.*

Keywords: *museum; patriotism; historical memory; traditional values of the Belarusian people; continuity of family traditions.*

The Museum of General Secondary Education, as a rule, is the custodian of social and cultural heritage, organically uniting socio-cultural processes, updating the preservation of historical memory, traditional values and consolidation of the Belarusian people, acting as the foundation of patriotic education of young people [1, p. 821]. In the Republic of Belarus, a program has been developed that allows, in the process of implementing education and training, to strengthen state sovereignty and national security by consolidating Belarusian society and ensuring national unity. Thus, by the Decree of the Council of Ministers № 773 of December 29, 2021, a program of patriotic education of the population of Belarus for 2022-2025 was approved, which provides for the fulfillment of tasks for the formation of national identity, spiritual, moral, historical, cultural, civil-patriotic, military-patriotic education.

And it is no coincidence that the museum of the institution of general secondary education occupies a special place in the study of the history of the origin, formation, development of national culture, in the study of the subject and natural environment of a person in the process of intellectual filling of leisure, dissemination of interesting information to supplement the content of education and patriotic education of students. The Museum of General Secondary Education successfully implements the state policy of patriotic education: the formation of national identity based on traditional values, the desire for peace and creation, pride in one's country, achievements in economics, science, sports, readiness to defend one's native Fatherland (love for one's home, village, city, history of one's native land) [2, p. 56]. In this regard, it is important to direct the efforts of teachers, parents, pedagogical teams to the formation of national identity, to more actively form national values and traditions captured in museum expositions of educational institutions. It is advisable to pay special attention to the spiritual, moral, historical and cultural education of students in order to preserve the traditional values of Belarusian society, popularize the native history, military and labor exploits of the Belarusian people, important historical events, memorable places, their role and significance in the formation of Belarusian statehood. It is necessary to concentrate efforts on civil and patriotic education in order to form a law-abiding and actively fulfilling his civic duty, respecting the state symbols of the Republic of Belarus.

The Museum of General Secondary Education is of particular importance in modern realities, since the preservation of historical memory and traditional values is vital for contemporaries in understanding the spiritual world of different eras, studying Russian history and world culture. Everyone knows that the basic function of museums is the education of patriotism in the process of participation of the younger generation in museum activities [3, p. 82]. Patriotic education of students is ensured by a system of targeted measures of a worldview, ideological, legal, political, informational, as well as organizational nature, implemented in the process of interaction with the subjects of educational relations. The museum of the institution of general secondary education is a condition for cognitive, creative pastime, a means of communicating with rarities of the past and present. Museum exhibits, as the primary sources of knowledge, emotionally affect students, ensuring the continuity, continuity of the cultural and historical development of the spiritual life of the Belarusian people, recreating historical fragments of the past, forms the attitude of young worship to the present and future fate of their country. Due to the unique opportunity to use historical rarities, masterpieces of art culture, museums of general secondary education institutions have a large-scale cultural potential, as they are able to actualize various issues of economic, political, social and spiritual development of the Belarusian society.

The museum today in any country of the world is the center of preservation, selection, exposure of the historical and cultural heritage of our country, as well as a social institution that forms the historical consciousness, moral and aesthetic culture of students, which largely determines human spirituality, updating the strategic guidelines for patriotic education of students in the Republic of Belarus. The specificity of the museum's work in an institution of general secondary education lies in the fact that it has great educational potential, which forms a national identity that orients students towards the development of personal abilities (observation, classification, systematization of information) [4, p. 11]. In the museum, students are independently involved in the world of «revived» history, actively studying the historical past, museum objects (exhibits), which largely determines the prospects for patriotic education. Museum objects, as fundamental value imperatives, act as reliable information about interesting people, important events, scientific facts that can affect the emotional sphere of a person, evoke a sense of ownership, allowing you to see and feel the «spirit of the past», «immerse» in the special «world of the hero-creator», «victorious people». The museum allows students to develop their abilities, satisfy interests, which is stimulated by the expressiveness, diversity and authenticity of museum objects, which undoubtedly speak to the fundamental aspects of human spirituality in the information society [5, p. 73].

Pedagogical practice confirms the fact that the museum of the institution of general secondary education is a semantic component of the patriotic education of students of educational institutions [6, p. 22]. Remote forms of work are now becoming important: museum quests, challenges, Internet conferences, forum discussions, virtual exhibitions in the process of the teacher's implementation of information-visual methods, emotional and aesthetic means, innovative forms of museum pedagogy, which allows for an unconventional approach to the education and training of students using the information potential of museum objects. Continuing to remain a place for storing relics, rarities, the museum in an educational institution becomes the basis for communication, the formation of moral guidelines, and the education of a person of high culture [7, p. 173].

Museums of general secondary education in the modern Republic of Belarus preserve and study in detail the historical and cultural heritage of the region, city, village, since the museum is a kind of portal, a kind of «time machine» that moves students into the past, which is a symbolic access to the space of the socio-cultural life of our ancestors. The use of information technologies allows students not only to independently extract and analyze local history material, but also to make it public through virtual museums, exhibitions, Internet conferences, forum discussions. So, a virtual excursion, a quest excursion, a theatrical excursion, a master class excursion, a museum festival, a demonstration of museum objects in action are actively used by museums in their work. Museums of educational

institutions broadcast cultural heritage, preserve, study and popularize, as well as broadcasts of Belarusian moral and ethical values and guidelines to the younger generation, which is an integral direction of civil and patriotic education. Together with traditional forms of work, museum work in the institution of general secondary education includes innovative forms of cultural and educational activities (historical reconstructions, theatrical performances, quests, festivals, concerts, interactive excursions, lectures, master classes, creative workshops). Educational classes, optional, extracurricular activities in museums of the institution of general secondary education, as well as the integration of educational subjects with museum expositions, as practice shows, allow us to study the pages of our native history using heroic examples from the life of our unique ancestors and outstanding contemporaries. It is the personal participation of teachers, students and their parents in search work, the collection of materials for the study of museum objects when creating unique expositions, as well as conducting interesting excursions, contributes to the development of various techniques, skills of museum, excursion and professional activities, the formation of national identity based on the traditional values of the Belarusian people [8, p. 74].

The Museum of General Secondary Education introduces students to traditional values, moral behavior, and moral standards generally accepted in Belarusian society [9, p. 151]. In addition, today the museum is becoming a means of introducing students to national culture, acting as an antipode to digitalization and virtual social reality. The Museum of General Secondary Education, as a sociocultural institute, performs an educational function, part of which is the patriotic education of students. It should be noted that the activities of such a museum also have a beneficial effect on the formation of a comprehensively developed personality, capable of thinking critically on its own, striving for modern knowledge and science. In other words, the museum of educational institutions carries out a very important mission to form an educated personality, and most importantly, to educate a patriot, citizen, family man and worker in the modern Republic of Belarus.

The main goal of museum pedagogy is to involve teachers (teaching staff), students and their parents, relatives in the work, as well as patriotic education based on historical memory, continuity of family traditions, traditional values of the Belarusian people [10, p. 21]. Teachers are advised to regularly design their educational work in museums of general secondary education institutions and, together with students and their parents (legal representatives), hold events of a national-patriotic nature, including those timed to coincide with public holidays, since this is what contributes to the consolidation of Belarusian society. At the same time, it is necessary to always remember about the establishment of family values, to the extent of forces and opportunities to attract families of students to the process of patriotic education.

Thus, the museum of the institution of general secondary education and the prospects for patriotic education of students make it possible to state the fact that, firstly, the younger generation can and should join the original culture and traditional values of the Belarusian people in the process of studying the history of their small homeland, language, and the continuity of family traditions. The uniqueness of the cultural and historical heritage of their country, which implies the establishment of socio-state (national) values, the actualization of national identity and the consolidation of the Belarusian people. The Museum of General Secondary Education focuses on Belarusian statehood, the formation of a law-abiding citizen or a socially safe type of personality in the modern Republic of Belarus, respecting the state symbols of its country. The museum of the institution of general secondary education makes it possible to more effectively carry out the military-patriotic education necessary to prepare students for the fulfillment of the constitutional duty to protect the Republic of Belarus. The Museum of General Secondary Education as an institution of social and cultural activity is organically interwoven into the system of spiritual life of Belarusian society.

The museum allows teachers to consistently implement methods of educational impact on students, complementing traditional excursions, involving students in various forms of sociocultural creativity, contributing to the translation of historical and cultural knowledge, allowing the younger generation to be introduced to national-cultural, family traditions in the face of modern challenges [11, p. 156]. The museum is effective if it becomes an open pedagogical system included in the wide infrastructure of the economic, political, social, spiritual spheres. The Museum of General Secondary Education, as an institution of social memory, capable of improving traditional forms of research, exposition and educational activities on the basis of morality and positive axiological guidelines of the individual in the information society [12, p. 416].

The museum successfully solves the problems of historical-patriotic and moral-aesthetic education of visitors by means of excursion activities or other forms of historical and cultural education. Co-creation with the establishment of education, families, other institutions of the socio-cultural sphere, it is the museum that effectively solves educational problems, provides significant assistance to its region in organizing spiritually rich leisure activities for different groups of the population. The teacher, who is worried about the fate of his homeland, by all means contributes to improving the quality of education and the sustainable development of the country, will try to update the information and educational work, revealing with the help of museum pedagogy the content of social and state values of the Republic of Belarus. In this regard, it should be especially noted that it is important to place accents taking into account the national-historical policy aimed at improving

personnel work, strengthening the ideological vertical against the background of the active broadcast of historical shrines, monuments of the Fatherland in order to increase the prestige of the service of law enforcement agencies and the Armed Forces of the Republic of Belarus.

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表演文本作为边疆语义学和地方意识形态呈现的一种形式
PERFORMATIVE TEXT AS A FORM OF FRONTIER SEMANTICS AND PLACE IDEOLOGY PRESENTATION

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注释。本文探讨了美国和欧洲边疆语义学的各个方面。边疆语义学的主要测量和呈现单位被认为是形成适当心理环境的表演性文本，或构建了思维生产系统和理解一个人一生中所涉及的关系网络的算法的语义世界。在科学（史学和制图）视觉呈现话语中创作的文本被视为表演性文本。
关键词：边疆语义学、概念语义学、"地点"、认知映射、表演性文本、心理节奏。

Annotation. *The article examines aspects of frontier American and European semantics. The main unit of measurement and presentation of frontier semantics is recognized as a performative text that forms an appropriate mental environment, or a semantic world in which a system of thought production and an algorithm for understanding the network of relationships in which a person is involved during his life are constructed. The texts created in both scientific – historiographical and cartographic – visual-presentation discourses are considered as performative texts.*

Keywords: *frontier semantics, ideational semantics, 'place', cognitive mapping, performative text, mental tempo.*

The turn of the XX and XXI centuries was marked by qualitative changes in the tempo and essence of social existence, which, of course, was influenced by political transformations of society, which entailed the movement of significant human flows from one region of the world to another. Migration processes, which

have become iconic processes of human life, have predetermined the inevitability of changing the mental landscape of the Earth and taking into account frontier semantics in its formation.

Frontier semantics, or frontier semantics, is a mental content that inevitably becomes part of the mental activity of a "migrant" who is intellectually and emotionally experiencing transformations taking place in his life. The nuclear component of frontier semantics, a kind of hypersystem, as well as the nuclear element of temporhythm, has become a space that has taken over the status of the metanarrative framework of modern civilization from the category of time, and is identified with the component of the space of experience – a Place, a structural element, which, according to I.P. Basalaeva [Basalaeva, 2012] is a sense of Place constituted by an individual biography. The earth is all around us, according to J.E. Maplas, one of the recognized researchers of the ideology of place, is not only a reflection of our practical and technological capabilities, but also a reflection of our culture, our needs, our hopes, concerns and aspirations [Malpas, 2004]. E. Casey [Casey, 1993] insists that there is no knowledge or feeling places other than knowing 'to be in this place, to be in this place, to be able to feel this place.'

Most fully, as N.V. Khalina believes, frontier semantics turns out to be in a performative text that forms an appropriate mental environment, or a semantic world in which a certain thought can be created, a system of thought production and an algorithm for understanding the network of relationships in which a person is involved during his life [Khalina et al., 2019].

Y.B. Gryaznova, analyzing performative texts in the methodology of science, notes that texts of this type are actualized in the situation of the absence of a single paradigm and the emergence of many others [Gryaznova, 1998]. This type of text is the limit of self-determination texts and at the same time their local implementation, verification and demonstration. Being an expression of thought, a performative text, in its essence, is not only a statement about something, it is also a demonstration of what this text is in action. G.V. Melikhov [Melikhov, 2011] believes that the best purpose of a performative text is to use it as an exercise of the author's ability to reflect. A performative text is an individual work of awareness, the energy of striving for what is taking place; keeping the reader in his own intention.

A peculiar performative text is created by Frederick Turner, the founder of the Wisconsin and Harvard American historical schools of the 20th century. In the 1891 work "The Meaning of History", F. Turner formulates a deconstructive thesis by its nature as fundamental for the newly created scientific direction: "each epoch rewrites history anew, in accordance with changed conditions." History as a scientific discipline is beginning to be used as a tool for solving modern problems, problems relevant to the "here-and-now", which leads the founder of the

American historical schools of the twentieth century to realize American exceptionalism. The frontier category is becoming a key category for both the awareness of American exceptionalism and the construction of a new format of historical knowledge and historical science. Apparently, as the first definition of the frontier as a constructive category of American historical science, the definition of the frontier used by the US Census Bureau should be recognized: the frontier is the boundary beyond which the population density is less than 2 people per square mile.

The conceptually forming idea of the frontier for American historiography was expressed by F. Turner at the 1893 Annual meeting of the American Historical Association in Chicago [Turner. 1893]. Although professional historians categorically did not accept such a one-factor explanation of the American past and the design of an autonomous American civilization, the concept of the frontier became fundamental in explaining the uniqueness of the American character and the prospects for the development of American society after the settlement of the entire continent by Americans, when the border of Western settlements, or frontier, disappeared. In the course of the Americans' advance "deep into" the mainland and the frontier movement, all European institutions, even the human psyche, were changing. Land development, adaptation to the geographical landscape required transformation, deconstruction of the mental landscape through awareness of new opportunities and resources of human nature (human breed).

F. In his works, Turner departs from classical narrativism, preferring an interdisciplinary approach synthesizing data from geography and statistics. Thus, when analyzing the history of the territories of the United States, F. Turner prefers to consider the process of historical division, or deconstruction, of these territories into sections, each of which differed in specific political and economic behavior. It was "sectarianism" that had a significant impact on the development of both American society and the United States as a state. The work of F. is especially significant in this regard. Turner's The Importance of Sections in American History, published in 1933, after the author's death.

Stefan Mark Mitchell, in his PhD thesis "Deconstruction of National Identity: Character, Place and Modern American Independent Cinema", performed at the University of East Anglia (Norwich, Norfolk, UK), draws attention to the fact that the grandiose design of America as a radically open space for immigrants meant more than just erasing the history of these immigrants [Mitchell, 2014]. This meant: retroactive idolization of one particular difference, erasing all others. In the multifaceted landscape of America's differences, the European tradition has turned into a "mortgage" of supernatural proportions.

The ideology of the frontier can be considered, in our opinion, as a system of semantic rules for the production of messages transmitted by the communicative

dimension of connotation. The generating position in the American frontier ideology is the position of the 'Wild West' (Old West, Old Northwest). – the position of the 'place' crystallization of the events of American life. In the frontier concept of F. Turner the presence of the Wild West and the desire of immigrants to constantly explore new territories determined the peculiarities of the formation of the American mentality and the mental landscape itself, the elements of which are mobility, the spirit of freedom, adventurism, and the American dream.

The Wild West zone – the frontier zone – covered the territory of the modern states of North Dakota, South Dakota, Montana, Wyoming, Colorado, Kansas, Nebraska, Oklahoma, Texas. This zone gradually expanded and moved west to the Pacific coast.

The frontier, or intermediate between Europe and Asia, between the West and the East, understanding of the nature of Russian culture arises, according to D.S. Likhachev, when looking at Russia from the West [Likhachev, 1999]. In fact, its spiritual and Christian character is the legacy of Byzantine culture, the military unit structure is the legacy mainly of Scandinavia, and the fundamental basis for the synthesis of both was folk, pagan culture. Currents of two extremely dissimilar influences stretched through the gigantic multinational space of the East European Plain, which had a decisive significance in the creation of the culture of Russia. South and North, not East and West, Byzantium and Scandinavia, not Asia and Europe.

According to D.S. Likhachev, for Russia, as well as for Europe (Spain, Serbia, Italy, Hungary), the confrontation between the South and the North was much more important than the confrontation between East and West.

The historiographical frontier of the culture of Russia and the United States is conditioned by the need for self-identification and the use of the achievements of European culture for these purposes, In the case of Russia, the culture of Europe and its traditions are used to reorganize the way of life and modernize everyday reality. In the case of the USA, the suitability, vitality of European values, technical and technological parameters of European culture in a different landscape and geocultural environment are being tested.

Within the framework of the American frontier, Western metaphysics was dismantled, the basic aspects of knowledge production were deconstructed and a spatial conceptual structure was created 'The United States of America', focused on the assimilation (read, deconstruction) of national cultures, and, consequently, the denial of cultural differences – the scale of the 'melting pot'. American national identity is a form of cultural narrative, a logocentric discourse, and an explicit metaphysical structure. The remote verification of the values of European culture led to the identification of the "west" category as a working, guiding movement in the history of the "vital activity" of European civilization outside the traditional

mental landscape. This category acts in the American frontier, on the one hand, as the principle of deconstruction of the system of philosophical and spiritual values of the place of origin – the mental European behavioral text, on the other hand, as the pragmatic basis for the design of a new type of behavioral text, conditioning a new value system, which is defined by the binomial "New World" – "Old World".

The vital activity of the American frontier is conditioned by the need to move "into the depths", to move one's own place, to reside in the direction of the West, in the direction "beyond". In various religious and mythological traditions, the West is the land of death, the abode of the dead, the kingdom of exile.

The "ideology" of the frontier, of moving one's place, which led to the formation of a special sense and feeling of place, lay at the heart of the movement of the borders of the Roman Empire, which was reflected in the cartographic performance of the Roman Empire.

The Roman map of the IV century – the Peitinger tablet – represents the network of roads of the Roman Empire, moving along which actually means realizing the bulk of the empire and recreating its borders, the frontier, first of all, in the imagination of the nomad. A nomad traveler traveling along the roads of the Roman Empire is completely identified with a "point", the movement of which is its trajectory, which is a spatial curve, which, in turn, can be represented as conjugate arcs of different radii, each emanating from its center, the position of which can change over time. A feature of the geographical maps of the European Middle Ages is Mappa mundi (Latin. "world map") It was that they were not intended for practical use, for example, navigation, but for illustrating the Christian picture of the universe.

The boundary of land and sea, the boundary of two behavioral models – models of movement in space/ on the earth's surface and the model of navigation in time (on the sea surface) – was recorded using portulans, or portals, nautical charts of the late XIII-early XVI, showing the waters of the Mediterranean and Black Seas, as well as the Atlantic Ocean coast beyond the Giblartar. In fact, the portals depicted the real border not only of land and water elements, but also the actual frontier line between different forms of human life, i.e. life as a harmonious alignment of one's space with one's time and staying in the time of another space, another element. Portolan, therefore, is also an image of the boundary of mental states that determine the difference between earthly and "unearthly" mental landscapes.

Mappa mundi should be considered prototypes of "imaginable geography", correlated by the author of this term, Elvard Said, with the perception of space generated by certain texts, images and discourses [Said, 2006]. Imaginary geography is proposed to be considered as a form of social constructivism. Mappa mundi acted as a way to identify the vitality of the European way of thinking and

a graphical variant of substantiating the importance for the world community of the European axiological system for assessing the empirical experience acquired by other ethnic communities.

The need to identify the vitality of the European way of life and the axiological systems defining it arose in Europe, more precisely, Western Europe, according to the concept of Larry Wolf [Wolf, 2003], in the XVIII century, in the age of Enlightenment, which chronologically coincided with the beginning of the US movement towards awareness of its own national identity and statehood and the creation of a performative text of American identity. J. Days in his work "The American Intellectual Frontier", which are devoted to the importance and in the history of the United States of the intellectual enlightenment of the entire century: "The fathers of our country belonged to the intellectual aristocracy; they shared the intellectual enlightenment of the eighteenth century. Franklin, Jefferson, and John Adams were secular people in their beliefs and ideas, especially from the modern French world" [Dewey, 1922.].

It was Western Europe, according to L. Wulf [Wulf, 2003], that invented Eastern Europe as its auxiliary half in the age of Enlightenment. The "discovery" of Eastern Europe is recognized as a fact of philosophical geography, which allowed the description of a geographical place without direct visual contact with it. Philosophical geography excluded Eastern Europe from Europe, assigning it a place in Asia, which allows L. Wolf to associate the emergence of the concept of Eastern Europe with the development of E. Said's "orientalism" [Said, 2006]. At the same time, "Orientalism" is considered as a style of intellectual possession, the end product of which is a fusion of knowledge and power and a situation of intellectual superiority. Eastern Europe, in this case, is quite identified with a performative text that crystallizes the event of Europe's awareness of its 'place' on the world map, your identity.

Europe's search for its own definition largely depended on the formation of a mental matrix, which was superimposed on relations with the social and geographical reality surrounding the continent [Filyushkin, 2011].. However, the same thing happened in the United States, causing a rethinking of the sense of place, the sense of place and the scale of space by those who became part of the mental landscape of the new state. The transformation of the sense of place brought to life a new behavioral text, essentially a performative text.

A resident of the American frontier created his own version of "Eastern Europe" – the frontier, the Wild West development zone, or the American Old West, located in the territory of the modern states of North Dakota, South Dakota, Montana, Wyoming, Colorado, Kanas, Nebraska, Oklahoma, Texas. This territory gradually expanded and moved westward all the way to the Pacific coast. The United States Census Bureau defined the frontier as a boundary where the population density was less than 2 people per square mile.

Emigrants from the former Russian Empire (Soviet Russia) took part in the formation of European and American mental landscapes and the design of American identity of the twentieth century, who created, in G.D. Grebenshchikov's terminology, Russian emigrants, or in G.D. Grebenshchikov's interpretation, "American Rus" – the American frontier of the 20-30s. The twentieth century is a performative frontier that forms a new design of the mental landscape of the United States, newly formed in the era of intellectual enlightenment states in America, for which a sense of 'place' became the basis of statehood and national identity. The feeling that imposed the bonds of eternal union on the mental islands that separated from the European homeland and condemned themselves to an eternal journey – the frontier – in the actual infinity, the infinity of universal transformations.

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雷•布拉德伯里的短语单位翻译成俄语的方法类型
（基于小说《夏天，再见》）

TYPOLOGY OF METHODS FOR TRANSLATING PHRASEOLOGICAL UNITS BY RAY BRADBURY INTO RUSSIAN (BASED ON THE NOVEL "SUMMER, GOODBYE")

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注释。本研究的相关性取决于对科幻小说体裁中的短语单位进行全面研究的必要性。本研究旨在从翻译学角度分析雷•布拉德伯里的短语单位，这些短语单位采用连续抽样法收集，并通过比较词汇和文体分析法进行检验。在翻译中使用了以下跨语言转换方法：确定部分和完整等价物；使用描述法、泛音翻译、直译和省略。

关键词：短语单位、翻译、跨语言转换。

Annotation. *The relevance of the research is determined by the need for a comprehensive study of phraseological units found in the genre of science fiction. The aim of the study is to analyze Ray Bradbury's phraseological units in the translatological aspect, collected by the continuous sampling method and examined by the comparative lexical and stylistic analysis method. The following methods of cross-language transformation were used in translation: partial and full equivalents were determined; descriptive method, overtonal translation, literal translation, and omission were used.*

Keywords: *phraseological units, translation, interlanguage transformation.*

Introduction

Phraseological units are actively used in oral and written speech, stylistically enriching it and adding expressiveness. Their main purposes is to influence the recipient of information. However, at the same time, they have all the qualities that can present difficulties for the translator from the very first steps.

The problem of translatability of phraseological units was actively worked on by linguists of S. Vlahov and S. Florin. They believed that the possibility of achieving a full-fledged dictionary translation depends on the completeness of the

relations between the units of the source language and the target language [1: pp. 86-90].

If the source language has a phraseological unit (FE) equal to the phraseological unit of the target language, phraseological tools are used for translation. However, it should be borne in mind that even if the Russian and English phraseological units completely coincide, their meanings may not coincide.

When the phraseological unit of the source language is not equal to the phraseological unit of the target language, non-phraseological tools are used. If the phraseological unit is not included in the target language, then the translation is carried out by other means. A non-phraseological translation is used.

N. B. Aristov suggested using a dictionary when translating phraseological units. If the dictionary does not give the meaning of the whole unity as a whole, then it is necessary to use the dictionary to establish the meaning of each of the components separately [2: p.163]. The idea expressed by unity is also conveyed in Russian with the help of an equivalent, sometimes with only some minor deviations. The idea expressed by unity is conveyed in Russian by other visual means, since its expression is based on a completely different image. This is especially common when translating proverbs. These rules, formulated in the works of such linguists as V. N. Komissarov, L. V. Dmitrieva, N. F. Smirnov, E. A. Martinkevich, S. E. Kuntsevich and others, helped to solve the problem of translatability of phraseological units and facilitated the process of translating fiction, where phraseological units are most often found.

In the vast majority of cases, translation from English to Russian is carried out by searching for correspondences in dictionaries and applying translation transformations. In the translation literature, there are many classifications of translation transformations proposed by well-known scientists, including L. S. Barkhudarov, V. N. Komissarov, and others [3: p. 66; 4: p.76].

As you know, translation transformations can be lexical, grammatical, and complex (lexico-grammatical). The main translation techniques of transformations include transliteration, transcription, calculation, generalization, concretization, modulation, integertrans formation, and functional substitution.

However, not all of these translation techniques are suitable for working with phraseological units. Many well-known philologists have proposed various solutions to this problem. Thus, A.V. Kunin, having studied the existing approaches to the problem of translatability of phraseological units in Russian linguistics, identified two types of translation: phraseological and non-phraseological [5]. To the phraseological type of translation, he attributed the method of full phraseological equivalent and the method of partial phraseological equivalent.

The full phraseological equivalent method (calking) helps you save the entire set of values of the unit being translated. It is used when the translation lan-

guage has the same denotative and connotative meanings, the same metaphor and emotional-expressive colors the phraseological unit in the source language. This method is most often used to translate international phraseological units borrowed by both languages from a third language.

A full phraseological equivalent is a rather rare phenomenon that suggests that the translation coincides with the original in meaning, lexical composition, stylistic orientation, and grammatical structure. It should be noted that phraseologisms that perform a nominative function are often translated using the full equivalent. This is due to the fact that they describe a person or action in more detail. In this case, omission or identification is not entirely appropriate, since it is the absolute equivalent that can give a clear and clear idea of the subject or object. Thus, the use of a full phraseological equivalent implies a complete correspondence of the translation to the original in all aspects: image, lexical content, grammatical structure, and stylistic coloring.

The method of partial phraseological equivalents usually used in the absence of the phraseological equivalents. In this case, to make an adequate translation, the translator selects a phraseological unit in the target language with a figurative meaning based on a different image.

Partial equivalents that contain lexical, grammatical, or lexico-grammatical discrepancies suggest completeness of meaning transmission while preserving stylistic orientation.

To the non-phraseological type of translation, A.V. Kunin attributed the methods of literal, descriptive and overtonal translation. In this case, the phraseological unit is transmitted using the lexical means of the translated language, and losses in the field of imagery and connotation are almost inevitable.

Literal translation (calcification) is used when other techniques fail to convey a phraseological unit in its semantic-stylistic and expressive-emotional meaning intact, but it is still necessary to preserve the figurative basis.

Descriptive translation is used to explain the meaning of a phraseological unit that lacks both an analog and an equivalent in the target language, and a literal translation is also impossible. Descriptive translation is often used when translating phraseological splices, since their meaning is unmotivated and is not derived from the meaning of their components, which further complicates the choice of an equivalent in the language of translation. Descriptive translation has one important feature: when choosingре данного приема перевода сохраняется общеthis translation method, the general linguistic meaning of the translated phraseology is preserved, but the semantic and stylistic shades that appear in the original text are not recreated.

Overtonal translation means finding an equivalent that can be used to translate a phraseological unit only in a certain context. The translator's actions in this case

are reduced to interpreting phraseology using explanation and comparison. This is a translation of a phraseological unit used only in a specific context, i.e. occasionally (according to A. V. Kunin). It should be taken into account that the occasional nature of this equivalent is determined exclusively by the features of its text. Thus, the use of overtonal translation implies that the translator has a certain amount of creative imagination.

Research of the novel text

Phraseological units in Ray Bradbury's works [6; 7] are of considerable interest for scientific research. They allow you to focus the reader's attention on the inner world of the characters, make monologues, dialogues and the plot as a whole more dynamic. However, the idiosyncrasies of the writer's idiosyncrasies and the content of using phraseological turns create difficulties in translating them into Russian.

We considered the variants of translation of phraseological units proposed by E.Petrova in the novel "Summer, Goodbye" – the last work published during the writer's lifetime, in 2009. The action takes place in the town of Greentown, two years after the events described in the book "Dandelion Wine". The main character is still Douglas Spaulding, who is now 14 years old. As a teenager, he does not want to leave his childhood and become an adult. This internal conflict is the basis of the plot.

Using the continuous sampling method, we selected phraseological units and considered the ways of translating these language units in the work of E. Petrov's novel "Summer, Goodbye", which for greater representativeness and clarity of the material were presented in the form of a table.

Transformation methods used in translation
phraseological units романа of R. Bradbury's novel " Summer, Goodbye!"

Original text	Russian translation text	Method used in translation
The ship blew its horn a last time and **broke his heart** so it fell from his eyes in tears as he cried all the names of his loves on shore	Пароход дал прощальный гудок и **разбил** Дугласу **сердце**: оно брызнуло слезами у него из глаз, и он стал звать родных и близких, оставшихся на берегу	literal translation
The hours burned in cold white wintry flashes, as people scuttled in and out of Braling's mansion, **hoping against hope** that he was Lazarus	Часы сменяли друг друга снежно-холодными всполохами, а в особняке Брейлинга метались люди, надеясь, **вопреки здравому смыслу**, лицезреть воскрешение Лазаря	partial equivalence

Long time no see. They always come home when they're hungry	Ага, **явился, не запылился**. Аппетит нагулял – и тут как тут	overtonal translation
Somewhere **in a corner of his mind**, Doug saw the bike fling Quartermain high, wheels spinning, while Douglas fled, the cryof Quartermain following close	Мысленным взором Дуглас увидел, каквелосипед на полном ходу врезается в Квотермейна и подбрасывает его в воздух, а он, Дуглас, дает деру под старческие вопли	descriptive method
Do or die!	Хоть умри!	partial equivalence
He **makes money** if we lie here, you and you *and you!*	Ему **только на руку**, если мы здесь ляжем в землю – и ты, и ты, и ты!	overtonal translation
Halloween's almost here and before thenwe got to **sour their grapes**!	До Хэллоуина осталось всего ничего, номы и ждать не будем: покажем им, где раки зимуют!	overtonal translation
Gosh almighty, **you're nuts**!	У тебя **мозги набекрень**, честное слово!	partial equivalence
Now they're after me!	А теперь за мной охотятся!	descriptive method
Some boy with a cappistol **means nothing**!	И мальчишку с пугачом **не впутывай**!	overtonal translation
Sip your revenge quietly	Отомстить всегда успеешь	descriptive method
No, you are a **student-come lately**	Нет, у тебя всего лишь **замедленная реакция**	descriptive method
Why don't we just chuck all those **Bolshevikboys** into a pot, boil them down to essence of kid?	В котел бы их всех, **малолетних бунтарей**, да сварить на медленном огне, как ты считаешь?	descriptive method
You boys are not very good at **covering your tracks**	Вы, ребята, не умеете **заметать следы**	literal translation
Doug **swallowed hard**	Дуглас **сглотнул застрявший в горле комок**	partial equivalence
But I remember being your age, and getting **caught redhanded at doing something** Iknew I shouldn't do, but I did anyway	А меня, помню, в твои годы **застукали споличным**, когда устроил я одну каверзу; и ведь знал, что пакость, а все равно делал	full equivalent
Doug's face **turned red**	Дугласа **бросило в краску**	partial equivalence

The only thing that **comes to mind** right now is maybe we stop the courthouse clock	Единственное, что сейчас **на ум приходит**, – часы башенные остановить, что ли	literal translation
It was a hot evening and all the boys were perspiring and talking **under their breath** and wishing they were somewhere else, almost wishing they were in school, which would be better than this	Вечер выдался душным; мальчишки обливались потом и разговаривали **вполголоса**, мечтая перенестись куда угодно, да хотя бы в школу – всяко лучше, чем здесь	full equivalent
Here was their nemesis, which they thought they'd defeated, **being brought back to life**	У них на глазах машина отмщения, которую они считали поверженной, **возвращалась к жизни**	partial equivalence
I smell a rat, fellas	**Не к добру это**, парни	descriptive method
Keep your eyes peeled and if I give the word, break and scatter [6]	Теперь **не зевайте** и по моему приказу будьте готовы рассредоточиться и скрыться [7]	partial equivalence

Based on the analyzed material, we found out that the novel "Summer, Good-bye!" most often uses the method of partial equivalent (7 FE out of 22, or 28 %) and descriptive translation (6 FE out of 22, or 27 %). The translator was also able to find Russian-language matches for two phraseological units (the full equivalent). The method of descriptive translation in percentage terms is identical to the full one, so some phraseological units still received only a semantic description. This may slightly reduce the semantic value of the text.

Overtonal translation was used in 18 % of cases (in 4 FE out of 22) and, just as in the previous case, is due only to the context and the decision of translators not to use the generally accepted equivalent of a particular phraseology.

The frequency of using a literal translation, as well as the full equivalent method, was 13% each (2 FE out of 22). In the first case, the translator was able to reproduce phraseological units using the lexical means of the Russian language. By means of the full equivalent method, the emotional coloring of the language unit was transmitted, and proverbs and colloquial expressions peculiar to another culture were replaced with equivalents close to the Russian reader.

In this study, we also analyzed the quantitative correlation of methods of translating phraseological units of the novel "Summer, Goodbye!" into Russian according to the classification of A. V. Kunin. According to A. V. Kunin's typology, there are two types of translation methods: phraseological and non-phraseological. The first type includes full and partial equivalent methods, while the second type includes overtonal translation, literal translation (calking), and descriptive translation.

Non-phraseological translation refers to descriptive translation. Such a translation is usually applicable in cases where this concept is indicated in one language by a phraseological unit, and in another – by a word. For example, many English verbs expressed in word combinations can be conveyed quite painlessly by their lexical equivalent.

Such non-phraseological translation, although not completely painless, also lends itself to FE, which have synonymous words in the NJ. Such translations also perform their role quite satisfactorily in the dictionary, indicating the exact semantic meaning of the unit. However, in the context, any correspondence must acquire a "phraseological form" or, at least, a stylistic coloring and expressiveness close to the original ones. In a word, even in the descriptive translation of a phrase, you should always try to get closer to the phraseological one, to convey at least some of its elements or sides.

Literal translation (calcification) is usually preferred in cases where other methods, in particular phraseological ones, cannot convey the whole of the phrase in its semantic-stylistic and expressive-emotional meaning, and for one reason or another it is desirable to "bring" the figurative basis to the reader. Calculating is possible only when a literal translation can convey to the reader the true content of the entire phraseology.

This is feasible in a number of cases. First, in relation to figurative phrases, mainly phraseological units that have retained their metaphorical nature; you can calculate, secondly, a number of proverbs and, first, those that do not have subtext. Third, you can use this technique to convey some stable comparisons, but only after making sure that the NJ carrier understands them correctly.

However, many tracing papers can be attributed to phraseological translation. For example, I will not let you tear a fingernail from a finger, i.e., a son from his father: it is translated almost literally and turns out to be a completely meaningful phrase in Russian, denoting the separation of close people from each other.

If the translation is not possible, the phraseology may be omitted. In the story phraseological translation methods were used in 41% of cases, while non – phraseological translation methods were used in 59% of cases.

Conclusion

In order to conduct a comparative linguistic analysis of the novel "Summer, Goodbye!", 22 phraseological units were selected. Most often, the translator used the full equivalent method, trying to accurately convey the meaning of the translated phraseological units. Most often, the translator used literal translation and the partial equivalent method. The method of omitting phraseological phrases was not used in the text. In the novel" Summer, Goodbye! " phraseological translation methods were used in 41% of cases, while non-phraseological translation methods were used in 59 %.

It should be noted that the translation of almost any work of Ray Bradbury is associated with overcoming certain difficulties. The writer's prose is characterized by vivid images. When creating them, the author used a variety of means of artistic expression, including phraseological units. The uniqueness of the literary language of Bradbury and the ambiguity of translating the means of expression of his language into Russian still arouses the interest of a number of literary critics and indicates the need for further study of the writer's work in the context of translation theory and practice.

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危机情况下的舆论管理
MANAGING PUBLIC OPINION IN A CRISIS SITUATION

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摘要。本文致力于探讨危机条件下舆论管理的主要方向。确定了在危机背景下制定的战略框架内使用反危机公关技术的重要性。已经确定，在危机期间，最有效的策略是通知利益相关者。沟通过程是通过公众目标群体使用的信息渠道建立的。
关键词：反危机公关、沟通、危机局势、目标受众、沟通渠道。

Abstract. *The article is devoted to the main directions of public opinion management in crisis conditions. The importance of using anti-crisis PR technologies within the framework of strategies developed in the context of crises is determined. It has been established that during a crisis, the most effective strategy is informing stakeholders. The communication process is built in relation to target groups of the public through the information channels they use.*

Keywords: *anti-crisis PR, communications, crisis situations, target audiences, communication channels.*

The processes occurring in modern society associated with scientific progress have made society more vulnerable. The introduction of new technologies in various spheres of human activity increases the number of risk factors, which can cause a negative public attitude towards the organization, manufacturer, etc. Currently, there are various public opinion management technologies that should be directly used in the process of preventing crisis situations, eliminating the consequences of crises and maintaining reputation. This direction in the communication sphere is called "anti-crisis PR".

It should be noted that the problem under study has not been sufficiently studied in modern science. Much attention of the scientific community is riveted to

the theoretical aspects of the study of crisis communications. Scientific contribution to the development of anti-crisis PR was made by modern researchers: F.I. Sharkov, D.P. Gavra, N.D. Karyagin, V.A. Danilov, M.R. Dushkina, E.M. Korotkov, A.V. Krutik, A.I. Muravyov, A.A. Menshikov, V.L. Muzykant, Golub O.Yu., Sergeeva E.V., Zagoruiko E.V., V.S. Zorina, T.G. Karpova, E.A. Mladkovskaya, I.V. Mukhin, and others. A significant share of modern studies of anti-crisis PR is reduced to the study of the concept of crisis, the content of the mechanism of crisis communications, reputational risk management to prevent organizational crises. In the works of modern authors, crisis communications are considered as an element of strategic communications of the organization, the features of crisis communications are determined. In connection with the development of the information society, such areas as the role of new media in crisis communications, media relations and news agenda management during a crisis play a major role in the study of anti-crisis PR. It is worth noting the contribution of science to the study of the practical aspect. Today, more and more attention is paid to the practice of crisis communications, issues are being studied dedicated to the features of state and political PR in the international, national and regional space, as well as business and public communications in the context of increasing crisis processes. Some research papers are devoted to the practice of PR communications during the pandemic and post-pandemic, as well as the problems of adaptation and transformation of the communication practices of government bodies and socio-political movements, mass media, business and public organizations. [1] The crisis state of an organization is always associated with certain shocks. A crisis for which the organization is not prepared can destroy the company's reputation in an instant. However, a crisis can also become an impetus for the development of the company and lead it to new successes. Practice shows that the main goal of organizing work on public opinion management during a crisis comes down to stabilizing relations with interested groups of the public, which is achieved by maintaining their trust using various anti-crisis PR technologies. Anti-crisis PR technologies are a sequence of actions carried out one after another, in a certain sequence depending on the crisis situation. However, this does not mean that the technologies are immutable. On the contrary, depending on the nature and character of the crisis situation, different technologies are used, each of which contains a certain set of actions planned in advance in the anti-crisis program of the organization, which is a strategic document. Anti-crisis PR technologies can be designed to prevent, overcome a crisis, as well as manage public opinion in the post-crisis period.

It is necessary to highlight the stages of work with crisis situations: before the onset of a crisis situation, during the crisis. PR activities before the onset of a crisis are reduced to the preparation and prevention of crisis situations, the formation of a team for crisis management and the distribution of functions between its

participants, the definition of areas of work in the organization before the onset of a crisis situation. PR strategies, preventive measures in anti-crisis communication, PR strategies for exiting the crisis are used in the activities of the organization. In a crisis, the main emphasis is placed on working with target audiences, their identification and communication channels are carried out, work is carried out with the internal and external public, technologies for forming a positive opinion and neutralizing negativity are used. Communication in crisis situations is built through problem management in order to prevent crisis situations, informing the public about risks, signs of crisis situations and errors of the organization in a crisis are identified, factors of the organization's success are determined, a strategy for combating rumors is developed. A separate area is working with the media.

F.I. Sharkov identified four possible strategies that companies most often adopt as basic ones in the context of crises:

- "informing stakeholders about the efficiency improvement planned by the organization for the event;
- changing the stakeholders' perception of the facts themselves;
- distract stakeholders from the issue under consideration;
- adjust external expectations regarding the organization's performance."[3]

What kind of public opinion management technology will be used within the framework of anti-crisis PR depends on the organization's attitude to social responsibility. For example, some organizations deny their responsibility, others recognize it but do not accept it, others take into account the opinions of stakeholders, and others assume responsibility themselves, while predicting it in advance.

Particular attention in Russian practice today is given to the strategy of informing stakeholders. Thus, one should agree with the fair opinion of A.A. Novikova, who believes that "one of the main tasks of any PR structure is to create a positive information background around the company, interact with the audience (build feedback), and increase the level of trust in the company." The researcher draws attention to the fact that in practice, the management of organizations often does not realize the importance of communication in a crisis situation, interaction with the media and the public is relegated to the background, does not see the need to convey information about the event to interested groups of the public, citing the possibility of receiving a negative response from the audience. However, the lack of communication in a crisis situation causes tension, misunderstanding, the emergence of "their own opinion" among the public, which sometimes does not correspond to the real state of affairs. The lack of information contributes to the formation of "their own view" of the problem among representatives of the media, which is communicated to the general public. Competition and opposition can also take advantage of the situation and present it in a favorable light. The "silence" of representatives of the organization becomes fertile ground for the emergence of

rumors, including about the most negative consequences of the crisis for society. However, a negative reaction from the public can also be caused by too intrusive information about the absence of problems in the organization, aggressive advertising in the media, etc. [2]

We come to the conclusion that disclosure of information about the crisis should be properly planned. Since communication is a two-way process that involves developing a message, defining a communication channel, transmitting information via a selected channel, receiving it by the recipient and responding to it, it is important to choose the right communication channel and develop the content of the information message. The correct choice of a communication channel guarantees that the target audience will receive the sent information message. The communication channel is determined based on who the target audience is. As a rule, one organization has several target audiences. The target audience is determined based on their causes and the nature of the crisis. Thus, if the crisis arose as a result of external factors, the target audience, as a rule, is a wide group of the public and the media. If the crisis situation was a consequence of internal corporate problems, then the target audience will be the internal public of the organization, but if there was a leak of information outside it, then it will be necessary to determine the groups of the external public in relation to which the communication process will be carried out. The target audiences can be investors, sponsors in the case when the cause of the crisis is the financial performance of the organization. Thus, depending on who is the target audience in a crisis situation, the communication channel and the content of the information message sent to it are determined. Next, let us pay attention to what technologies of influencing public opinion are used in the PR sphere to prevent, eliminate and neutralize crisis situations in modern Russian society. Many economic sectors have felt the impact of sanctions pressure, which resulted in the absence of materials, goods, etc. of a number of foreign manufacturers on the Russian market. In the first period after the introduction of sanctions, the Russian market had difficulty coping with the demand for certain types of goods (for example, building materials, components for technical devices, engineering equipment, etc.), supplies from friendly countries were difficult, prices rose. For example, in the construction sector, companies faced the absence of some building materials and equipment that were taken into account when designing facilities, a financial problem, since the allocated funding was not enough to complete the construction that had begun, companies lost profits, and deadlines for commissioning facilities were extended. The last of the listed problems significantly undermines the reputation of companies in front of clients, so developers began to conduct anti-crisis PR campaigns. Clients became the main target audience of developers. The main channels of information transfer were defined, they were the media and the Internet. The goals of anti-crisis com-

munication were different, but their essence was reduced to reducing the concerns of target audiences, removing negativity in the media, and resuming the level of sales. Various public opinion management technologies were used. It should be noted that public opinion management in a given situation can have a different nature. If it is necessary to form an information environment, inform the general public about the processes taking place in the relevant industry, then the technologies used will be of an educational nature. If it is necessary to form an active position of public representatives, integrate them into social processes - we are talking about a socializing nature. If it is necessary to receive feedback on problematic issues - a mobilization nature of public opinion management takes place. If there is a need to form an objective picture of reality among wide groups of the public or individual groups - public opinion management is of a manipulative nature.[4] Thus, the main area of work with the target audience of construction organizations has become informing the public through social networks and official websites of companies. In the modern information society, this is one of the priority communication channels used by target audiences to search for and receive information. The frequency of posting information messages and other materials may vary depending on the situation. As a rule, target groups are informed through this channel on a daily basis. The content of pages in social networks varies. The following types of content are used in working with social networks: informational, entertaining, engaging, user-generated, selling, viral; content forms - article, post, cases, newsletters, infographics, presentations, photos, illustrations, etc. An analysis of social networks and websites of large Russian construction companies from 2020 to 2023 showed that public opinion management technologies were largely educational in nature. Most often, companies used the informational type of content, the forms of which were expressed in the form of news articles and posts, interviews with experts, reviews, photos, videos. The informational nature of the materials was manifested in the provision of news on the progress of construction of facilities, on the conclusion of contracts with new suppliers, on the state of the construction industry in Russia as a whole, on the commissioning of facilities. It is worth noting that the selling nature of the content (advertising) was also present. Thus, the main efforts of public relations specialists were aimed at the timely provision of information on the activities of companies to fulfill their obligations to representatives of the target audience for the construction of facilities, strengthening their reputation in difficult economic conditions, as well as attracting new clients, which helped stabilize the situation around the construction market and strengthen the position of developers in difficult conditions. Thus, in a crisis situation, public opinion management is a necessary tool. A crisis destructures an organization, disrupts its activities. A crisis creates unpredictable conditions in which an organization is forced to continue its activities. The stability of an organization largely depends

on public opinion. Therefore, it is necessary to manage it in a crisis. Work with crises should be carried out throughout the existence of an organization. Communication with target audiences is the most effective means of anti-crisis PR. Anti-crisis PR communications are a set of communication activities aimed at forecasting, preventing, overcoming, and regulating the consequences of a crisis. In a situation of organizational stability, it is necessary to calculate the organization's risks and communication ways out of them. The process of preparing for a crisis is a continuous process. It is quite labor-intensive, including the collection and analysis of information, the development of strategies. During the onset of a crisis, an anti-crisis public relations campaign should be carried out in accordance with pre-developed scenarios, including making adjustments to them.

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"积极的生活体验"是心灵的实际内容
"ACTIVE LIFE EXPERIENCE" AS THE ACTUAL CONTENT OF THE PSYCHE

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注释。本文引入了"积极生活体验"这一新术语概念，并介绍了生活体验形成阶段和从一个阶段过渡到下一个阶段的分类。"积极生活体验"是与周围现实互动的一系列充分有效的方法和技巧，代表了自我实现过程中的心理自助。本文还识别和描述了被动退化，其特点是个人发展具有一定的"冻结性"，并着眼于逐渐自我毁灭。

关键词：积极生活体验、前主动生活体验、被动"沉睡"生活体验、被动退化生活体验、自我实现、社会适应、心理学、心理治疗。

Annotation. *This article introduces a new terminological concept of "Active Life Experience" and presents a classification of the stages of formation and transitions from one stage of life experience to the next. "Active Life Experience" is a whole galaxy of adequate and effective ways and techniques of interaction with the surrounding reality and represents psychological self-help in the process of self-actualization. The article also identifies and describes the passive-regressive, characterized by a certain "frozenness" of personal development and focused on gradual self-destruction.*

Keywords: *active life experience, pre-active life experience, passive "sleeping" life experience, passive-regressive life experience, self-actualization, social adaptation, psychology, psychotherapy.*

I am deliberately introducing this term of mine, by which I mean the "living" and **current content of thinking, based on sensory experiences of the past, standing behind the shield of specific psychological defenses, creating in an interdependent complex a psychic reality that is unique for each specific individual.**

In the classification aspect, life experience I divide each individual into:
- active,

- pre-active,
- passive "sleeping",
- passive-regressive life experience.

Active LE- is a psychological self-help in the process of self-actualization, which includes:

1) Psycho-emotional support in the form of cognitive attitudes of the direction of thinking, interpretation of actions and their consequences in reality, formation of beliefs. And also, the setting of the emotional range of response (from fear to aggression) depending on the spectrum of dominant experiences in past experience, subjectively assessed by the person as effective. Also, psycho-emotional support includes self-control skills, necessary and adequate restraint, the ability to take a "time-out" for the process of balancing sensory response and its components, as well as a setting for the dominant activation of the left hemisphere of the cerebral cortex.

2) Coping strategies, which can be either learned and assimilated through personal experience or by imitation as a result of observations and interactions with other individuals, which are subjectively significant for the individual and are assessed as effective (but this can be realized without taking into account changes in the social environment and one's own capabilities - both mental and physical). They represent analytical and strategic planning of further actions aimed at solving a problem situation.

3) Personal resources – the strong points of the individual (positive orientation, adequacy and rationality of thinking; patience, willpower, kindness, confidence…), which are a kind of skeleton, a "spine". They are based on life principles and values, which are based on the core of an individual worldview and perception of the world, based on stable subjective and objective interpretations.

An important factor here is their awareness and effective activation.

SEE ---> REALIZE ---> UNDERSTAND ---> USE

4) Social intelligence is a stable structure of adaptability to the surrounding reality; effective resolution of conflicts, emotionally and intellectually complex tasks. Social intelligence is based on a fairly wide and diverse range of responses to a situation in accordance with the set goal and in conjunction with the requirements of society. "The ability to swim like a fish in water" already implies certain "political" skills of interaction with different social confessions.

And in order to maintain balance and your own resources, it is important to be meticulous about your surroundings, about those people who become your significant and close ones. Communication with disadvantaged people in every sense is very dangerous for a person. Such individuals walk with dirty boots in the beautiful garden of your bright soul. Take care of it! A person must be worthy of this gift of your hospitality.

5) Adaptability is the ability and skill to adapt quickly and effectively to changing living conditions. Adaptability of the psyche and the body as a whole extends to all components of human life. This feature is greatly influenced by the level of personal stress resistance, sufficient lability of the nervous system, developed logical thinking, the ability to think in different categories - from simple and existentially specific to non-standard. And also, the foundation of the sustainability and stability of adaptability is the psychological and physical health of the individual (Malakhova A.N. "You are the creator of your own happiness" LitKult, 2021).

6) The degree of adequacy of perception of reality. A very important aspect, since it determines the entire internal and external mental picture of reality, and can be disrupted with the effective functioning of the 5 above. I will convincingly illustrate this fact using the example of psychopathy.

Psychopathy is a persistent disorder of a person's character, characterized by a lack of guilt and empathy, anxiety, insecurity; an increased level of egocentrism; it is not a disease, since there are no remissions and it is not curable.

With this disorder, the personality may have highly developed social intelligence, adaptability, coping strategies, resources, emotional self-support. But all these components do not determine the adequacy of the perception of reality, since it is refracted through the prism of an overall unhealthy psyche, which has learned to project and create socially expected and acceptable reactions in the social environment to suit its own goals without orientation toward love, kindness and care for others. The mental reality of such a personality is distorted.

Adequate human perception of the surrounding reality is a stable and clear ability to **distinguish between good and evil**, as well as a moral and ethical response to stimuli of this nature (a sincere desire to help those in need), based on internal steadfast principles and views.

Pre-active LE- the process and stages of formation of active life experience, but this is not it yet. Reactions and worldview are unstable, sometimes chaotic, difficult to control by the personality.

There is a saying that "we are taught by rakes". Repeated negative experience of interaction with social, in particular, and surrounding reality in general, encourages us to a deeper understanding of the cause-and-effect relationships of events and situations, as well as greater vigilance in order to prevent them in the future.

The pre-active LE is a kind of "sprout", the beginning of the already Active LE.

This process can be described as life-learning.

The personality learns to track emotions and effectively control them by activating the inhibition of the nervous system and distributing the direction of these impulses.

There is also a process of awareness of the constant of thinking, behavior and their components according to the degree of actualization (what certain thoughts,

behavioral reactions lead to and how they can be replaced with positive and re-sourceful ones). This is primarily self-analysis and the selection of effective ways of interacting with reality while maintaining self-identity and minimizing psycho-traumatization.

Passive "sleeper" the LE can be activated, transferred to the active one through the process of self-knowledge and self-improvement or through shock, stress, and upheaval in order to awaken. I would also call the "sleeping" one "reserve" - like a reserve player in hockey. The received LE is not assessed by the personality as useful and requires new similar situations that will more clearly signal the psyche about the need to learn from its mistakes, be wiser, activate the "inner adult" (according to Erich Bern) and not step on the same "rake" again and again.

Passive-regressive LE

Withdrawal into an infantile state, characterized by a kind of "switching off" of the ability and possibilities of changing negative impacts on the personality. Characteristic of the "victim" position, "loser psychology", when the LE does not teach new and effective ways of interacting with reality. Full or partially full acceptance of circumstances. Self-perception is based on the inability to change this world, the person "goes with the flow". Submission to external forces. The subject does not see a way out of the current circumstances, does not realize his own resources.

The passive-regressive LE is an "underdeveloped" system of experience that has stopped at one of the stages of formation. Therefore, the transition to the active LE is not possible directly.

However, with a puzzle-like (metaphorical term created by me as an analogue of the word "puzzle") structuring of regressive attitudes at the mental level, it is possible to generate a fairly effective active LE, provided that there is a logical transition through the stages of the "Sleeping LE", and then the "Pre-active LE".

"Sleeping LE" This in itself speaks of the presence of potential.

If you are given legs, you can walk, but you need to learn this - independently, based on a reasonable awareness of the opening positive opportunities and the joy of self-realization and self-actualization (the goal of happiness for a psychologically healthy person according to A. Maslow) or with the help of a teacher-mentor, who can be either a person you want to be like, or a book that awakens your potentials and resources.

"Pre-active LE" represents an understanding of the presence of internal mental stimuli for the implementation of the beginning of personal growth in a positive direction.

It's like a kind of "grain".

In "Sleeping LE" I know, I feel that it is in me.

In the "Preactive LE" I see it and hold it in my palms with the intention of growing it.

And this "seed" can germinate if the necessary stages are met:

1. **What exactly should you choose?** to "landing" (to single out as the most significant in internal work – my resources, the beginnings of personal strengths).

2. **Find the location**– the ground and space (what specific thoughts, beliefs and behavioral reactions will I develop, work on, in what terms – thoughts, emotions, reactions, behavior as a system of reactions, physiological state – the relationship between the body and the psyche as psychosomatics).

3. Determine the methods of cultivation (how will I strengthen the new pattern, what exactly contributes to its development, what circumstances for its growth can I independently create inside myself and outside, who awakens this development, what flow of information feeds it and makes it stronger, how should the focus of my attention be distributed?).

And also under the necessary conditions:

1. The first of them is a conscious desire, an understanding of WHY I need this.

2. Self-motivation (self-support, self-love, self-care, understanding the goal and anticipation of the result).

3. A clear implementation plan (what comes first, what comes next).

4. Strengthening willpower, self-esteem, reducing psycho-emotional arousal and tension.

5. Holding intention, mindfulness.

6. Encouragement (self-encouragement for each stage of internal development with an emphasis on what has been achieved, or the pleasure of realizing that you are getting closer to your goal – satisfaction and adequate pride).

A person may have a different constellation of formed patterns of interaction with the surrounding reality and it is important that they are effective, positive and creative. I will emphasize once again that this is the basis of the psychological health of the individual (Malakhova A.N. "Healthy Personality - Sanguine" LitKult, 2023).

What causes passive-regressive LE?

"Learned helplessness" - sacrifice. It is based on the "inferiority complex" according to Alfred Adler. In this case, a person feels weak, lacking the ability and resources to overcome circumstances and current situations. Apathy, depression, low self-esteem, and often preceded by humiliation, aggression, devaluation by significant people, psychotraumatic experience of the past. As a result, the individual develops a fairly persistent experience and convictions in the futility of efforts aimed at overcoming the current situation.

Past attempts that were not crowned with success become a kind of "brand" and verdict in the psyche – "nothing will work out anyway", "there is no point", "we have never lived well and never will".

BUT here I would like to remind you for reflection with the purpose of strengthening your internal resources of fortitude that "it is not the Gods who burn the pots" and "the devil is not as scary as he is painted." Truly, everything is in our hands!

The formation of new, relevant, "working" attitudes, and then actions and behavior, radically changes a person's thinking and life in a "magical" way.

The basic foundation of passive-regressive LE:

• "negative psychology" of the perception of reality, characterized by a focus on the thanatic ("Thanatos" according to Z. Freud is an unconscious desire for death), destructive aspects of existence. "Everything is decay", "well, expect trouble", "nothing good will come of this" - common phrases of such individuals along with the devaluation of the good and positive.

• established negative, destructive behavioral patterns (I behave this way and react this way not depending on the situation, but always) and scenarios are already of a permanent nature, defining stable personality traits. In psychology, scenarios are understood as lives that are passed down the family tree from forefathers to grandchildren and so on.

• tendencies towards statics in life (fear of change as an exit from a subjectively controlled balance). This is both the fear of losing power and anxiety, fears of the future and the new. A person is familiar with these life circumstances and subjectively knows what to expect and how to react. An "illusion of life control" is created. In new circumstances, it is necessary to form new behavior, and even more so to undergo an adaptation process, which increases anxiety.

• low level adapt ability generates the power of cowardice, and is determined by shyness. This is determined by personal anxiety, neurosis. Being in constant psycho-emotional tension, having low self-esteem and fears, the personality has a very meager supply of its own mental resources to be adaptive. Hysteria or "frozenness" ("stupor") is triggered in the conditions of changing reality.

• "getting stuck" at any stage of their development without subsequent growth. Already an elderly person, but behaves like a boy of about 10 years old. Causes infantilism, fear of the future, the desire to remain in a comfortable period of life, the formation of distorted concepts about positive subsequent stages (for example, he saw quarrels and pain in relationships in the family, will strive to remain an eternal teenager, so as not to form his own family, avoiding such misfortune).

• fixation with difficulty switching the focus of attention. At the same time, overvalued ideas are a symptom of mental illnesses and disorders. The observed rigid principles, excessive conservatism and maximalism are characterized by low lability of the nervous system.

All this requires a medical examination and support from specialists (neurologist, psychiatrist, psychologist).

• mono-focus of the psyche (a narrowed path of its development and self-actualization - "this way and no other way"). A certain "one-sidedness", seeing life itself and its laws from a single "angle of view", as well as subsuming stereotypes, beliefs, principles under this. "Totality of fate" or the need to always fight for a "place in the sun".

With all the above components of passive-regressive LE, it is important to understand that the individual, first of all, needs psychotherapeutic support and the formation of a qualitatively new way of thinking.

Metaphorically, I want to display the formation of the Active LE as follows:

A knight in armor on a horse, who strives to make his way to the castle and take his rightful place as king.

This path itself is the process of formation and strengthening of the Active Life Experience. The Knight represents the personality itself, already understanding its life guidelines and principles. This path is the process of self-actualization through the formation of active life experience.

Knightand is the personality itself, aimed at self-actualization, accumulation and retention of Active LE. The castle and the throne are rightfully the goal of self-actualization.

Each of us has our own path and this is wonderful, because a person is an individual, and therefore unique.

中国古典舞身韵与西方芭蕾的审美差异探究
A STUDY ON AESTHETIC DIFFERENCES BETWEEN CHINESE CLASSICAL DANCE BODY RHYME AND WESTERN BALLET

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摘要.通过对两种舞蹈形式的核心理念、表现形式和审美价值的比较分析,揭示其背后的文化背景和哲学思想。中国古典舞强调内心的情感表达和自然的和谐,以"身韵"为核心,追求含蓄和意境。西方芭蕾注重技术技巧和形式美,强调结构和优雅。本研究探讨中西方舞蹈在文化背景和审美追求上的异同,并分析这种差异对现代舞创作的启发和影响。

关键词: 中国古典舞、身韵、西方芭蕾、审美差异、文化背景、艺术表现、舞蹈哲学。

Abstract. Through comparative analysis of the core concept, expression and aesthetic value of these two dance forms, the cultural background and philosophical thoughts behind them are revealed. Chinese classical dance emphasizes inner emotional expression and natural harmony, takes "body rhyme" as the core, pursues implicateness and artistic conception. Western ballet focuses on technical skills and formal beauty, emphasizing structure and elegance. This study explores the similarities and differences in cultural background and aesthetic pursuit of Chinese and Western dance, and analyzes the inspiration and influence of this difference on modern dance creation.

Keywords: Chinese classical dance, body rhyme, Western ballet, aesthetic differences, cultural background, artistic expression, dance philosophy.

1. Introduction
1.1 Research background and significance
Chinese classical dance and Western ballet are two artistic forms with profound cultural heritage, representing the dance traditions of the East and the West respectively. With the deepening of global cultural exchanges, exploring the aesthetic differences between the two dances not only helps to understand their respective cultural connotations, but also provides new inspiration for modern dance creation.

1.2 Research Objectives

The purpose of this study is to reveal the cultural background and philosophical thoughts behind the core concepts, expressions and aesthetic values of Chinese classical dance and Western ballet through comparative analysis, so as to promote the mutual understanding and integration of Chinese and Western dance art.

1.3 Research Questions

• What are the unique core concepts and forms of Chinese classical dance body rhyme

• What is unique about the core concepts and expressions of Western ballet

• How does the cultural context of the two dance forms influence their artistic expression

• The significance of aesthetic differences between Chinese and Western dance for the development of modern dance and dance art

2. Aesthetic characteristics of Chinese classical dance rhyme

2.1 Historical background of Chinese classical dance

Chinese classical dance originated in ancient court and sacrificial dances. The Zhou Dynasty set up music and dance institutions to systematically develop court dance. In ancient times, dance was mainly sacrificial activities, and became an important part of ritual music in the Shang and Zhou dynasties. After the Han Dynasty, the palace dance integrated acrobatics, martial arts and other elements. The Tang Dynasty was the golden age of dance, which absorbed foreign influences and reached its artistic peak. The rise of folk dance drama in Song Dynasty promoted the development of traditional opera. After the founding of New China, Chinese classical dance developed systematically in the 1950s, combining opera, ballet and martial arts to form a unique style. Contemporary dance focuses on tradition and innovation, "body rhyme" emphasizes physical expression and emotional transmission, and Dunhuang style, Han and Tang style and other schools have added new vitality.

2.2 Core concept of body rhyme in Chinese classical dance

Chinese classical dance originated from ancient court and sacrificial dances, developed systematically through the Zhou Dynasty, and reached its artistic peak in the Tang Dynasty, integrating with foreign influences. After the Song Dynasty, the rise of folk dance dramas promoted the development of traditional opera. After the founding of New China, it combined opera, ballet and martial arts to form a unique style. Contemporary dance focuses on tradition and innovation, body rhyme emphasizes physical expression and emotional transmission, adding new vitality to multiple genres. Its core concept includes the core of "Qi Yun", which runs through the form and emotion, emphasizing vitality; The pursuit of "artistic conception beauty" embodies the combination of scene, form and spirit; The characteristics of "both form and spirit" emphasize the combination of hard-

ness and softness and high unity; And "harmony" thought, embodies the opposites balanced unity, become an important part of aesthetic culture connotation. These ideas together constitute the unique aesthetic characteristics and cultural values of Chinese classical dance.

2.3 Forms of Chinese classical dance

Chinese classical dance combines many artistic elements, and its rich movements and unique aesthetics make it occupy an important position in the history of Chinese dance. Here's a brief overview of how it manifests:

• Movement and posture: The movement of Chinese classical dance is diverse, including standing goose shooting, large goose shooting, oblique sea diving, etc. Among them, the golden rooster independently emphasizes that the crotch does not move and the upper body turns to the right; Eagle wings to raise the legs, the upper body forward bent; The circle moves and changes its position in the air.

• Dance genres: Chinese classical dance forms several genres, such as rhythm style, Han and Tang style, Dunhuang style and Kunlun style. Han and Tang style as the basis, learn from the richness of Han Dynasty dance, learn other dances to enrich their vocabulary.

• Performance style: emphasizing the combination of inside and outside, the movements are full of emotion and imagination, creating a "blank" effect. Dancers need to master subtle body language to convey rich emotions.

Historical background and cultural inheritance: Classical dance extracts dance forms from opera, murals and other elements, and constantly innovates with social changes.

• Modern development and innovation: Contemporary Chinese classical dance innovates on the basis of tradition, integrates modern and contemporary dance performances, forms diversified styles, absorbs Western construction experience, and becomes an independent national and contemporary dance species.

Specific works and performances such as "Fan Dance Danqing" show the charm of traditional calligraphy and painting through one fan, the dynamic force is gentle, and contains the pursuit of shape and meaning. With rich movements and profound cultural deposits, Chinese classical dance has continuously innovated in modern times and become an important carrier to show the charm of Chinese culture.

2.4 Aesthetic values of Chinese classical dance

The aesthetic values of Chinese classical dance are deeply influenced by traditional culture and philosophy, and the core is "both form and spirit", paying attention to the beauty of external posture and the transmission of inner emotion and spiritual connotation. The pursuit of graceful posture, emphasizing the body soft, stretch, coordination, through the lines and curves to show emotion and beauty pursuit. Highlighting elements such as "twist", "tilt", "circle" and "bend", it

reflects traditional thinking and aesthetic standards. Pay attention to the expression of "qi rhyme", that is, the flow of breath and the expression of charm, so that the dance is vivid and full of vitality. It combines opera and martial arts to form a unique national style, retaining the traditional essence while injecting modern connotation and innovation. Reflecting the traditional ethical and moral value orientation such as "harmony is precious", dance is not only visual enjoyment, but also spiritual baptism. In short, the aesthetic values of Chinese classical dance are embodied in the combination of form and spirit, vivid spirit, hardness and softness, cultural inheritance and ethics, showing artistic charm, reflecting profound cultural deposits and philosophical thoughts.

3. Aesthetic characteristics of Western ballet

3.1 Development of Western ballet

The development of western ballet spans several centuries, reflecting the evolution of European social culture and artistic aesthetics. Originated in the Italian court during the Renaissance, it was standardized and developed by Louis XIV of France and became an aristocratic fashion. In the 19th century, it developed greatly in Russia, integrating French and Italian traditions to form a unique Russian school, such as Swan Lake and the Nutcracker. At the beginning of the 20th century, the modern art movement promoted its transformation, exploring new forms and themes, and the ballet music opened a new chapter. Ballet has become increasingly global and a popular art form. In short, Western ballet originated in Italy, standardized by France, and matured and internationalized in Russia, integrating diverse cultures, forming a rich artistic style, and becoming a world cultural heritage.

3.2 Core concepts of Western ballet

The core concept of western ballet can be analyzed from four dimensions: history, aesthetics, culture and artistic expression. It originated in Italy, spread to Russia through France and flourished, forming a unique style and system. Aesthetically, it emphasizes physical elegance and power, expressing emotion and story through precise movements and smooth lines. Rich in cultural connotations, closely related to European history and social changes, influencing dance forms around the world. In terms of artistic expression, it conveys deep emotions through body language and stage performance, emphasizing the creation of beauty and emotional expression. In general, Western ballet shows the complexity of human emotions and thoughts, and is a way of conveying technical and cultural emotions.

3.3 Manifestations of Western ballet

The expression of western ballet mainly includes the following aspects:

• Dance skills: basic posture and movement: such as "first position", "second position" and other basic positions, as well as "turn", "jump", "spin" and other skills.

• Body control: Emphasizing body balance, flexibility and strength, dancers need to have a high level of physical fitness.

• Musical accompaniment: Ballet is often combined with classical music, which provides rhythmic and emotional support for the dance. Dance movements are often closely linked to the rhythm and emotional changes of the music.

• Costume and stage design: Costumes, ballet costumes are usually tights and skirts, designed to be elegant and easy for dancers to move freely.

• Stage design, stage sets and lighting design enhance the visual effects of the performance and create a specific atmosphere.

Storytelling: Ballet often conveys its story through dance movements and expressions, and many classic ballet works, such as Swan Lake or Sleeping Beauty, have a clear narrative structure.

• Emotional expression: Through subtle changes in body language, facial expressions and movements, dancers convey emotions and enhance audience empathy.

Group, trios, pas de deux, solo: Ballet can be divided into solo, pas de deux, trios and group dances, with different forms showing the interaction and harmony between the dancers.

• Diversity of styles: There are many styles of ballet, such as classical ballet, modern ballet and neoclassical ballet, each with its own characteristics and showing different artistic expressions.

These forms of expression together constitute the unique charm of western ballet, making it a dance form with deep artistic value.

3.4 Aesthetic values of Western ballet

Ballet emphasizes the elegance of the body and the beauty of the line, the pursuit of delicate and smooth movements, and the presentation of extraordinary beauty. Symmetry and balance are its important characteristics to convey harmonious beauty. It is not only technical display, but also emotional expression, delicate movements and facial expressions enhance artistic appeal. Formally, ballet has strict technical norms, reflecting the respect and pursuit of art. Its cultural connotation is rich, and its aesthetic values reflect the aesthetic tastes and cultural concepts of different historical periods. The pursuit of ideal beauty, create a dream effect. In group dance, individual expression and the whole coexist harmoniously. To sum up, ballet's aesthetic values combine elegance, balance, emotional expression and cultural inheritance to form a unique and profound artistic experience.

4.Summarize

4.1 Differences and similarities between Chinese and Western dance aesthetics

As two important art forms, Chinese and Western dance carry unique cultural traditions and historical development, showing significant differences. Chinese

classical dance emphasizes the beauty of artistic conception, pursues to convey the spiritual realm beyond reality, pays attention to the beauty of roundness, the harmony and unity of costumes and movements, and is deeply influenced by traditional culture, reflecting an important part of Chinese culture. Western ballet pays attention to the human muscle line rhythm and form display, emphasizes the emotional beauty and the free expression of body language, originated in the European court, pays attention to technology and standardization, and reflects the aesthetic thought of subjective-guest dualism. In terms of expression techniques, Chinese classical dance emphasizes the contrast of intensity, speed and amplitude, and uses artistic conception and symbolic actions to convey ideas and philosophical ideas. Western ballet emphasizes strict technical training, pays attention to the malleability and flexibility of the body, and enhances the audio-visual effect with complex music and stage scenery. The differences between the two profoundly reflect different cultural traditions and artistic pursuits, enrich the diversity of world dance art, and promote cross-cultural communication and understanding.

4.2 Significance to the development of dance art

The differences between Chinese and Western dance bring diversity to the development of dance art. Chinese classical dance emphasizes artistic conception and symbolic expression, providing rich connotation; Western ballet promotes technical innovation and improvement. This diversity enriches dance forms, provides dancers with multiple choices, and promotes the overall development of dance art. At the same time, differences promote cross-cultural communication, and dancers broaden their artistic horizons by learning each other's dance skills and culture, and promote cultural mutual understanding and integration. The differences between Chinese and Western dance also provide possibilities for innovation and integration. Choreographers and creators draw on the two cultural elements to create new dance forms, enrich the means of dance expression, and provide diverse audio-visual experience for the audience.

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科拉北部不断变化的环境中的苏格兰松 （PINUS SYLVESTRIS L)
SCOTS PINE (PINUS SYLVESTRIS L) IN A CHANGING ENVIRONMENT IN THE KOLA NORTH

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摘要。研究了科拉北部（摩尔曼斯克州）III-IV龄级绿色苔藓地衣松林中苏格兰松的生长发育特征。研究发现，幼龄松树的生长更多地取决于种群内关系，而不是气候因素。在观察到的松树直径生长自然波动的背景下，在大气污染物的影响下观察到了显著的变化。发现松树生长与 Severonikel 植物（蒙切戈尔斯克）向环境中排放的有毒物质的量之间存在显著的负相关性。结果表明，排放源区域苏格兰松单株树木和林分的生长发育更多地取决于环境污染强度，而不是气候因素的变化。
关键词：生长、松树、竞争、污染、科拉北部。

Abstract. *The growth and development characteristics of Scots pine in green moss-lichen pine forests of III-IV age classes in the Kola North (Murmansk Oblast) were studied. It was found that the growth of pine at a young age depends to a greater extent on intra-population relationships than on climatic factors. Against the background of observed natural fluctuations in pine growth in diameter, significant changes were noted under the influence of atmospheric pollutants. A significant negative correlation was found between pine growth and the volume of toxic substances emitted into the environment by the Severonikel plant (Monchegorsk). It was shown that the growth and development of individual trees and stands of Scots pine in the area of emission sources depend to a greater extent on the intensity of environmental pollution than on changes in climatic factors.*
Keywords: *growth, pine, competition, pollution, Kola North.*

It is well known that the modern natural vegetation cover in the Kola North is a mosaic of forests at different stages of restoration successions after logging and fires (Yarmishko, 1997; Forest Condition…, 2000; Dynamics…, 2009; Yarmishko, Ignatyeva, 2021; Evdokimov, Yarmishko, 2023, etc.). Intensive economic development of the Kola North and the development of mining industries engaged in the extraction and enrichment of various types of ore raw materials have led to the emergence of a new type of human impact on the environment - industrial atmospheric pollution. Its negative impact in places where enterprises are concentrated on the Kola Peninsula began to manifest itself already in the 30-40s of the last century (Dynamics…, 2009). The objective of the present study was to assess the responses of individual trees and stands of Scots pine to changes in the characteristics of the physical and cenotic environment during their restoration in clear-cut areas. It was also important to assess the response of pine to chronic pollution with sulfur dioxide in combination with heavy metal compounds (Ni, Cu, Co), especially against the background of a significant reduction in emissions in recent decades. The radial wood growth was chosen as the main integral quantitative indicator of the state of Scots pine in the conditions under consideration.

Materials and methods of research

Long-term comprehensive studies (1981-2023) were carried out in Scots pine communities belonging to the two most common association groups in the Kola North - lichen and green moss-lichen pine forests of III-IV age classes on illuvial-ferruginous podzolic soils. The studies were conducted in pine forests located at different distances from the emission source within three zones: background, buffer and impact. In each zone, a series of permanent sample plots (PSP) with an area of 0.1-0.15 ha were laid out. The tree layer of pine forests is formed by Scots pine – Pinus sylvestris L. with a small share of downy birch Betula pubescens L., sometimes with a single admixture of Siberian spruce Picea obovata L. The studied forests are distinguished by sparseness, low crown density, low taxation characteristics (height, diameter, sum of cross-sectional areas). In the background areas, the basis of the grass-dwarf shrub layer is formed by Vaccinium myrtillus L., V. vitis-idaea L., Empetrum hermaphroditum Hagerup. The ground cover contains species of the genera Cladonia, Cladina and Pleurozium schreberi in different proportions, depending on the duration of the fire. Particular attention was paid to Scots pine communities in background areas, where the influence of atmospheric pollutants is negligible or absent altogether. The main source of industrial pollution in the study area is the Severonikel plant (Monchegorsk, 67°55' N, 32°48' E), which began operations in 1939 (Poznyakov, 1999). Maximum emissions, averaging 230 thousand tons of SO2 and 15 thousand tons of finely dispersed polymetallic dust per year, containing a mixture of sulfides and oxides of heavy metals (Ni, Cu, CO), were observed in the period from 1973 to 1992. By the beginning of

the 21st century, the volume of SO2 emissions decreased by almost 8 times, and heavy metals by 5 times (Dynamics…, 2009)).

The method of selection, establishment of permanent sample plots (PSP) and detailed analysis of woody vegetation was described by us in our earlier works (Yarmishko, 1997; Methods of studying..., 2002). In order to obtain quantitative data when studying the growth characteristics of Scots pine by diameter, 15-20 model trees were selected on each sample plot and within their working zones. The width of annual wood rings, selected with a Pressler borer, was measured using a LINTAB 6 device. A common methodological feature of the conducted studies was a comparison of the results obtained in Scots pine communities under conditions of different levels of atmospheric pollution with those in the background forests, which we accepted as the norm (control). In processing the quantitative data, descriptive statistics methods, correlation and regression analyses were used.

Research results and discussion

Pine forests in the Kola North have been actively developed by humans for a long time. Intensive logging was launched in the study area in the middle of the last century. Research has shown that in fresh clearings, as well as in clearings affected by ground fires in the study area, pine seedlings appear in the amount of 12-15, sometimes 30-35 thousand pieces / ha. However, a large number of sprouts, seedlings and self-seeding perish in the first years (drying out of the substrate, diseases, etc.). As the pine grows and develops in the clearings, competitive relationships between individuals intensify, both in the aboveground part and in the zone of root systems (Yarmishko, Ignatyeva, 2019; Evdokimov, Yarmishko, 2023, etc.). Instrumental measurements of Scots pine wood cuts and cores and their processing allowed us to obtain a series of absolute values of the width of annual rings of Scots pine in middle-aged forest stands in the Kola North. Fig. 1 shows the dynamics of radial pine increment in three background areas - Upolokshsky, Yeno-Kovdorsky and Lovozersky. It is evident that, despite the distance of the studied communities from each other by almost 150 km and different density of forest stands, a fairly high synchronicity of year-to-year variability of increments and their close values are observed. The obtained data indicate that the intensity of diameter increment in Scots pine continues to decrease in the studied time interval, without reaching stability, in contrast to the height increment. The general trend of the dynamics in the period from 1960 to 2021 is reflected by a negative linear function (Fig. 1). The formation of radial increment can be divided into 2 periods: in the first time interval (1960-1985), the increment value decreases by an average of 3 times (from 1.5–2.1 mm year-1 to 0.5–0.7 mm year-1). The second time period (from 1986 to 2021) is characterized by a less intense decrease in the intensity of radial increment: from 0.8–0.9 mm year-1 to 0.4–0.5 year-1, which is a difference of 1.8–2 times. In the three studied areas, this function

explains, on average, ~20% of the variation in diameter increment. The remaining variation is due to other factors.

Our correlation analysis did not reveal any significant relationship between radial growth of pine in the background area and the main climatic factors (average July temperature, amount of precipitation in July, total temperature and precipitation for the growing season). Finnish researchers (Havas, Huttunen, 1972) at one time revealed a positive relationship between radial increment and average July temperature in 30-year-old Scots pine stands. Analysis of meteorological conditions in years of maximum and minimum increment values allows only the most general definition of trends in the dynamics of radial increment of Scots pine under background conditions in the Kola North.
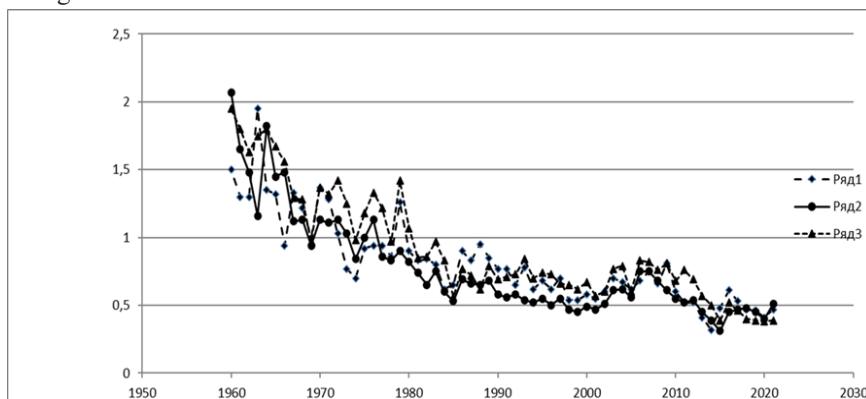
Figure 1. *Annual dynamics of radial growth of Scots pine in middle-aged green moss-lichen stands in three background regions (Upolokshsky, Yeno-Kovdorsky and Lovozersky) in the Kola North. Legend: vertical – radial growth in mm, horizontal – years.*

Annual dynamics of radial growth of Scots pine in stands of III-IV age classes under conditions of different pollution levels in the central part of the Kola Peninsula are shown in Fig. 2 and 3. Of particular interest is the growth of pine in diameter in the region of moderate atmospheric pollution (at a distance of 35 km from the pollution source). The intensity of radial growth of pine in these conditions was 25-30% higher in the period from 1960 to the early 1980s than in the control. This can probably be explained by the location of the site at the foot of a southern-facing slope and the temporary meliorating effect of poor northern taiga soils by copper-nickel production waste. This is confirmed by the intensive growth of mycorrhiza on pine roots in the study area (Yarmishko, 1997). Since 1965, the radial growth curve has been descending (Fig. 2), resembling pine growth under background conditions. Conditional stabilization of pine growth occurred here by

the early 1980s, and until the 2000s its intensity practically did not exceed 1 mm/year. Pine in the conditions under consideration responded to the reduction in toxic emissions by intensifying its growth by 10-15% compared to the previous period (Fig. 2). Correlation analysis of the series of radial growth of Scots pine in areas of moderate pollution and volumes of gaseous emissions reliably reveals a negative relationship (r= -0.47; n=24; P<0.05).
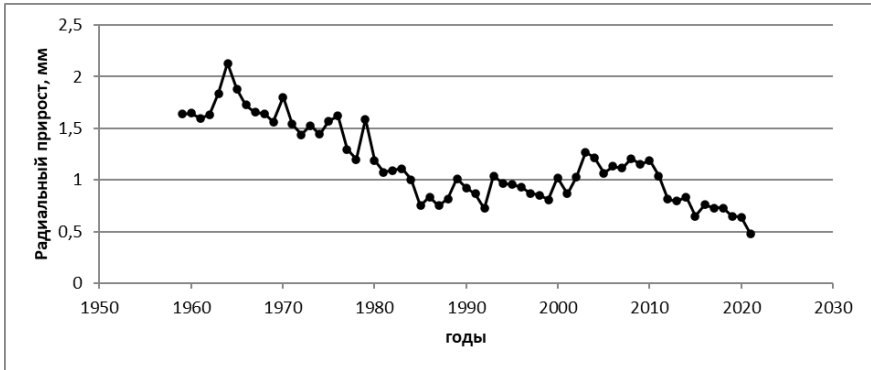
Figure 2. *Radial growth of Scots pine in the moderately polluted area.*

The radial growth of Scots pine in the highly polluted area (within a radius of 8-12 km from the emission source) at the beginning of the formation of forest stands was not very intensive, not exceeding 0.8-0.9 mm/year. Despite the great similarity of the growth curves of young communities in the conditions under consideration (descending nature) with those in the background conditions and in the buffer zone, pine here has been significantly affected by pollutants since its settlement. The increase in the capacity of the plant with the simultaneous start of using Norilsk ore in the 1970s, which differs from the local ore in its higher sulfur content, was the direct cause of a significant decrease in pine growth in the area under consideration (Fig. 3). In the period from 1993 to 1999. The plant's treatment facilities were upgraded, which reduced the volume of sulfur dioxide emissions by 8 times and polymetallic dust by 5 times compared to their maximum values. The annual volume of emissions has been relatively stable since 1999 and averages 40,000 tons of sulfur dioxide and 5,000 tons of polymetallic dust. Figure 3 shows that Scots pine has responded adequately to the reduction in environmental pollution. Correlation analysis of Scots pine radial growth series in highly polluted areas reveals a fairly high negative relationship. There is a significant correlation between both the radial growth of pine and the amount of sulfur dioxide emitted into the atmosphere (r= -0.80; n=24; P<0.05) and the amount of solid particles (r= -0.85; n=24; P<5).
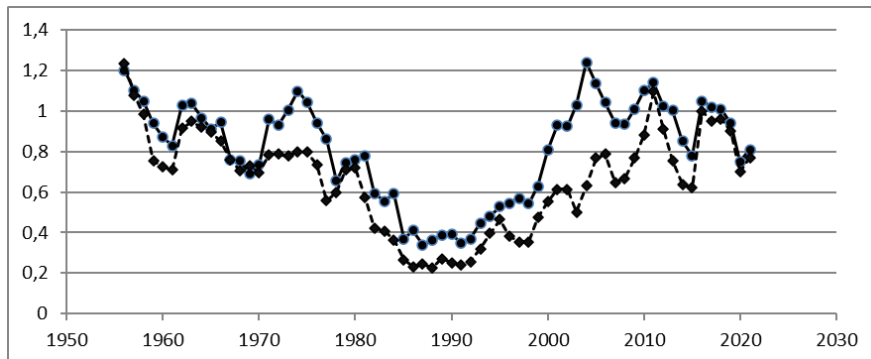
Figure 3. *Radial growth of pine in areas of high pollution. Legend: vertical – radial growth in mm; horizontal – years.*

It should be noted that the established relationship is much closer in the area of high pollution than in conditions of moderate industrial pollution. Here, the growth and development of individual trees and stands of Scots pine depend to a greater extent on the intensity of environmental pollution with sulfur dioxide and heavy metal oxides than on changes in climatic factors.

Conclusion

Due to the peculiarities of forest formation processes in clearings, young Scots pine stands are characterized by a high homogeneity of the spatial structure and the uniformity of trees. By the time the tree canopy is formed, young stands differ in density, closeness and condition. It is in young stands that the disproportion between density, fullness and closeness is most pronounced. This phenomenon can be explained by the uniformity of tree distribution and the narrow crown of pine in the Kola North. Another feature of dense young stands is the slowness of natural tree loss processes in them.

Quite intensive radial growth of Scots pine in the Kola North continues for 45-50 years, and according to V.F. Tsvetkov and V.I. Tsvetkova (1985) even longer, up to 50-60 years. In fairly dense stands (12-15 thousand pcs./ha) it noticeably decreases from the age of 25-30 years. The growth of pine at a young age, judging by its decreasing trends, depends to a greater extent on intra-population relationships than on climatic factors.

In conclusion, it can be noted that against the background of observed natural fluctuations in the growth of Scots pine in diameter in the Kola North, significant changes have been noted under the influence of atmospheric pollutants. At the same time, a significant negative correlation was established between the pine growth and the volume of toxic substances emitted into the environment by the Severonikel plant.

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根据 R.M. BAYEVSKY 和 KERDO 植物指数对来自城市和农村的 18 岁大学男生的
适应潜力进行评估

ADAPTATION POTENTIAL ACCORDING TO R.M. BAYEVSKY AND THE KERDO VEGETATIVE INDEX IN 18-YEAR-OLD BOYS WHO ENTERED UNIVERSITIES FROM CITIES AND RURAL SETTLEMENTS

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摘要。作者分析了使用 R.M. Baevsky 的计算方法和 Kerdo 植物指数（KVI, c.u.）研究适应潜力（AP, c.u.）的结果，这些年轻人来自城市和农村，进入俄罗斯八所专业大学继续深造。研究的目的是比较居住地对进入大学前居住在俄罗斯不同城市和农村的年轻人 AP 和 KVI 水平的影响。

材料和方法。作者采用随机抽样方法，对 385 名年龄为 18.2 ± 0.8 岁、毕业于俄罗斯综合学校、被该国八所专业大学一年级录取的来自城市和农村的年轻男性进行了调查。使用计算方法评估了 AP 和 KVI。结果与讨论。调查结果表明，俄罗斯联邦各专业大学的学生适应水平令人满意。作者在计算单个或平均组指标时未发现任何适应机制故障。结果表明，农村地区考入大学的年轻人 AP 水平明显高于城市地区。KVI 表明青少年身体受到交感神经和副交感神经的影响。结论。AP 和 KVI 水平显著取决于居住地。考虑到计算 AP 和 KVI 指数的简单性以及它们在任何人类生活条件下使用的可能性，作者建议在临床医学和体育实践中强制使用它们。

关键词：青年大学生，适应潜力，Kerdo 植物指数。

Abstract. *The authors analyzed the results of studying the adaptive potential (AP, c.u.) using the calculation method of R.M. Baevsky and the Kerdo vegetative index (KVI, c.u.) in 385 young men who entered eight specialized universities of Russia from cities and rural settlements to continue their education. The purpose of the study was to compare the influence of the place of residence on the level of AP and KVI of young men who lived in different cities and rural settlements of Russia before entering universities.*

Material and methods. *Using the random sampling method, the authors examined 385 young men aged 18.2 ± 0.8 years, graduates of comprehensive*

schools in Russia, accepted to the first year of eight specialized universities of the country from cities and rural settlements. The AP and KVI were assessed using the calculation method. Results and discussion. The results obtained during the survey indicated a satisfactory level of adaptation of students from various specialized universities of the Russian Federation. The authors did not reveal any breakdowns in adaptation mechanisms when calculating either individual or average group indicators. It was shown that the level of AP in young men admitted to universities from rural areas was significantly higher than in those from cities. The KVI indicated a balance between sympathetic and parasympathetic influences on the adolescent body. Conclusions. The level of AP and KVI significantly depend on the region of residence. Considering the simplicity of calculating the AP and KVI indices and the possibility of their use in any conditions of human life, the authors recommend introducing them into mandatory use in the practice of clinical medicine and sports.

Keywords: young university students, adaptation potential, Kerdo vegetative index.

Relevance. The AP according to the calculation method of Roman Markovich Baevsky has found wide application in studying the adaptive capabilities of students of different educational profiles [7, 9, 10], including technical [11], legal [5], physical education [6] and medical [1. 8] universities of Russia. The issues of studying the functional state of the autonomic nervous system of a healthy and sick person at different periods of his life are given close attention [3, 4].

Many methods have been developed and used to study human autonomic functions. In order to understand the mechanisms of autonomic regulation of human functioning, various life processes and physiological parameters that are influenced by the activity of the nervous system are studied. In the concept of "autonomic regulation" we put the functional activity of the body, through which the activity of all organs and systems is carried out and regulated in a person in order to maintain life and balance constantly changing external influences.

There is no doubt that any scientific research aimed at developing regional standards for the morphofunctional state of modern student youth is both relevant and in demand. The authors are deeply convinced that today it should become a mandatory rule - a university physical education teacher, starting classes with students, must have a clear idea of their health, functional state and adaptive capabilities. At the same time, in our opinion, his research arsenal should include simple and safe assessment methods that allow them to be applied in any conditions of the educational or training process.

The object of the study: students of the adolescence period (18.2±0.8 years) of various territorially located universities of the Russian Federation.

The subject of the study is the level of AP according to R.M. Baevsky in young men who entered various universities of Russia from cities and rural settlements.

Research hypothesis. It is suggested, firstly, that in students of the adolescence period at the initial stage of obtaining higher education, AP reliably depends on the region of residence. Secondly, the level of AP is most significantly influenced by a high level of motor activity before entering the university, associated with regular physical education and sports, both in a comprehensive school and in a youth sports school. Thirdly, the adaptive capabilities of young men living in rural areas are reliably higher than those of young men living in cities. Fourthly, the KVI testified to the balance of sympathetic and parasympathetic influences on the life of young men. The aim of the study: to assess the influence of the region of residence on the level of AP and KVI of young men who entered universities from cities and rural settlements.

Material and methods. Using the random sampling method, the study of AP and KVI was conducted among 385 young men, graduates of comprehensive schools aged 18.2 ± 0.9 years, who entered eight universities of the Russian Federation from cities and rural settlements to receive specialized education in full-time education in: Khabarovsk Regional Institute for Development of Education named after K.D. Ushinsky (KHRIDE) - 32 (8.3%), Irkutsk State University (ISU) - 74 (19.2%), Siberian Federal University (SFU) - 69 (17.9%), Novosibirsk State Pedagogical University (NSPU) - 50 (12.9%), Tyumen State University (TSU) - 48 (12.4%), Tyumen State Medical University (TSMU) - 29 (7.5%), Ural State University of Physical Education - (UralSUPE) 46 (11.9%), Tchaikovsky State Academy of Physical Education and Sports (TSAPhEaS) - 37 (9.6%). There were 232 (60.2%) young men who entered the universities from cities, 153 (39.8%) from rural settlements (Fig. 1).
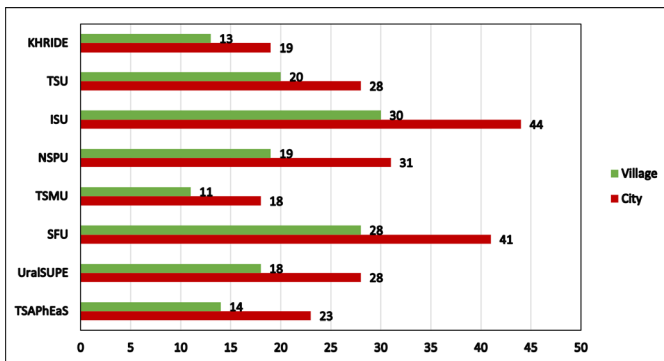
Figure 1. *Number of young men admitted to specialized universities in Russia from cities and rural areas.*

To assess the state of adaptation mechanisms, the values of adaptation potential were calculated using the formula of R. M. Baevsky [2]:

AP = 0.011 x HR + 0.014 x SBP + 0.008 x DBP + 0.014 x B + 0.009 x BM – 0.009 x P – 0.27,

where: HR – heart rate (beats/min), SBP and DBP – systolic and diastolic blood pressure (mm Hg), B – age (years), BM – body weight (kg), P – height (body length, cm), 0.27 – free term of the equation.

Score: 2.10 – satisfactory adaptation (characterizes sufficient functional capabilities of the circulatory system); 2.11 – 3.20 – functional stress of adaptation mechanisms; 3.21 – 4.30 – unsatisfactory adaptation characterizes a decrease in the functional capabilities of the circulatory system with an insufficient adaptive response to physical activity; more than 4.30 – characterizes a sharp decrease in the functional capabilities of the circulatory system with the phenomenon of a breakdown of the adaptation mechanisms of the whole organism.

The heart rate was calculated by palpation on the radial artery for one minute. Blood pressure was determined according to the method of N.S. Korotkov on the shoulder. Body length was measured with an accuracy of 0.5 centimeters using the stadiometer proposed by us (Patent for Utility Model RU 153076). Body weight was measured on a beam scale with an accuracy of 50 grams. The balance between the tone of the sympathetic and parasympathetic divisions of the autonomic nervous system is determined by the IPC [12], which was calculated using the formula:

IPC = 100 × (1 − DBP/HR),

where; DBP is diastolic blood pressure (mm Hg); HR is heart rate (beats/min).

In order to obtain objective indicators of the cardiovascular system, we gave all students the following recommendations:

– to avoid physical activity for 10 minutes before the study;
– to sit in a chair and do not change your body position for five minutes before measuring blood pressure and calculating heart rate;
– the sleeve of clothing should not squeeze the shoulder;
– the cuff of the blood pressure measuring device should be placed on the bare shoulder and not squeeze it;
– measure blood pressure on the same arm.

During the study, we asked the young men to go to bed no later than 11 p.m., wake up at 7 a.m., i.e. to sleep for about 8 hours. One of the conditions of the study was the request to drink at least 2 liters of water during daylight hours and eat at least 3 meals a day. During the study, the students did not drink coffee, alcohol, or strong drinks.

Evaluation of the Kerdo vegetative index

Indicators	Evaluation of the Kerdo vegetative index sympathicotonia
от +16 до +30	pronounced sympathicotonia
≥ + 31	parasympathicotonia
от − 16 до − 30	pronounced parasympathicotonia
≤ − 30	balance of sympathetic and parasympathetic influences
от − 15 до +15	Evaluation of the Kerdo vegetative index sympathicotonia

The results of the study were processed on a personal computer using the Statistika program. The reliability of differences was assessed using Student's t-test, and differences were considered reliable at $p<0.05$.

Ethical review. When working with students, we observed the principles of voluntariness, rights and freedoms of the individual guaranteed by Articles 21 and 22 of the Constitution of the Russian Federation, as well as the Order of the Ministry of Health and Social Development of Russia No. 774n of August 31, 2010 "On the Ethics Council". The study was conducted in compliance with the ethical standards set out in the Helsinki Declaration of the World Medical Association "Ethical Principles for Medical Research Involving Human Subjects", which was adopted at the 59th General Assembly in October 2008. The authors received verbal consent from the students to conduct the study and publish the data.

It should be noted that the calculation of the AP values literally within a few minutes provides objective information about the current state of human health.

Results and discussion. Considering that the formula for calculating the AP according to the method of R.M. Baevsky includes HR, SBP and DBP, we tried to study them in young men in a state of physiological rest, sitting in a chair in the time interval between 9 and 11 am. The results of the study showed that in almost all young men, the HR was within the normal physiological values, i.e. it was not less than 60 and not more than 90 beats per minute.

It seems especially important to us that the HR in young men indicated good pumping function of the heart, since regardless of the region of residence, it was stably maintained within the range of 62 to 79 beats per minute. As for SBP, it was also within the normal values from 92 to 134 mm Hg, which gave the young men the opportunity to participate in sports sections according to their interests in addition to their studies. The evidence of these provisions is that the values of the AP in the young men-students of various territorially located universities of Russia that we examined did not exceed 2.10 conventional units (Table 1), which we regard as satisfactory adaptation of the circulatory system to environmental conditions.

The level of adaptation potential and the Kerdo vegetative index of young men who entered universities of the Russian Federation from cities and rural settlements (M ± m)

University	AP		tst= reliability of differences (P)	KVI		tst= reliability of differences (P)
	City	**Village**		**City**	**Village**	
UralSUPE n=46	1,826±0,06	1,509±0,07	tst=2,43 P<0,05	8,7±0,29	6,4±0,36	tst=2,38 P<0,05
TSAPh EaS n=37	1,841±0,05	1,522±0,06	тst=2,37 P<0,01	9,3±0,34	7,6±0,39	тst=2,33 P<0,01
ISU n=74	2,054±0,04	1,739±0,05	тst=2,34 P<0,01	12,8±0,32	10,1±0,24	тst=2,31 P<0,01
TSU n=48	2,023±0,03	1,711±0,05	тst=2,29 P<0,01	13,7±0,41	10,2±0,43	тst=2,40 P<0,01
NSPU n=50	2,060±0,05	1,722±0,06	тst=2,33 P<0,05	13,1±0,36	11,4±0,28	тst=2,36 P<0,05
SFU n=69	2,078±0,04	1,736±0,05	тst=2,38 P<0,01	12,4±0,27	10,4±0,33	тst=2,42 P<0,01
KHRIDE n=32	2,056±0,05	1,710±0,06	тst=2,34 P<0,05	11,7±0,51	9,5±0,45	тst=2,39 P<0,05
TSMU n=29	2,096±0,04	1,755±0,07	тst=2,28 P<0,05	12,7±0,33	10,3±0,43	тst=2,35 P<0,05

At the same time, it is noteworthy that the numerical values of the AP among young men who entered universities from rural areas were significantly (p<0.05) lower than among urban young men (Fig. 2).
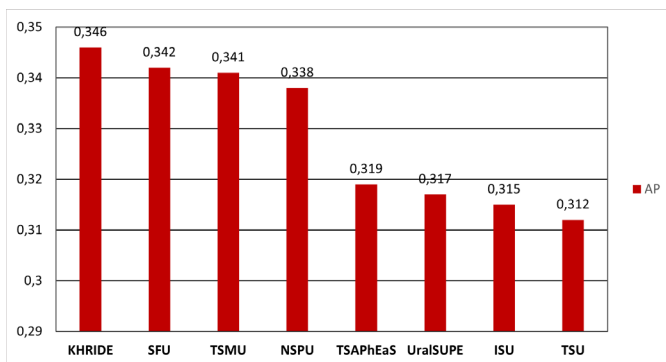
Figure 2. Differences in the values of the adaptive potential of young men who entered specialized universities from cities and rural settlements.

From the anamnesis it was established that out of 153 young men who entered universities from rural settlements, 102 (66.6%) people regularly went in for sports (mainly cross-country skiing, biathlon, football, kettlebell lifting and martial arts). Out of 232 young men who entered universities from cities, 117 (50.4%) people systematically went in for sports (mainly martial arts, football, cross-country skiing, biathlon, track and field).

Only by studying each student's individual values of the KVI, then generalizing them, were we able to form a true idea of the functional state of the young men. Naturally, the course of the study and its results can be interfered with by factors of the external environment that are independent of a person, primarily atmospheric factors, which can change not only during the day, but even an hour. We are inclined to believe that at the beginning of the first semester, the influence of atmospheric meteorological conditions on male students, regardless of the region of residence, was relatively stable, so they did not have any significant effect on the results obtained. The results of calculating the KVI highlighted a number of interesting features in scientific and practical terms. Firstly, all young men, regardless of the region of residence, had a balance of sympathetic and parasympathetic influences of the autonomic nervous system. Secondly, a clear relationship was observed between the ratio of the DBP and HR per minute. We proceeded from the fact that with a balance of the sympathetic and parasympathetic tone of the autonomic nervous system, which is typical for healthy young men adapted to external conditions, the DBP value is numerically equal to the HR value.

Thus, we can conclude that the level of AP in young men who entered specialized universities of our country from cities and rural settlements to receive higher education does not exceed 2.10 c.u. i.e., which is evidence of satisfactory adaptation of their body to environmental conditions. Young men who entered universities from rural settlements, in comparison with urban young men, had higher functional capabilities of the body with satisfactory adaptation to environmental conditions, which we explain by the higher level of motor activity that took place during their studies in comprehensive school. In all young men, regardless of the region of residence, the KVI indicated a balance of sympathetic and parasympathetic influences.

Conflict of interest. The authors declare no conflict of interest.

Transparency of the study. The study had no sponsorship. The authors are solely responsible for providing the final version of the manuscript for publication.

Declaration of financial and other relationships. All authors participated in the development of the topic, design of the study and writing the manuscript. The final version of the manuscript was agreed upon and approved by all authors. The authors did not receive a fee for the study.

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外科医院院内肺炎病原菌耐药菌株流行情况分析
ANALYSIS OF THE PREVALENCE OF ANTIBIOTIC-RESISTANT STRAINS AMONG PATHOGENS OF NOSOCOMIAL PNEUMONIA IN SURGICAL HOSPITALS

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摘要。由于革兰氏阴性和革兰氏阳性菌引起的医院内感染（HAI）数量庞大，微生物的病原学作用和种类谱不断增加，因此，其流行病学、来源和预防问题仍然十分重要。外科医院的主要病原菌是凝固酶阴性葡萄球菌、金黄色葡萄球菌、铜绿假单胞菌、克雷伯氏菌、大肠杆菌、肠球菌和念珠菌，这些病原菌开始在医院内感染的病原学中占据主导地位，尤其是在重症监护室。研究发现，外科医院重症监护室患者呼吸道感染最常见的病原体是革兰氏阴性菌（GNB）——铜绿假单胞菌（34.8%）和肺炎克雷伯氏菌（8.9%）。大肠杆菌占菌株的11.6%。在47份痰液样本和34份FBA样本中，分别分离出23和19种肠道细菌以及24和15种非发酵革兰氏阴性菌（NFGB）。从痰液和FBA样本中分离出的肠道细菌和NFGB数量差异无统计学意义（p=0.05）。ICU内和ICU外患者的CAP病原菌谱存在显著差异。因此，从ICU患者中分离出的铜绿假单胞菌、大肠杆菌、不动杆菌属和变形杆菌属的频率显著更高（p<0.001），而肺炎链球菌在ICU外更可能引起CAP（p<0.005）。

医院内获得性肺炎的主要病原菌对抗菌药物具有很强的耐药性。因此，铜绿假单胞菌菌株对所有类型的抗生素均具有高度耐药性。在卡巴培南类抗生素中，亚胺培南活性最高 – 62.9%，美罗培南 – 57.4%。分离的培养物对它们的耐药率分别为 37.1% 和 42.6%。在氨基糖苷类抗生素中，庆大霉素活性更高 – 53.2% 的敏感培养物，46.8% 的菌株对其不敏感，而 47.4% 的菌株对阿米卡星不敏感。分离的铜

绿假单胞菌菌株对氟喹诺酮类药物表现出较高的耐药性 – 头孢哌酮 – 68.6% 和环丙沙星 – 61.8%。

关键词：院内感染，抗生素耐药性，革兰氏阴性微生物，院内肺炎。

Abstract. The problem of hospital-acquired infection (HAI) caused by gram-negative and gram-positive microbiota, its epidemiology, sources and prevention remain relevant due to the fact that the number of these diseases is quite large, and the etiological role and species spectrum of microorganisms is constantly increasing. The predominant pathogens in surgical hospitals are coagulase-negative staphylococci, S. aureus, P. aeruginosa, Klebsiella spp., E. coli, Entercococci, and Candida spp., and these pathogens are beginning to lead in the etiology of HAI, especially in the intensive care unit. It was found that the most common causative agents of respiratory tract infections in patients of the intensive care unit of a surgical hospital were gram-negative bacteria (GNB) - P. aeruginosa (34.8%) and K. pneumoniae (8.9%). E. coli accounted for 11.6% of strains. Of the 47 sputum samples and 34 FBA samples, 23 and 19 enterobacteria and 24 and 15 non-fermenting gram-negative bacteria (NFGB) were isolated, respectively. The difference in the number of enterobacteria and NFGB isolated from sputum and FBA samples was statistically insignificant (p=0.05). Significant differences in the spectrum of CAP pathogens were noted in patients in the ICU and outside the ICU. Thus, P. aeruginosa, E. coli, Acinetobacter spp. and Proteus spp. were significantly more often isolated from ICU patients (p<0.001), while S. pneumoniae was more likely to cause CAP outside the ICU (p<0.005).

The main pathogens of hospital-acquired pneumonia were highly resistant to antimicrobial drugs. Thus, P. aeruginosa strains were highly resistant to all classes of antibiotics. Of the carbapenems, imipenem had the highest activity - 62.9% and meropenem - 57.4%. The frequency of resistance to them in the isolated cultures was 37.1% and 42.6%, respectively. Of the aminoglycosides, gentamicin was more active - 53.2% of sensitive cultures, 46.8% of strains were insensitive to it, while 47.4% were insensitive to amikacin. The isolated P. aeruginosa strains showed high resistance to fluoroquinolones - cefoperazone - 68.6% and ciprofloxacin - 61.8%.

Keywords: nosocomial infections, antibiotic resistance, gram-negative microorganisms, nosocomial pneumonia.

In recent years, in Russia, as well as throughout the world, there has been a widespread resistance of infectious disease pathogens to antibacterial drugs (ABD). The development of drug resistance leads to the emergence of the ability of microorganisms to maintain their vital activity, despite the use of adequate etiotropic therapy.

The results of active research conducted in recent decades indicate the emergence of resistance of some bacterial strains to more than three classes of anti-

bacterial drugs (multi-resistance or polyresistance); to all but one or two classes (extreme resistance); to all ABDs (pan-resistance).

Resistance of microorganisms to antibiotics is a change in the bacterial genome as a result of mutation and subsequent selection of the most successful variants. Resistance can be innate, if it is a species characteristic of the bacterium, and acquired, if some bacterial strains remain viable at antibiotic concentrations that suppress the bulk of the microbial population of the same species.

The problem of hospital-acquired infection (HAI) caused by gram-negative and gram-positive microbiota, its epidemiology, sources and prevention remain are relevant due to the fact that the number of these diseases is quite large, and the etiological role of gram-negative microorganisms is constantly increasing. The main reasons that favor the development of nosocomial infections are the constantly existing contingents of patients belonging to the high-risk group, a large number of sources, active circulation of hospital strains with constant selection of the most resistant of them to the main antibacterial agents, which, in particular, is due to irrational antibacterial therapy. Of great importance in the development of nosocomial infections is the increasing frequency of isolation of gram-negative opportunistic microorganisms (OPM) as etiological agents. According to a number of researchers, the frequency of gram-negative flora isolation in cases of hospital-acquired infections (HAIs) in the intensive care unit is 40.1%, with respiratory and urinary tract infections being the most commonly observed, followed by bacteremia and wound infections.

The state of the hospital environment largely determines the likelihood of developing hospital-acquired infections. It is known that the high resistance of OPM in the environment suggests both airborne and contact-household routes of transmission of microorganisms, posing a danger to patients of surgical clinics with a weakened immune system.

The pathogens of hospital-acquired infections are usually microorganisms that have adapted to permanent habitation in hospital conditions. The most common pathogens of hospital-acquired infections are bacteria, the structure of which varies within the hospital and depends on the patient population, localization of the infection, antibiotic use practices and control methods.

It is known that resistant hospital strains have recently taken the leading position in the structure of pathogens of nosocomial infections in hospitals in various countries of the world. To a large extent, this is a consequence of the uncontrolled and widespread prophylactic use of antibacterial drugs, irrational prescription of empirical therapy for nosocomial infections. The predominant pathogens in surgical hospitals are coagulase-negative staphylococci, S. aureus, P. aeruginosa, Klebsiella spp., E. coli, Entercococci, and Candida spp. These pathogens are beginning to lead in the etiology of nosocomial infections, especially in intensive care units.

Given the undeniable importance and relevance of the problemIn order to prevent the spread of nosocomial infections in surgical clinics and in particular in intensive care units (ICUs), as the most important area of the hospital, it is necessary to conduct regular internal microbiological monitoring in order to monitor the selection and circulation of nosocomial strains - pathogens that cause infections associated with the provision of medical care.

The study of clinical material from patients was carried out with the aim of establishing the relationship between microorganisms isolated during the study of the environment and hospital personnel with pathogens isolated from patients.

Bacteriological examination of clinical material with suspected lower respiratory tract infections (LRTI) was performed in the presence of: purulent sputum, fever, leukocytosis and changes in the leukocyte count. To assess the etiological significance of LRTI pathogens isolated from clinical material, quantitative criteria were used: for bronchial aspirate and sputum - > 105-106 CFU/ml and for material obtained using bronchoalveolar lavage - > 104 CFU/ml.

The nosological structure of infectious nosocomial complications in the intensive care units of the examined surgical hospitals showed that the most frequent clinical form of nosocomial infections in the intensive care units, according to our data, were lower respiratory tract infections (64.5%), and the most frequently isolated pathogens were gram-negative bacteria (66.2%)..A total of 110 strains of nosocomial infection pathogens were isolated, including: 71 (64.5%) from sputum and tracheobronchial aspirate; 14 (12.7%) from peritoneal exudate; 11 (10.0%) from wound discharge; 8 (7.3%) from the bloodstream and 6 (5.5%) strains during microbiological examination of urine. Of the 110 isolated cultures, 74 strains were gram-negative bacteria. Gram-negative bacteria were isolated in 45 of 138 examined patients with respiratory tract infection, in 17 of 49 patients with intra-abdominal infections, in 6 of 24 with bloodstream infections and in 6 of 25 patients with urinary tract infections.

As is known, the most important and severe form of infectious hospital-acquired lung pathology in patients in intensive care units is hospital-acquired pneumonia (HAP), which develops in the hospital against the background of the underlying disease. HAP ranks second among all HAIs (13-18%) and is a frequent infection (≥45%) in intensive care units, which is associated with the frequency of invasive interventions.

The pathogenesis of CAP is multifactorial, and these factors interact with each other. The lower respiratory tract, which are most often affected by HAI, have their own anti-infection defense mechanisms, the disruption of which leads to the development of CAP. The main routes of infection penetration into the lower respiratory tract are aspiration of the contents of the oropharynx contaminated with bacteria. Colonization of the oropharynx with Streptococcus pneumonia, anaer-

obes, and less often Haemophilus influenza, is typical for many healthy people. In contrast, colonization of the oropharynx with other gram (-) microorganisms, primarily P. aeruginosa and Acinetobacter spp., is rare under normal conditions. The likelihood of tracheal colonization with P. aeruginosa and enterobacteria increases with the length of hospital stay and (or) on mechanical ventilation, and leads to a 10-fold increase in the development of CAP.

Thus, the risk of developing CAP increases after patients have undergone surgery, for example, on the chest and abdominal organs. Among all hospital-acquired infections, CAP is characterized by the highest mortality rate, which can reach 30-70%, and the development of CAP in patients on mechanical ventilation increases by 6-21 times and depends on the duration of artificial ventilation.

Microbiological examination of clinical material samples from the NPDP should be performed in all patients with suspected CAP. In connection with the above, we conducted studies to identify patients with CAP in the intensive care unit of the examined surgical hospital and to identify clinically significant pathogens of pulmonary complications. Clinical material from 165 patients with respiratory infection was studied, 98 cultures gave a positive result, 112 strains of various microorganisms were isolated, among which more than 70% were gram-negative aerobic bacteria. Potential causative agents of CAP were isolated in 98/165 (59.4%) patients, and in 67/168 (39.8%) patients no etiologically significant microorganisms were detected. In the group with positive results, the pathogen in monoculture was isolated in 25/98 (25.5%) cases; In 73/98 (74.5%), associations of microorganisms were detected.

The most common causative agents of respiratory tract infections in patients of the intensive care unit of a surgical hospital were gram-negative bacteria (GNB) - P. aeruginosa (34.8%) and K. pneumoniae (8.9%). E. coli accounted for 11.6% of strains. Of 47 sputum samples and 34 FBA samples, enterobacteria were isolated - 23 and 19 cultures and non-fermenting gram-negative bacteria (NFGB) - 24 and 15, respectively. The difference in the number of enterobacteria and NFGB isolated from sputum and FBA samples was statistically insignificant ($p = 0.05$).

The isolated cultures of enterobacteria and non-fermenting gram-negative bacteria (NFGB) agglutinated human erythrocytes O(I) with a frequency of 21.4–78.7% and 1.8–67.2%, respectively. Resistance to tellurite K was observed more often ($p<0.005$) in enterobacteria and NFGB of CAP pathogens isolated from sputum than in cultures isolated from TBA - 64% and 52%, respectively. The ability to grow on minimal medium at 420 C was more often found in bacteria isolated from sputum of patients with CAP on mechanical ventilation. Among the isolated NFGB, a higher frequency of hemolytic isolates was found in NFGB than in enterobacteria. Only 4.5% of enterobacteria and 1.9% of NGOB - pathogens of hospital-acquired respiratory infections do not have any of the studied pathogenicity factors. 81.7% of isolated enterobacteria - pathogens of pulmonary complications

carried 2 factors, and 14.3% - 3 pathogenicity factors. 4-6 pathogenicity factors in the group of CAP pathogens were carried by 64.5% of NGOB isolates.

Significant differences were noted in the spectrum of pathogens causing CAP in patients who were in the ICU and not in the ICU. Thus, P. aeruginosa, E. coli, Acinetobacter spp. and Proteus spp. were significantly more often isolated in patients in the ICU (p<0.001), while S. pneumoniae was more likely to cause CAP in patients not in the ICU (p<0.005).

It is important to note that the main pathogens causing hospital-acquired pneumonia were highly resistant to antimicrobial drugs than strains isolated from other ecotopes.

Thus, P. aeruginosa strains were characterized by a high frequency of resistance to all classes of antibiotics. Of the carbapenems, imipenem had the highest activity - 62.9% and meropenem - 57.4%. The frequency of resistance to them in the isolated cultures was 37.1% and 42.6%, respectively. Of the aminoglycosides, gentamicin was more active - 53.2% of sensitive cultures, 46.8% of strains were insensitive to it, while 47.4% were insensitive to amikacin. The isolated P. aeruginosa strains showed high resistance to fluoroquinolones - cefoperazone - 68.6% and ciprofloxacin - 61.8%.

Beta-lactam antibiotics are widely used drugs. According to their chemical structure, they are divided into several groups: penicillins, cephalosporins, carbapenems and monobactams. As is known, this group of antibiotics is usually used to treat a wide range of gram-positive and gram-negative bacteria. Resistance to beta-lactams is formed as a result of the action of enzymes, beta-lactamases. Beta-lactamases are produced by some bacteria and cause their resistance to beta-lactam antibiotics, which have a common element in the molecular structure: a four-atom ring known as a beta-lactam. Beta-lactamase breaks this ring, deactivating the antibacterial properties of the molecule.

Gram-positive microorganisms resistant to ABD also remain etiologically significant, for example, representatives of the genus Staphylococcus. The most pathogenic among them is the species S. aureus. The presence of methicillin resistance characterizes the strains MRS (Methicillin Resistant Staphylococcus) and MRSA (Methicillin Resistant Staphylococcus aureus). Diseases caused by them can begin against the background of therapy with aminoglycosides and cephalosporins.

Resistance to methicillin, oxacillin is caused by the appearance of penicillin-binding protein (PBP2a) in microorganisms, which is encoded by the mecA gene. In 1975, the localization of the mecA gene on the chromosome was determined. The transfer of the mecA gene occurs as part of the mobile element scc - staphylococcal chromosomal cassette.

Resistance to glycopeptides is formed as a result of target modification, active efflux of the drug. Several types of vancomycin resistance are known (VanA/VanB and VanC). VanA is characterized by a high level of resistance to vancomycin and

teicoplanin, VanB - variable resistance to vancomycin and sensitivity to teicoplanin. It is believed that staphylococci received this ability from enterococci, often strains resistant to vancomycin, VRS (Vancomicin Resistant Staphylococcus) and VRSA (Vancomicin Resistant Staphylococcus aureus), are also characterized by resistance to methicillin.

In the vast majority of cases, standard phenotypic methods allow for an effective and comprehensive assessment of antibiotic susceptibility. However, in some cases, standard methods for determining antibiotic susceptibility are insufficiently effective or suboptimal for identifying certain mechanisms and determinants of resistance due to the variability of their phenotypic manifestation in vitro (e.g., resistance to carbapenems in enterobacteria caused by OXA-48 production), or are lengthy, labor-intensive, or unavailable (e.g., for identifying mutational resistance of mycobacteria to various drugs [47], or mutational resistance of mycoplasmas pathogenic for humans to macrolides and fluoroquinolones). In such cases, detection of genetic markers of resistance is more effective or more accessible for predicting AR.

Identification of individual mechanisms and determinants (genetic markers) of resistance, except in rare cases (e.g., detection of mecA/mecC in staphylococci), does not replace phenotypic determination of susceptibility, since the resistance phenotype can be associated with the presence of many different genetic factors, including unknown ones. However, determination of resistance mechanisms is important both for the selection and optimization of AMT in individual patients and for long-term monitoring of antibiotic resistance. Despite the apparent differences, these goals are closely interrelated, since the accumulation of regular (routine) data on the detection of microorganisms with important resistance mechanisms in individual patients over time forms a pool of epidemiological data, which, in turn, allows us to assess the risks and likelihood of infections caused by "problematic" resistant pathogens and to select the most effective drugs, including for empirical use, in other patients (in the department, hospital, region, etc.).

Molecular genetic methods allow to identify genes associated with resistance to ABD. The advantages of this approach are: high sensitivity, speed of obtaining results, standardization and technological nature of the study.

It is important that the study does not require manipulation of live bacterial cultures, which, in turn, serves to prevent the spread and circulation of microorganisms within medical, diagnostic and laboratory institutions.

俄罗斯人群中先天性脊柱侧弯、特发性脊柱侧弯患者和健康个体中杂合缺失
TBX6/null（del 16p11.2）的发生率
INCIDENCE OF HETEROZYGOUS DELETION TBX6/NULL (DEL 16P11.2) IN PATIENTS WITH CONGENITAL SCOLIOSIS, IDIOPATHIC SCOLIOSIS AND HEALTHY INDIVIDUALS IN THE RUSSIAN POPULATION

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摘要。约 10% 的先天性脊柱侧弯病例具有由 TBX6 基因中不利的多态性等位基因组合形成的次等位 T–C–A 单倍型的特征：rs2289292、rs3809624 和 rs3809627。先天性脊柱侧弯的第二大遗传因素是 16 号染色体 16p11.2 区域的缺失，TBX6 基因位于该区域。我们的工作旨在研究先天性脊柱侧弯患者 DNA 样本

中 TBX6（16p11.2）杂合缺失的频率。该研究包括 193 名先天性脊柱侧弯（CS）患者和 141 名健康志愿者。此外，还测试了 94 个特发性脊柱侧弯（IS）3 期和 4 期患者的 DNA 样本。采用多重定量实时 PCR 检测 16p11.2 基因座的杂合缺失，包括 TBX6 基因。在 193 例先天性脊柱侧弯患者中，有 22 例（11%）检测到杂合 TBX6/null 缺失，在 141 名健康志愿者中，有 2 例（1.4%）检测到杂合 TBX6/null 缺失。在 94 例特发性脊柱侧弯患者中，无一例检测到 TBX6/null 缺失（0%）。在任何情况下，均未检测到 TBX6/null 基因拷贝数（16p11.2 区域内的微重复）的增加。因此，俄罗斯人群中先天性脊柱侧弯患者杂合 TBX6/null 缺失的发生率为 11%。杂合缺失的携带者与先天性脊柱侧弯之间存在高度关联（OR = 14.99）。

关键词：先天性脊柱侧弯；特发性脊柱侧弯，TBX6 基因，16p11.2缺失。

Summary. Approximately 10% of congenital scoliosis cases are characterized by the hypomorphic T-C-A haplotype formed by a combination of unfavorable polymorphic alleles in the TBX6 gene: rs2289292, rs3809624 and rs3809627. The second most common genetic factor of congenital scoliosis is the deletion of the region of chromosome 16, 16p11.2, on which the TBX6 gene is localized. The aim of our work was to study the frequency of heterozygous deletion of TBX6 (16p11.2) in DNA samples of patients with congenital scoliosis. The study included 193 patients with congenital scoliosis (CS) and 141 healthy volunteers. Additionally, 94 DNA samples from patients with idiopathic scoliosis (IS) stages 3 and 4 were tested. Multiplex quantitative real-time PCR was used to detect heterozygous deletions at the 16p11.2 locus, including the TBX6 gene. Heterozygous TBX6/null deletion was detected in 22 of 193 (11%) cases of congenital scoliosis, as well as in 2 of 141 (1.4%) healthy volunteers. In no case in the group of 94 patients with idiopathic scoliosis was TBX6/null deletion detected (0%). In no case was an increase in the number of TBX6/null gene copies (microduplications in the 16p11.2 region) detected. Thus, the incidence of heterozygous TBX6/null deletion in patients with congenital scoliosis in the Russian population is 11%. A high degree of association (OR = 14.99) was established between carriage of heterozygous deletion and congenital scoliosis.

Keywords: congenital scoliosis; idiopathic scoliosis, TBX6 gene, 16p11.2 deletion.

Introduction.

Congenital scoliosis and idiopathic scoliosis are diseases with insufficiently studied etiology and pathogenesis. In approximately 10% of cases of congenital scoliosis, a hypomorphic haplotype T-C-A is detected, formed by a combination of unfavorable polymorphic alleles in the TBX6 gene: rs2289292, rs3809624 and rs3809627 [1, 2]. The second most common genetic factor of congenital scoliosis is a deletion of the region of chromosome 16, 16p11.2, on which the TBX6 gene is localized. The combination of "hypomorphic haplotype T-C-A/deletion 16p11.2"

is found exclusively in patients with congenital malformations of the spine [3-5], which can be combined with other malformations. In other cases, both familial and sporadic, unique mutations of the TBX6 gene in a compound with the T-C-A haplotype are found in the study of congenital scoliosis [6, 7].

Deletion 16p11.2 is not specific for congenital scoliosis. Associations of 16p11.2 with congenital malformations of the heart, urogenital tract, obesity, autism and other somatic and psychoneurological abnormalities have been found. In addition to deletion of the chromosome region 16p11.2, its duplication has also been described, associated with congenital malformations of the cervical spine, Netherton syndrome, idiopathic scoliosis and mental disorders.

Homozygous deletions of 16p11.2 are lethal for embryos. The prevalence of heterozygous deletion in the world population is estimated at 0.03% - 0.06% [3, 8]. In most cases, the deletion occurs de novo at the stage of gametogenesis or embryogenesis [3].

We were unable to find data on the prevalence of 16p11.2 deletion in the Russian population.

The aim of the work was to study the frequency of heterozygous deletion TBX6 (16p11.2) in DNA samples of patients with congenital scoliosis who had previously undergone treatment at the Turner National Medical Research Center of Pediatric Traumatology and Orthopedics. DNA samples from healthy individuals (control group) and patients with idiopathic scoliosis were also analyzed.

Materials and methods.

Patients and controls.

The study included 193 patients with congenital scoliosis (CS) and 141 healthy volunteers. Additionally, 94 DNA samples from patients with idiopathic scoliosis (IS) stages 3 and 4 were tested. The study was approved by the local Ethics Committee. The characteristics of the patient and control groups are presented in Table 1.

Table 1.

Characteristics of the patient and control groups

Patient groups	Number of patients (%)	Age, years (average age)
Patients with CS	193 (100%)	3 - 17 (11.2)
female	110 (57%)	3 - 17 (10.9)
male	83 (43%)	4 - 17(11.4)
Patients with IS	94 (100%)	6 - 20 (16.4)
female	73 (78%)	10 - 19 (16.5)
male	21 (22%)	6 - 20 (16.3)
Controls	141 (100%)	18 - 56 (28.7)
female	121 (86%)	18 - 49 (26.1)
male	20 (14%)	19 - 56 (34.3)

Genotyping.

Genomic DNA was isolated from blood using a commercial reagent kit (Synthol, Moscow).

To detect a heterozygous deletion in the 16p11.2 locus, including the TBX6 gene, a multiplex quantitative real-time PCR (MQRT-PCR) method with fluorescently labeled TaqMan hybridization probes was used. The sequence in the F9 gene (coagulation factor IX) on chromosome X was used as an endogenous internal control with known variable values of gene copy number.

Based on the approach described for the analysis of heterozygous deletions [9, 10], we developed an MQRT-PCR method for determining the ratio of the TBX6 and F9 gene copies in the same DNA sample. To improve the reliability and reproducibility of MQRT-PCR, we used forward and reverse primers with 5' ends extended by 10 nucleotides (5'-GGCCAAGTGT-3'), which are not complementary to the target sequence of the template genomic DNA. We also used a modified "subcycling step" in the PCR thermal cycling program. The list of primers and fluorescently labeled PCR probes is presented in Table 2.

Table 2.

List of oligonucleotide PCR primers and fluorescently labeled PCR probes used in the work

№	Name of oligonucleotides	5'-3' nucleotide sequence
1.	TBX6-FT	GGCCAAGTGTCCCCGAGACCACATTCATC*
2.	TBX6-RT	GGCCAAGTGTAGGGATTGGCTGCAATCTTC
3.	TBX6-FLP	FAM-CTGTGGGTTCTGGTAGGCTGTCA-BHQ1
4.	F9-FT	GGCCAAGTGTCATCTCTGGACCAAGAATGC
5.	F9-RT	GGCCAAGTGTAATCTTCCCTTGTCACTGGC
6.	F9-FLP	JOE-CCTTGTCCACCTCTATTTCAGGCA-BHQ1

* the 5"-part of the primer consisting of 10 nucleotides that are not complementary to the target template DNA is highlighted in underlining

PCR was performed in 25 microliters of a mixture containing 1xPCR buffer, 0.5 units of Taq DNA polymerase activity SynTaq (Syntol, Moscow, Russian Federation), 3.5 mM $MgCl_2$, 200 µM of each dNTP, 5% dimethyl sulfoxide, 0.5% formamide. The reaction included 500 nM of each oligonucleotide primer and 200 nM of each fluorescently labeled PCR probe (Eurogen, Moscow, Russian Federation). The analysis was performed on a Bio-Rad CFX96 system (Bio-Rad, USA).

The thermal cycling process began with an activation step of antibody-blocked Taq polymerase for 5 min at 95°C. Then, two cycles of 30 sec at 95°C and 2 min at 60°C each were performed to maximize saturation of all regions of the template DNA complementary to the primers. The "extra cycle" step for enrichment of

the amplicons consisted of 10 repetitions of denaturation for 10 sec at 95°C and a combined annealing-synthesis step for 30 sec at 72°C. The final thermal cycling step consisted of 30 cycles of denaturation for 10 sec at 95°C and a combined annealing-synthesis step for 30 sec at 62°C with data collection on the change in fluorescence intensity in the samples. A schematic representation of the PCR process is shown in Figure 1.

The copy number ratio between the target locus TBX6 (fluorescent probe labeled with FAM) and the internal reference F9 (fluorescent probe labeled with JOE) was calculated by the ΔCt method as the difference: Ct(JOE) minus Ct(FAM). In this case, this ratio is normally 1:1 for females and 2:1 for males, and ΔCt is in the range of 0.5 - 1.4 and 1.6 - 2.2, respectively. Male DNA with the TBX6/null genotype shows a gene copy ratio of 1:1 and looks like female DNA. Female DNA with the TBX6/null genotype shows a decrease in the ΔCt ratio below 0.3 to a negative value with ΔCt from -0.1 to -0.4.

Statistical analysis of data. Statistical analysis of the obtained data was carried out using the online calculator "Medical Statistics" (https://medstatistic.ru/calculators.html).

Results.

Heterozygous TBX6/null deletion was detected in 22 of 193 (11%) cases of congenital scoliosis, as well as in 2 of 141 (1.4%) healthy volunteers. In no case in the group of 94 patients with idiopathic scoliosis was TBX6/null deletion detected (0%).

In no case did we detect an increase in the number of copies of the TBX6/null gene (microduplications in the 16p11.2 region).

Clinically, 15 of 22 patients (68%) with heterozygous TBX6/null deletion were diagnosed with congenital scoliosis against the background of multiple malformations of the spine, 3 (14%) - congenital kyphoscoliosis of the thoracic spine, 2 (9%) - congenital scoliosis of the thoracic spine, and 2 (9%) - congenital scoliosis of the lumbar spine.

The gender distribution among patients with heterozygous TBX6/null deletion was uniform: 11 of 22 (50%) were female and 11 of 22 (50%) were male. Also, among healthy volunteers, TBX6/null deletion was detected in 1 woman and 1 man. Based on the data obtained in our study, the odds ratio (Odds ratio) OR = 14.99 between the carriage of a heterozygous deletion and congenital scoliosis was statistically determined.

Discussion.

The obtained data on the incidence of heterozygous deletion TBX6/null in patients with congenital scoliosis in the Russian population (11%) are consistent with the published results of studies obtained in other ethnic and population groups [3-5].

In our study, cases of carriage of heterozygous deletion TBX6/null in healthy volunteers (1.4%) were identified for the first time. We were unable to find published information on asymptomatic carriage of heterozygous deletion TBX6/null. At the same time, data were obtained in various studies proving the relationship between the carriage of heterozygous deletion TBX6/null and diseases of various pathogenesis, manifestations and severity. The variety of clinical manifestations caused by heterozygous deletion of 16p11.2 depends on the structure of the remaining region of the homologous chromosome.

For the development of congenital scoliosis, the presence of the TBX6/null genotype is not enough. It is necessary that there is a functionally defective gene on the corresponding region of the paired chromosome. The most common hypomorphic haplotype in congenital scoliosis is T-C-A in a compound with deletion of 16p11.2 or other nonsense mutations of the TBX6 gene. It is noteworthy that homozygosity for the T-C-A haplotype has no clinical manifestations [6].

Conclusion.

The incidence of heterozygous deletion TBX6/null in patients with congenital scoliosis in the Russian population is 11%. A high degree of association (OR = 14.99) was established between the carriage of heterozygous deletion and congenital scoliosis. In clinical practice, it is advisable to determine the carriage of heterozygous deletion 16p11.2 for the purposes of medical genetic counseling for congenital malformations, both isolated and combined, and disorders of the psychoneurological spectrum that appear at an early age.

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钛盘表面处理过程中等离子体电解氧化方式对成纤维细胞增殖活性的影响
THE INFLUENCE OF PLASMA ELECTROLYTIC OXIDATION MODES DURING SURFACE TREATMENT OF TITANIUM DISKS ON THE PROLIFERATIVE ACTIVITY OF FIBROBLASTS

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Introduction: Dental implantation is one of the most high-tech sections of modern dentistry. The use of dental implants to replace defects in dental arches significantly improves the quality of life of patients with partial or complete absence of teeth.

The key issue in the use of dental implants is their osseointegration or the ability of newly formed bone tissue to tightly fuse with the surface of the implant, which ensures high strength of the connection of the artificial structure with the surrounding tissue. The determining factors for the success of osseointegration are the atraumatic nature of its installation, the shape of the implant and the characteristics of its surface: chemical purity, micro- and macroroughness.

In the manufacture of dental implants, titanium or its alloys are most often used, on the surface of which a stable and inert oxide is formed, which largely determines its bioinertness and biocompatibility. The surface of the implant is subjected to various types of treatment to improve the osseointegrative properties. Thus, a number of studies have demonstrated that a high degree of roughness with an average surface value of 1-3 μm has a positive effect on the mechanical stability of the implant both at the time of its installation and in the long term.

The most common methods of treating the surface of titanium implants are shot blasting and etching with highly concentrated acid solutions. The following acids are used for this: HCl, H2SO4, HNO3 and HF. Acid etching leads to the formation of microscopic pores on the implant surface, the size of which ranges from 0.5 to 3 μm in diameter. At the same time, some authors did not note a statistically significant difference in the clinic when using implants with different types of surfaces.

Objective: The aim of the work was to study in vitro the cytotoxicity of three variants of modifying the surface of titanium discs made of Grade IV alloy using plasma electrolytic oxidation (PEO).

Materials and methods. The cytotoxic properties of the discs were assessed using cells of the transplantable cell line of mouse embryonic fibroblasts Balb/3T3 clone A31. This cell line was selected for the analysis in accordance with the recommendations of GOST ISO 10993-5-2011. The cell line was cultured in sterile plastic Petri dishes with a specialized coating for adhesive cultures at +37ºC in an atmosphere of 5% CO2. When conducting the cytotoxicity analysis, the number of living cells in samples incubated with discs was compared with the control - the number of living intact cells incubated in the absence of any foreign materials.

The study used titanium discs with a diameter of 8 mm and a thickness of 1 mm made of medical titanium alloy Grade IV. The disks were modified by 3 variants of plasma electrolytic oxidation (PEO), respectively, 3 types of surface were formed: Surface No. 1 PEO was formed in an aqueous solution of alkaline electrolyte without the use of additional modifiers (PEO-Ti); Surface No. 2 - PEO in a saturated solution of calcium hydrogen orthophosphate; Surface No. 3 - PEO in a simple electrolyte and subsequent PEO in an electrolyte based on orthophosphoric acid, i.e. double sequential processing. In all cases, the exposure time of the disks was 40 minutes. Then the samples were washed twice in distilled water and dried. Smooth milled disks made of Grade IV alloy, without surface treatment, served as a comparison.

Results. It was found that when culturing cells in the presence of a smooth Grade IV disc without surface treatment, the number of living cells was 77.2%, which is 22.8% less than the positive control - cells in an empty well. Cultivation of fibroblasts in the presence of PEO-Ti and PEO-Ti + HAP type discs showed - 70%, for PEO-HAP discs - 58.7% (reduced by 41.3%). At the same time, morphologically, the cells did not differ from the control. Conclusions. The surface of titanium discs modified with PEO-Ti is the most promising modification method for dental implants.

在面粉糖果产品工艺中选择植物强化剂的原因
REASONS FOR THE CHOICE OF A PLANT-BASED FORTIFIER IN THE TECHNOLOGY OF FLOUR CONFECTIONERY PRODUCTS

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摘要。如今，糖果行业致力于扩大产品范围并生产功能性食品，包括燕麦饼干。面粉糖果产品由优质小麦粉制成，其特点是营养成分不足。本研究的目的是通过对优质小麦粉和豌豆粉的化学成分进行比较评估，证明选择用于生产燕麦饼干的强化剂的合理性。研究发现，与优质小麦粉相比，豌豆粉的蛋白质、膳食纤维、钙、镁和磷含量最高。面粉化学成分分析表明，豌豆加工二次产品应用于面粉糖果产品制造技术（包括燕麦饼干）的可行性。
关键词：小麦粉、豌豆粉、饼干、化学成分。

Abstract. Nowadays, the confectionery industry aims to expand the range of products and manufacture functional types of foods, including oatmeal cookies. Flour confectionery products are made from premium wheat flour and characterized by insufficient nutrient content. The purpose of this study was to justify the choice of a fortifier for the production of oatmeal cookies based on a comparative assessment of the chemical composition of premium wheat flour and ground pea flour. It was found out that Ground pea flour was found to have the highest content of protein, dietary fiber, calcium, magnesium, and phosphorus compared to premium wheat flour. The flour chemical composition analysis indicates the feasibility of pea processing secondary product application in the technology of flour confectionery products manufacturing, including oatmeal cookies.

Keywords: wheat flour, ground pea flour, cookies, chemical composition.

Today, the current direction of the food industry development is the formation of food products wide range that not only meets the priority directions of state

policy in the healthy nutrition field, but also satisfies consumer demand for their quality. The current trend in the food market development is an increase in the consumption of substances that play an important role in the body physiological processes, that is, physiologically functional ingredients. Flour confectionery products are essential in the nutrition of the country's population. They are one of the main sources of energy and nutrients. However, their composition is not balanced. They have low nutritional value and high energy value; contain a large amount of fats and carbohydrates with an insignificant content of essential nutrients. [1].

The solution to this problem is flour confectionery products enrichment with plant origin ingredients containing a natural complex of macro- and micronutrients. From the resource saving viewpoint, the grain processing industry is of particular interest, since a significant portion of by-products is formed during grain processing. These products have high nutritional value and are promising raw materials for flour confectionery products manufacture. [2].

Ground peas are a secondary product formed during peas processing into cereals, which is a rich source of protein, dietary fiber, minerals, antioxidants and is a gluten-free product. The nutrients digestibility, which also characterizes the product nutritional value, is determined primarily by the particle size. Therefore, it is advisable to carry out preliminary grinding of crushed peas by the method of disintegration-wave transformation under weak (with a power of tenths of a microwatt) microwave impact at about 8 mm wavelengths, according to the classical excitation scheme of the generator on the Gunn diode [3]. The resulting product is characterized by an increased degree of dispersion (particle size 25-30 μm).

Ground peas contain vegetable protein, which is an equivalent substitute for meat protein. Moreover, it is easily digestible. The advantages of pea protein are high digestibility (90–95%) and low allergenicity. It has no negative impact on human health as well. Its protein is gluten-free, rich in cysteine, methionine, and the essential amino acid lysine [4].

Extracts and low-molecular fractions of phenols and tannins from peas have antioxidant activity. Flavonoids contained in the ground peas have hypoglycemic, hypoazothermic, antiviral and antitumor activity. Sitosterols form insoluble complexes that reduce the risk of cardiovascular and oncological diseases. Saponins have a tonic effect, positively influencing lipid metabolism, immunity and lowering blood pressure [5].

The purpose of this study was to justify the choice of a fortifier for the production of oatmeal cookies based on a comparative assessment of the chemical composition of premium wheat flour and ground pea flour. Ground pea flour was obtained by grinding it with a disintegration-wave method to a particle size of (27.5 ± 2.5) μm (TR 01.11.75-002-02588724-2022). The chemical composition

was determined in the raw materials: protein - according to GOST 32044.1-2012, fat - according to GOST 5668-2022, water-soluble carbohydrates - according to GOST R 51636-2000, dietary fiber - according to GOST 31675-2012, mineral composition (calcium, magnesium, phosphorus) - by inductively coupled plasma mass spectrometry (ICP-MS).

An assessment of the raw materials chemical composition studied showed that in terms of dietary fiber content, ground pea flour exceeds premium wheat flour by 4.5 times (table). An important function of dietary fiber in the human body is its ability to remove harmful substances from the body. Insufficient dietary fiber amount in the diet is accompanied by functional disorders of the gastrointestinal tract, decreased immune system function, increased risk of cardiovascular diseases, etc developing.

Table

Chemical composition of flour different types

Name	Content of nutrients in 100 g	
	premium grade wheat flour	ground pea flour
Protein, g	10,30	27,83
Fat, g	1,10	1,50
Digestible carbohydrates, g	70,10	38,17
Dietary fiber, g	3,50	15,7
Minerals, mg:		
calcium	18,00	114,4
magnesium	16,00	152,3
phosphorus	86,00	563,3

The protein content in ground pea flour is 2.7 times higher than that of premium grade wheat flour. Eating a product containing 100 g of ground pea flour will provide 37.1% of the daily protein requirement, 52.3% of dietary fiber, and 10.5% of digestible carbohydrates.

Ground pea flour significantly exceeds premium grade wheat flour in terms of mineral content, such as calcium, magnesium and phosphorus. Magnesium, calcium and phosphorus are minerals that play a very important role as, they support vital processes within the body's cells.

The data obtained indicate the feasibility of application of pea processing secondary product in the technology of flour confectionery products with increased nutritional value from premium grade wheat flour. It will increase their content of protein, dietary fiber, and minerals. In addition, its application in the technology of oatmeal cookies will allow developing a resource-saving technology for flour confectionery products of increased nutritional value.

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选择无人机探测地形最有效方法的理论依据
THEORETICAL JUSTIFICATION IN THE SELECTION OF THE MOST EFFECTIVE METHOD FOR EXPLORING THE TERRAIN BY UNMANNED AERIAL VEHICLES

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摘要。本文分析了无人机的主要运动方式，以找出在关注对象监测区域内对一定区域地形进行巡逻的最有效方式。
关键词：无人机，飞行器，集群方法，编队方法。
Abstract. The article analyzes the main methods of movement of unmanned aerial vehicles in order to identify the most effective way of patrolling a certain area of terrain in the area of monitoring objects of interest.
Keywords: unmanned aerial vehicle, aircraft, barreplication, swarm method, formation method.

Introduction.
At present and in the future, it is difficult to overestimate the importance of research in the field of intelligent systems for detecting and assessing objects without pilot aviation systems. It is only possible to designate a small area of industries in which unmanned aerial vehicles (UAVs) can be used with great potential: scientific and research work, civil aviation, military equipment, topography, aerial photography, filming, video filming, meteorological monitoring, transport services, engineering and geodetic surveys, geolocation, data transmission.

The article examines and analyzes possible methods (methods) of barrage UAVs in both single and group flights. The paper studies existing methods of movement in the airspace of unmanned aerial vehicles.

The task in this direction is to identify the most promising method of controlled flight of an aircraft with tracking of the movement of objects of interest in remote areas of the terrain.

This theoretical study was conducted at the metatheoretical level, that is, with by using the dialectical method, the method of systems analysis and satisfies the requirements: compliance with the set goal, availability of a reliable result, maximum efficiency at minimum cost, availability in understanding mania and application [1].

Over the past few years, the demand for the use of unmanned aerial vehicles has increased, which is dictated by a wide range of their applications. The fact that work with aircraft does not require the direct presence of a person plays a significant role in this issue.

As a result, there was a need to conduct research on the automation of UAV processes, aircraft both in single and group flights. The works [2-6, 8, 9] are devoted to the study of the issues of automation of flight control of the formation of aircraft. These works set out the general requirements for automatic control systems of a group of aircraft, made a formulaic representation of control objects in various methods of grouping aircraft, conducted studies of the problem of controlling aircraft in a group. As a result, technical proposals for the construction of systems for controlling the formation of aircraft as an unstable dynamic system are recommended, based on the results of which it is concluded that the formation, as a dynamic system in itself, without regulators, is fundamentally unstable in all flight modes, technical proposals for the construction of systems for controlling the formation of aircraft are recommended. In parallel with the system of single UAVs, a swarm or formation of several UAVs has obvious advantages (see Table 1) [7].

Table 1

Empirical data on the comparative characteristics of a system of single unmanned aerial vehicles and a swarm of drones

Features of the system	Single UAV	Drone Swarm (Group)
Vitality	Bad	Tall
Scalability	Limited	Tall
Flight speed	Slow	Fast
Autonomy	Low	Tall
Price	Tall	Low
Communication needs	Tall	Low
Effective reflective surface	Big ones	Small

Unmanned aerial vehicles are complex controlled objects that solve multi-purpose tasks: monitoring of water areas, airspace, inspection of a specific territory, transmission of information via a communication channel, radio and other types of control, work with a target. Therefore, such a characteristic as survivability is of primary importance for solving the assigned task. A swarm of drones increases the probability of solving the task even if several aircraft fail, demonstrating a high level of survivability [10].

Scalability: Using larger UAVs for single UAV systems only increases coverage up to a point, while in a multi-UAV system the range can be easily increased.

Flight speed: The mission is completed faster when using multi-UAV systems (when performing searches, for example, multi-UAV systems can process tasks in parallel, thereby speeding up the time required to complete the mission).

Autonomy: For single UAV systems, the typical mode of operation is for a pilot on the ground to have direct control of all aircraft systems in real time. For most multi-role UAVs, onboard automation provides controlled flight in accordance with flight plans and other directives.

Cost: By using multiple UAV systems, missions can be completed at lower cost.

Communication needs: Single UAV systems must constantly communicate with ground pilots or infrastructure, while a multi-UAV system has only one specific UAV (the master coordinator) that communicates with the ground and relays messages to other UAVs [7, 11].

Effective reflective surface: for military applications.

In fact, a UAV swarm is a set of aerial robots that work together to achieve a specific goal. Typically, the architecture of using UAVs includes either manual control, i.e., via remote control, or autonomous control via a program in the onboard processor installed on unmanned aerial vehicles [12]. Both control methods require a communication channel. In addition, highly efficient and reliable communication plays an important role in solving the tasks assigned to the UAV swarm, including coordination and cooperation strategies, control mechanisms, safety, mission planning algorithms, and much more.

Considering UAVs in a single flight mode, when each performs its individual task, planning a path for navigation from the starting point to the destination [13], this allows to minimize energy consumption, for a certain period of time and not to encounter obstacles. The efficiency of using aircraft sets the tasks of complex use of aircraft in solving one problem with an increase in the probability of its solution, optimizing the number of aircraft [14]. A method for determining the sequence of movement and different routes of arrival to the target using optical capture [15]. For the tasks of flying unmanned aerial vehicles in an urban environment and a confined space, to solve a formation task [16], machine vision systems are

used as the main source of information. At the same time, for flight modes along a given trajectory and avoiding collisions with obstacles, the accuracy of assessing the external orientation of the UAV is of particular importance.

The next stage of the study is the formation method, which involves uniform distribution of UAVs with a given range and a limited area of monitoring aircraft organized for construction and uniform coverage of the territory in search of the maximum and minimum possible distances between aircraft, so that in the visibility zone the entire territory is covered by monitoring sensors without dead zones. Efficiency is a large coverage of zones. Minus is the limited area of action associated with the operation of UAV sensor systems. With group control, interaction is carried out between individual UAVs in such a way that there is full compliance with their actions, with the tasks assigned to them (it is necessary to resolve issues related to the coordination of actions when performing one task) [17]. That is, the general task must be distributed and defined for each aircraft. When forming navigation, it is necessary to take into account safety - avoiding dangerous rapprochement and collision of UAVs with each other and with other objects (about several tens of meters). Formation of formation in conditions of wind load, significantly affecting the movement of UAVs. At the first stage, the problem of forming a formation using the Hungarian method is solved, and then planning is carried out and implementation of the trajectory movement of the group. The Hungarian method assumes autonomous movement of UAVs with different tasks. The solution was found using a software planner in real time. The research was carried out on drones owned by CollMot Robotics Ltd for further commercialization of the project [18].

The increased detection rate can be reduced by "reducing the dimensions of the aircraft" [19]. Group use of UAVs involves reducing the total area occupied by the UAV, which is achieved by appropriate reorganization of the group to reduce its visibility [20]. Considering the group flight of hypothetical UAVs, a strategy is implemented to prevent collisions between aircraft when forming a formation [21]. This strategy is based on the development of the artificial potential formation method.

The most promising method is a swarm of drones based on the principle of building a bee colony, a flock of birds, ants or a school of fish. This joint common intelligence is focused on the intelligence of each individual drone [22], is not pre-programmed and synchronized and is a collective organism that shares one distributed brain for decision-making and adapts to each other. There is no leader in the swarm, and it can adapt to the entry or exit of any drones from the team. Particular emphasis is placed on the natural algorithm of the swarm method [23]. The issue of aircraft control is also relevant, where a generalized control approach is proposed for solving several typical problems, in particular, the transition from

the use of single UAVs to groups and complexes of aircraft [24]. The choice of a particular group control strategy determines the structural organization of the corresponding UAV group control system [25]. There are centralized, hierarchical (combined) and decentralized group control systems (GCS). Their main advantage is the simplicity of organization.

But we will have to take into account the complexity of organizing the interaction of the group to achieve the final goal in the conditions of a predetermined and dynamically changing environment. The advantage of decentralized systems is high reliability and survivability. A more advantageous option is to use a hierarchical system when it is necessary to manage a large group solving one target task, which can be decomposed into several unrelated (or weakly related) subtasks.

Problems of group use of unmanned aerial vehicles related to the organization of coordinated planning and control, performing various observation tasks. Tasks of control of a group of UAVs for the organization of movement in formation along a given trajectory ensure the most effective achievement of the flight goal. A two-level hierarchical structure of coordinating control of a group of devices is proposed [26].

Conclusion

The article examines the issue of the main methods of flight modes of aircraft in order to identify the most effective solution to problems in the field of monitoring the movement of objects of interest during long flights in remote areas. An assessment of the feasibility of UAV movement methods is made: single flight, swarm method, formation method.

The choice of the terrain research method is correlated with the state of almost complete absence of system determinism. That is, a significant impact of stochastic (probabilistic) systems of influence of the external world on the effectiveness of the applied method is determined. As a dynamic system without regulators, UAVs have unstable indicators in all flight modes.

According to the conducted analysis of the methods of formation of UAVs for work in single and group flights, the optimal option for research and control of objects of interest on the ground is rationally to apply the formation method for light unmanned aerial vehicles. For research of the terrain in small, local areas, the method of single control is more applicable.

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肿瘤疾病的数学三组分模型
MATHEMATICAL THREE-COMPONENT MODEL OF ONCOLOGICAL DISEASE

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摘要。本文开发了一个非线性离散三阶系统，该系统可以对癌症的动态进行建模并同时生成治疗策略。为了找到治疗癌症的策略，采用了一种全新的数学建模方法，该方法基于混沌控制理论的数学方法。由此产生的模型可以分析有助于战胜癌症并使治疗走上可持续康复轨迹的可能性。所开发的模型不仅是有效和充分预测癌症动态的工具。它的主要优点是它模拟了预防措施，可以预防疾病的负面动态。由此产生的数学模型可用作癌症治疗的辅助分析工具。

关键词：癌症，治疗策略，数学建模，混沌控制理论，非线性离散系统。

Abstract. *The article develops a nonlinear discrete third-order system that models the dynamics of cancer and simultaneously generates a treatment strategy. To find a strategy for treating cancer, a fundamentally new approach to mathematical modeling is used, based on mathematical methods of chaos control theory. The resulting model allows analyzing the possibilities that contribute to overcoming cancer and bringing treatment to a sustainable trajectory of recovery. The developed model is not only a tool for effective and adequate forecasting of the dynamics of cancer. Its main advantage is that it models preventive measures that preempt the negative dynamics of the disease. The resulting mathematical model can be used as an auxiliary analytical tool in the treatment of cancer.*

Keywords: *cancer, treatment strategy, mathematical modeling, chaos control theory, nonlinear discrete systems.*

In works [1,2] a system of third-order differential equations was used to model the dynamics of oncological diseases:

$$\begin{cases} \dfrac{dx}{dt} = \mu_1 x(1-z) - \gamma_1 xz \\ \dfrac{dy}{dt} = \mu_2 y(1-y-z) - y(\gamma_2 x + \gamma_3 z) \\ \dfrac{dz}{dt} = (\gamma_1 xz + \gamma_2 xy + \gamma_3 yz)(1-z) \end{cases}$$

Here x is the density of dividing (tumor) cells, y is the density of normal (healthy) cells, z is the density of dead cells at time t; parameters $\mu 1$, $\mu 2$, $\gamma 1$, $\gamma 2$, $\gamma 3$ are positive constants characterizing the rates of cell interaction reactions. Let us consider a discrete analogue of this system

$$\begin{cases} x_{j+1} = x_j + \mu_1 x_j(1 - z_j) - \gamma_1 x_j z_j \\ y_{j+1} = y_j + \mu_2 y_j(1 - y_j - z_j) - y_j(\gamma_2 x_j + \gamma_3 z_j) \\ z_j = z_j + (\gamma_1 x_j z_j + \gamma_2 x_j y_j + \gamma_3 y_j z_j)(1 - z_j) \end{cases} \quad (1)$$

where $j = 0,1,2,\ldots$ Since in practice the disease progression is monitored and samples are taken at discrete points in time, the use of a discrete model is entirely appropriate. The choice of the system parameter values (1) is an independent task and is determined by a specific type of cancer. As an example, let us take the parameter values from [2]

$$\mu 1 = 1.4; \mu 2 = 1.4; \gamma 1 = 0.2; \gamma 2 = 0.1; \gamma 3 = 0.2.$$

From a medical point of view, the most difficult stage of cancer is the advanced stage. For example, such a case corresponds to the initial conditions (2), when the density of dead cells has reached a high level.

$$x_0 = 0{,}003 \; ; y_0 = 0{,}597 \; ; z_0 = 0{,}4. \quad (2)$$

Figure 1 shows the solution of the discrete system (1) with initial conditions (2), which displays the dynamics of an advanced oncological disease. The resulting graphs show the complete disappearance of normal cells and their replacement by dead cells.
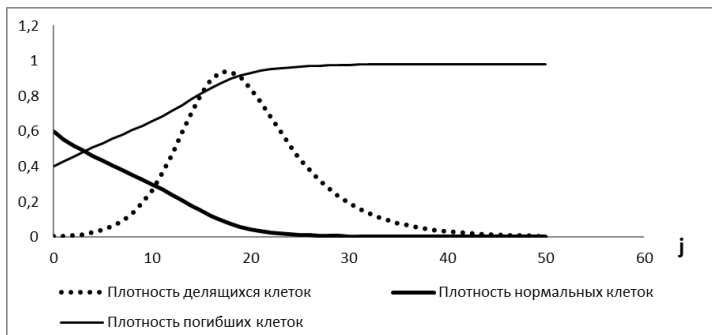
Figure 1. Dynamics of advanced oncological disease

Let us construct a strategy for overcoming advanced oncological disease. From a mathematical point of view, the absence of oncology is characterized by a state when $x_j=0$, $y_j=1$ and $z_j=0$. Substituting the values $x_j=0$, $y_j=1$, $z_j=0$ into the right-hand side of (1) shows that (0;1;0) is a stationary (fixed) point of system (1). Consequently, mathematical modeling of the strategy for treating oncological disease consists in directing the solution of system (1) to a stationary point. To achieve this, it is necessary to introduce control $U(j)=(u_1(j), u_2(j), u_3(j))$, which is capable of bringing any solution of system (1) to a stationary orbit, into system (1). For this purpose, we will use the methods of modern chaos control theory [3,4].

Let us introduce the following notations

$$v_1(j) = x_j;\ v_2(j) = y_j;\ v_3(j) = z_j$$

and we represent system (1) in vector form:

$$v(j+1) = G\big(v(j)\big)\ ; j \in \{0,1,2,\dots\},\qquad (3)$$

where

$$v(j) = \begin{pmatrix} v_1(j) \\ v_2(j) \\ v_3(j) \end{pmatrix};$$

$$G(v(j)) = \begin{pmatrix} v_1(j) + \mu_1 v_1(j)(1 - v_3(j)) - \gamma_1 v_1(j)v_3(j) \\ v_2(j) + \mu_2 v_2(j)(1 - v_2(j) - v_3(j)) - v_2(j)(\gamma_2 v_1(j) + \gamma_3 v_3(j)) \\ v_3(j) + (\gamma_1 v_1(j)v_3(j) + \gamma_2 v_1(j)v_2(j) + \gamma_3 v_2(j)v_3(j))(1 - v_3(j)) \end{pmatrix}.$$

We will show that the suppression of oncological diseases can be achieved by applying the control function $U(j)$ and using a modified system

$$v(j+1) = G\big(v(j)\big) + U(j); j \in \{0,1,2,\dots\}.\qquad (4)$$

Having linearized the system (3) in the vicinity of the fixed point $v\#=(0;1;0)$ and then applied the Pyragas method [5], we obtain a modified system (4), where $U(j)$ is a control function designed to stabilize the behavior of the system's solutions. Based on the results of works [3,4] on the stabilization of discrete systems, we obtain a control function of the following form:

$$U(j) = G(v_\#) - G\big(v(j)\big) + B(v_\#)[v(j) - v_\#] + Q(j)[v(j) - v(j-1)].\quad (5)$$

Here $Q(j)$ – periodic matrix given by the formula:

$$Q(j) = \begin{cases} (kE - B^2(v_\#))(B(v_\#) - E)^{-1}, j = 2n \\ O, j \neq 2n, n \in \{1,2,\dots\} \end{cases},$$

where $-1 < k < 1$, E – is the identity matrix, O is the zero matrix, $B(v_\#)$ – is the Jacobian matrix for the vector function G, $v_\#$ – is a fixed point. For the vector function $G(v)$ under consideration, the Jacobian matrix has the following form:

$$B(v_\#) = \begin{pmatrix} 1 + \mu_1 & 0 & 0 \\ -\gamma_2 & 1 - \mu_2 & -\mu_2 - \gamma_3 \\ \gamma_2 & 0 & 1 + \gamma_3 \end{pmatrix}$$

Let us show that for the negative oncological scenario obtained as a result of solving the problem (1) and (2), the modified system (4) makes it possible to model overcoming cancer and the subsequent recovery process. Having solved the modified system (4) with the initial conditions (2), we obtain the scenario of overcoming oncology, graphically presented in Figure 2.
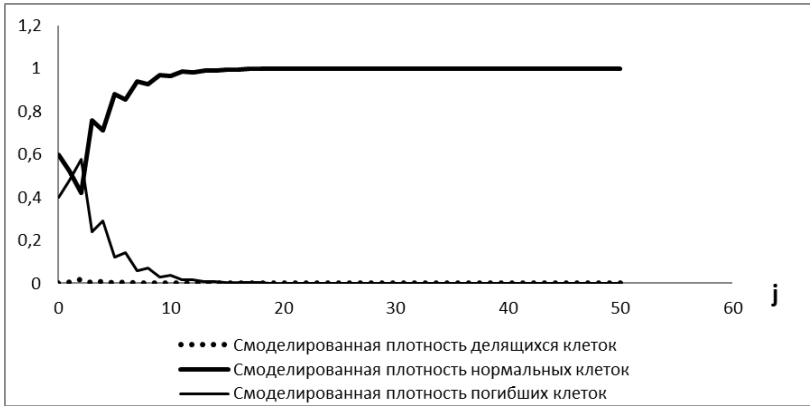
Figure 2. Modeled scenario for overcoming cancer

The strategy for overcoming cancer is determined by the control function $U(j)$, which is explicitly defined by the analytical formula (5). Positive values of the control function indicate the need to increase the density of the cells in question, while negative values require a decrease in the density of these cells. Thus, for the successful implementation of the modeled recovery scenario shown in Figure 2, it is necessary to have drugs and medical procedures that can increase or decrease the densities of dividing, normal, and dead cells at specific points in time in strictly defined amounts.

The article develops a nonlinear discrete system that models the dynamics of cancer and simultaneously generates a treatment strategy. The explicitly obtained mathematical formula for controlling $U(j)$ allows us to determine clear deadlines and the necessary volumes of treatment. At the same time, all operations, drugs, and procedures aimed at treating cancer must be carried out at precisely defined points in time and in strictly standardized volumes.

The methods developed in this article are quite convenient from a practical point of view and are easily adapted to current realities. The discrete system (4) performs the function of simulation modeling and generates various scenarios by varying the parameters. The resulting model allows analyzing the possibilities that contribute to overcoming oncology and bringing treatment to a sustainable recov-

ery trajectory. Thus, the mathematical model developed in the article can serve as an auxiliary analytical tool in the diagnosis, analysis of possible consequences and treatment of oncological diseases. For ease of use, this tool can be automated, since all the obtained formulas are easily programmable.

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防腐石墨烯涂层
ANTI-CORROSION GRAPHENE COATINGS

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摘要。保护金属结构免受腐蚀的常用方法之一是使用油漆和清漆涂层。为了将涂层应用于 08KP 钢，使用了丙烯酸涂料 COLOUR 和石墨烯粉末。结果表明，物质的腐蚀速率取决于缺陷数量、外力作用、温度和吉布斯能。结果表明，如果正确使用，石墨烯涂层是零件上最可靠的防腐涂层。结果表明，08KP 钢 + COLOUR + 石墨烯的腐蚀速率降低了近 22 倍。

关键词：石墨烯、丙烯酸涂料、腐蚀速率、钢、缺陷、温度、吉布斯能。

Abstract. *Among the common methods of protecting metal structures from corrosion is the application of paint and varnish coatings. To apply the coating to steel 08KP, acrylic paint COLOUR and graphene powder were used. It is shown that the corrosion rate of a substance is determined by the number of defects, the work of external forces, temperature and Gibbs energy. It is shown that graphene coatings are the most reliable anti-corrosion coatings on parts when applied correctly. It is shown that the reduction in the corrosion rate for steel 08KP + COLOUR + graphene is almost 22 times.*

Keywords: *graphene, acrylic paint, corrosion rate, steel, defect, temperature, Gibbs energy.*

To combat metal corrosion, Nobel Prize winner K.S. Novoselov proposed using graphene as a very effective anti-corrosion coating due to its chemical inertness and impermeability [1]. The excellent anti-corrosion properties of graphene

served as the basis for a series of experiments by various scientific groups from around the world [2-9].

The purpose of this article is: to synthesize graphene powder, mix it with CO-LOUR paint, apply coatings to steel and test the anti-corrosion properties of this coating

Among the common methods of protecting metal structures from corrosion is the application of paint and varnish coatings (Fig. 1). The most widely used anti-corrosion paint and varnish coatings have the following advantages: ease of application, the ability to apply the coating to virtually unlimited areas of any structure, as well as relative cheapness [10]. To apply the coating to 08KP steel, we used acrylic paint COLOUR and graphene powder obtained by us in [11, 12] (Fig. 2).
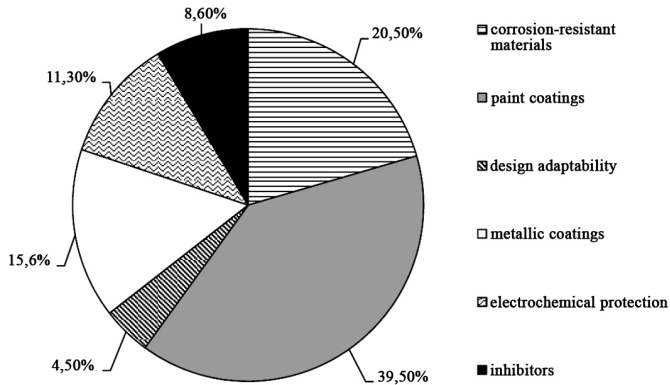
Figure 1. *Methods of protecting metal products from corrosion [10].*

a) *b)*
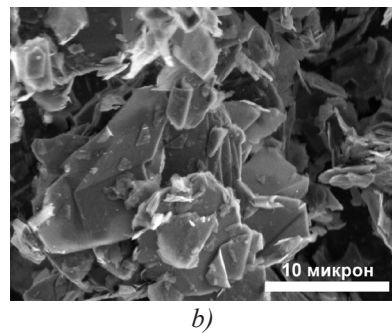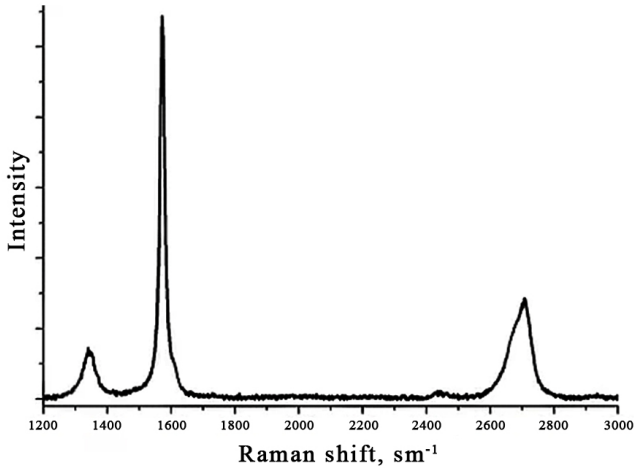
c)

Figure 2. *Graphene powder (a); REM powder (b);*
Raman spectrum of graphene powder

Figure 3 shows the chemical composition and EMF of the coating.
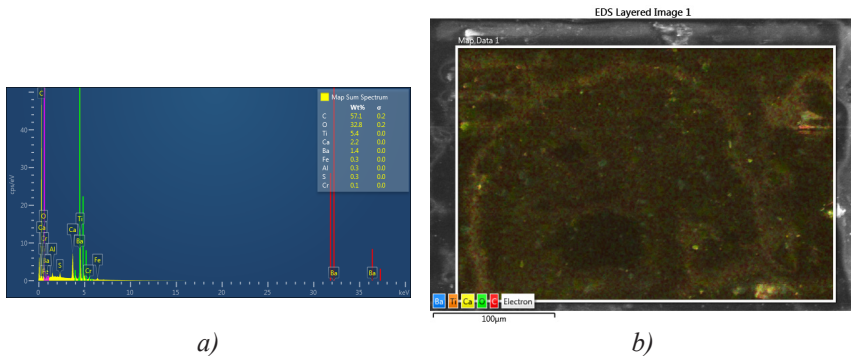
a)   *b)*

Figure 3. *XPS (a) and EDS (b) of 08KP steel with COLOUR/graphene coating*

COLOUR acrylic paint is an emulsion of polyacrylate polymer with the formula $(-CH_2-CH(COOH)-)_n$. The main factor determining the stability of the emulsion and polymer suspension in suspension polymerization is the structural-mechanical barrier created by fine mineral powders that are insoluble in water [13]. Our graphene powder (Fig. 2) is responsible for the stability of the emulsion, creating a uniform polymer film (Fig. 3) with high adhesion on steel. Let us designate the

polymer chain of polyacrylate as C–H and depict the structure of C–H/graphene (Fig. 4).
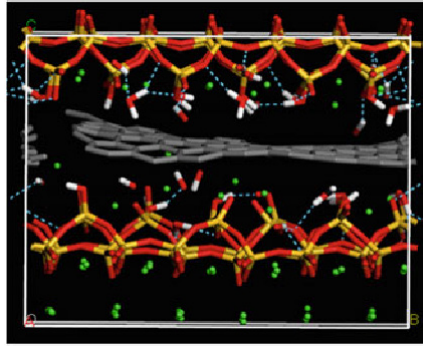
Figure 4. *Structure of C-H/graphene*

From Fig. 4 it is evident that graphene is embedded in the interlayer space of polyacrylate. A similar effect was observed in [14], where the behavior of ultra-high molecular weight polyethylene reinforced with graphene in various compositions of 0, 0.1, 0.5 and 1 wt.% is reported. Reinforcement with graphene leads to a decrease in the friction coefficient due to the slight shear of graphene nanoplatelets and increases wear resistance by more than four times, which is a combined effect of lubrication and strengthening.

If we take the corrosion rate ξ of the coating or metal as the response function from our work [15], we obtain:

$$\xi = \acute{N} \cdot \check{N} \cdot \frac{A}{G^0} \cdot \overline{N}, \tag{1}$$

So, the corrosion rate of a substance is determined by the number of defects N, work A, temperature and Gibbs energy. Let's consider each question separately.

The corrosion rate ξ of a metal is proportional to the temperature T. However, all the quantities included in formula (1) also depend on T. It is usually accepted [16] that $\xi \sim \exp(-1/T) \approx 1 - 1/T \approx T$. The corrosion rate ξ of a metal increases with increasing temperature due to the increase in the number of defects N, due to the increase in oxygen diffusion, etc.

The corrosion rate ξ of a metal increases with the increase in the corrosion work A, which is understood as the work on the diffusion of gases - O_2, CO_2, etc. from the atmospheric air (in nature or in cities); liquids - water (river or sea), alkali or acid solutions (underground mines or pits).

The corrosion rate ξ of a metal increases with the increase in the number of cracks in metal structures due to mechanical stresses in these systems.

Under constant thermodynamic conditions, the Gibbs energy $G^0 = \gamma S$, where γ is the surface energy of the coating or metal (J/m²); S is the surface area (m²). Corrosion resistance $\delta = 1/\xi$ is equal to:

$$\delta = 1/\xi = \tilde{N}_1 \cdot \gamma, \qquad (2)$$

The corrosion resistance of a substance is higher, the greater its surface energy. If we consider that for metals:

$$\gamma = 0,7 \cdot 10^{-3} \cdot T_m \, (J/m^2), \qquad (3)$$

where T_m is the melting point.

The higher the melting point of a metal, the higher its corrosion resistance. The melting point for graphene is $T_m = 4510$ K [17], which is higher than that of diamond $T_m = 4300$ K [18]. This means that graphene coatings are the most reliable anti-corrosion coatings on parts when applied correctly.

The right side of equation (1) is the anti-corrosion barrier that needs to be reduced. From equation (2) it follows:

$$\xi \to \min,$$
$$\delta \to \max. \qquad (4)$$

ASTM B1171 and GOST 9.908-85 require long-term exposure to 5% salt fog at a temperature of 35 ºC. According to this GOST, the mass loss per unit surface area Δm, kg/m², is calculated using the formula:

$$\Delta m = \frac{m_0 - m_1}{S}, \qquad (5)$$

where m_0 is the mass of the sample before testing, kg; m_1 is the mass of the sample after testing and removal of corrosion products, kg; S is the surface area of the sample, m².

The results of testing the surfaces of 08KP steel are shown in Table 1.

Table 1.
Coating corrosion rate

Coating	Coating corrosion, g/m²·t
Steel 08KP, no coating	2,84
Steel 08KP+COLOUR+graphene	0,13

Table 1 shows a decrease in the corrosion rate for steel 08KP + COLOUR + graphene by almost 22 times. This result practically does not change if steel 08KP is replaced by alloyed (anti-corrosion) steel or kept in sea (salt) water. This means that the anti-corrosion property of the part is determined by the surface layer - COLOUR + graphene. Fig. 5 shows an example: rust and application of paint and varnish coatings on ships.

a)

b)

Figure 5. *Rusty ship (a); application of paint and varnish coatings to the vessel.*

Corrosion phenomena in metal structures, especially in the environment, pose both economic and socio-ecological threats to the population of our planet, and to each state in particular. The fight against these processes has not weakened to this day. This article requires further research both in terms of expanding the range of metal products and in terms of research in extreme conditions of their operation.

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可压缩大气平衡柱模型中的周期性脉动热源/热汇
ON A PERIODIC PULSATING HEAT SOURCE/SINK IN THE MODEL OF A COMPRESSIBLE ATMOSPHERIC EQUILIBRIUM COLUMN

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关键词：分析模型、可压缩流体柱、流体柱平衡、非线性方程、气候模型、温度振荡。
Keywords: *Analytical model, column of compressible fluid, equilibrium of the fluid column, nonlinear equation, climatic model, temperature oscillation.*

Paleoclimatic studies show that climatic conditions near the surface change periodically over large time intervals [1]. Historical reconstruction of these conditions shows that they pulsate quasi-periodically, showing periods of warming followed by periods of cooling.

In [2], periodic temperature oscillations over time for an unbounded column of compressible atmosphere are described based on a simplified one-dimensional aerodynamic model. In deriving the model, two conditions of equilibrium of the air column are used: the classical condition of hydrostatics and the second – the absence of motion due to changes in atmospheric density over time. These two conditions are expressed by the equation for the compressible adiabat T

$$\frac{\partial^2 T}{\partial t^2} - \frac{\gamma}{\gamma-1}\frac{1}{T}\left(\frac{\partial T}{\partial t}\right)^2 = c^2\left(\frac{\partial^2 T}{\partial z^2} + \frac{1}{\gamma-1}\frac{1}{T}\left(\frac{\partial T}{\partial z}\right)^2\right) + g\frac{\partial T}{\partial z} + (\gamma-1)T\frac{\partial g}{\partial z}, \quad (1)$$

where z – vertical coordinate measured upward from the surface, t – time, $\gamma = 1,4$, g – acceleration of gravity, taken as constant, $c^2 = \gamma R_a T$ square of the speed of sound. In [2, 3] the criterion for the necessity of taking into account the compressibility of air when describing an atmospheric column with a height of more than 12 km and the use of simplifications are also discussed.

The solution for the adiabat T is a time-pulsating dependence, reflecting the long-period influence of nonlinearity in the left-hand side of equation (1), in which

the adiabat periodically increases indefinitely at the moment of pulsation and then decreases. The time dependence has the form:

$$T(z,t) = T_S \left[\cos^2\left(t\sqrt{\frac{\lambda_T}{\gamma-1}}\right)\right]^{-\frac{\gamma-1}{2}} f(z), \qquad (2)$$

where $f(z)$ – continuous positive function of height, λ_T – constant, $T(z,t=0) = T_S(z)$ – initial condition, which is chosen at some point in time, for example, corresponding to the minimum values of expression (2). It is easy to show that λ_T is not equal to zero, since there must be arbitrariness in the choice of the initial point in time.

Solution (2) has a long-period time dependence associated with a small positive parameter λ_T. One of the possibilities to estimate the parameter λ_T – is a historical reconstruction of periodic changes in climatic conditions near the planet's surface. According to geochronological data [1], in the past there were periodic cooling and subsequent warming of the atmosphere. If we estimate λ_T based on the chronology of these events, a time interval of 350 years corresponds to the value $\lambda_T \approx 10^{-19}\,c^{-2}$. A time interval of ten thousand years corresponds to the value $\lambda_T \approx 10^{-22}\ c^{-2}$.

Solution (2) does not contain an imaginary part, is real, positive and continuous in height and time. The adiabat T value periodically reaches infinite values in time. The adiabat T itself is not an instrumentally measurable quantity, and its derivatives with respect to time and the vertical coordinate have a physical meaning. Fig. 1.a shows the dependence of the adiabatic temperature (1) on time, demonstrating periodic pulsations that can be separated by a period of time of hundreds of years or more, depending on the parameter λ_T.
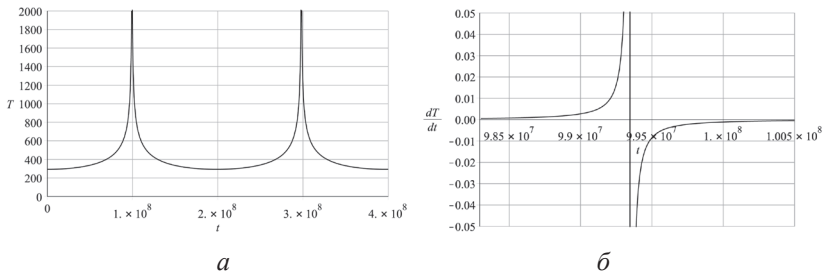
Figure 1. *Adiabatic temperature (a) and its time derivative (b) at $\lambda_T \approx 10^{-16}\,c^{-2}$. Temperature values are expressed in degrees Kelvin, time in seconds, the start of time and the period of oscillations are chosen arbitrarily.*

The rate of change of the adiabat T (the value $\partial T/\partial t$) is a source in the heat conductivity equation that determines the absolute temperature [2]. And this is one of the physical meanings of the adiabat (2). Figure 1.b shows the dependence

of the time derivative of the adiabat (2) at the moment of pulsation, where it is evident that the source remains practically zero most of the time and increases at an ever-increasing rate as it approaches the singular point. At the oscillation point, the sign of the first derivative of the adiabat with respect to time changes to the opposite (from $+\infty$ to $-\infty$), while the value of the source is undefined, since its value is simultaneously equal to both $+\infty$ and $-\infty$. In this sense, the behavior of the source is not singular at the pulsation point, and it can take any value between $+\infty$ and $-\infty$. To the right of the singular point, the source turns into a heat sink, initially quite powerful, since it is negative, and continues to increase monotonically to zero at a decreasing rate. The behavior of solution (2) shows that both the heating of the entire atmospheric column and the acceleration of this heating over time are endogenous properties of the compressible atmosphere, and solution (2) may prove to be a useful tool in analyzing paleoclimatic measurement data. The equation for absolute temperature contains many heat sources/sinks that are not taken into account in these calculations, such as the heat of evaporation/condensation of water, which can significantly smooth out the behavior of absolute temperature at the moment of pulsation.

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月球小卫星为新生地球上水和空气壳的形成提供数学证据

MATHEMATICAL EVIDENCE FOR THE FORMATION OF WATER AND AN AIR SHELL ON THE NASCENT PLANET EARTH FROM A SMALL SATELLITE OF THE MOON

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摘要。本文致力于从数学角度证明新生的地球由月球的一个小卫星形成水和气层，在演化过程中，它们在引力和自由落体加速度的帮助下结合成一个单一的物质体，而且这一证明得到了先前物理定律和现代科学发现的证实。这些证据包括由太阳表面发出的"以太"形成的外层空间物质、太阳自由落体的加速度、新生的地球自由落体的加速度、月球的小卫星和大卫星自由落体的加速度、太阳在宇宙空间中的运动机制以及太阳系行星沿椭圆轨道运动的机制。这一理论证实了引力变化与恒星表面到太阳系行星或其卫星表面的距离变化之间的数学关系，这取决于物质体的活动与位于太阳系空间的两个物质体之间的新引力定律相互作用。这一假设最初是由法国科学家、博物学家、生物学家、数学家和博物学家乔治•路易•布丰提出的，目前已得到现代数学证据的证实，新的科学发现证实了新生的地球上的水和气体壳层来自月球的一个小卫星，这让我们有机会观察在太阳系内部热物质体形成行星及其卫星的早期阶段发生的自然物理现象。

关键词：地球上水的形成、地球上空气壳的形成、宇宙以太、两个物体之间的引力定律、天体物理学。

Abstract. The article is devoted to mathematical proofs of the formation of water and an air shell on the nascent planet Earth from a small satellite of the Moon, which in the process of evolution with the help of gravitational forces and acceleration of free fall were integrated into a single material body, moreover, this proof is confirmed by previous laws of physics and modern scientific discoveries. The proof includes the substance of outer space formed from the "ether" emanating from the surface of the Sun, the acceleration of free fall of the Sun, the acceleration of free fall of the nascent planet Earth, the acceleration of free fall of a small and large satellite of the Moon, the mechanism of movement of the Sun in the space of the Universe and the mechanism of movement of the planets of the Solar system along an elliptical orbit. This theory confirms the mathematical relationship between the change in gravitational forces and the change in the

distance from the surface of our star to the surface of the planets of the Solar system or its satellites depending on the activity of material bodies interacting with the new law of gravitation between two material bodies located in the space of the Solar system. This hypothesis was originally put forward by the French scientist, naturalist, biologist, mathematician and naturalist Georges-Louis Buffon and is currently confirmed by modern mathematical evidence, new scientific discoveries confirming the emergence of water and a gas shell on the nascent planet Earth from a small satellite of the Moon, giving the opportunity to look at the physical phenomena of nature that occurred at the early stage of the formation of planets and their satellites from hot material bodies inside the Solar system.

Keywords: formation of water on planet Earth, formation of an air shell on planet Earth, cosmic ether, laws of gravitation between two bodies, astrophysics.

Since ancient times, mankind has tried to study the world that surrounds us. People have always been interested in the internal structure of the emergence of the Earth and its satellite the Moon in the Solar system and our Universe. These are the questions that have worried purposeful people for more than one century. Many legends and predictions of various peoples of the world and numerous cosmological theories of the formation of the planets of the Solar system, the formation of the Moon and many hypotheses that the emerging planet Earth in its early development had two Moons of different sizes have survived to this day. However, we will highlight only one hypothesis that can be proven by known and new laws of physics on the formation of water and a gas shell on the emerging planet Earth.

I believe that the hypothesis of Georges Buffon is more plausible, which lends itself to logical understanding and which can be proven by Newton's third law and new laws of physics.

The French scientist, naturalist, biologist, mathematician and naturalist Georges-Louis Leclerc, Count de Buffon, suggested that our Earth was formed as a result of a catastrophe. Once upon a time, a huge comet crashed into the Sun, causing numerous splashes consisting of solid and gaseous material particles to fly apart. Subsequently, these splashes began to cool, where the largest particles formed planets, including the planet Earth, and their satellites formed from gas splashes.

Moreover, even in modern times, astronomers of the Paris Observatory and the Institute of Astrophysics of Andalusia have discovered the largest comet. The diameter of comet 2014 UN271 was equal to 140 kilometers.

Let's not abstract ourselves from this cosmic catastrophe that took place several billion years ago, but we will conduct a systematic analysis of the mechanism of formation of the planets of the Solar system and their satellites from hot solid and gaseous material particles that scattered in space from this impact, with specific mathematical evidence that we will present in a popular science form for clarity.

In my opinion, at the early stage of development of the planets of the Solar system consisting of hot material bodies and their satellites consisting of gas shells, there were two Moons of different diameters on planet Earth. One Moon of a smaller diameter, due to the forces of gravity and the acceleration of free fall of bodies in space, united with the hot material body of the planet Earth. Then, with the help of chemical reactions of combination, decomposition, substitution, exchange and thermonuclear reactions, which occur only at temperatures reaching several million degrees, they formed an air shell and water, which gave life to our planet.

It is necessary to emphasize that all stars of our Universe, when they disintegrate, release "ether", which, when moving away from the surface of the star, cools down and turns into the substance of outer space.

The mass of "ether" or the substance of outer space can only be determined by the constant of the substance of outer space using new and proven laws of physics, as well as mathematically prove and confirm the postulates of the greatest English scientist, physicist, mathematician, astronomer and thinker Isaac Newton.

It is necessary to emphasize that inside the "ether" or the substance of outer space, electrically charged particles are connected to each other by the forces of interaction of two point charges located in space. Now the word corpuscle, which was proposed by Isaac Newton, can be supplemented with modern words and expressions, such as molecule, atom, photon, electron, neutrino, meson, quark, antiquark, pion, kaon, tetroquark, hadron, proton, neutron and so on... However, the percentage ratio of all substances, their quantity and combination included in the substance of outer space and "ether", which are constantly transformed during their movement, no one will ever know, since we still do not know well how our microworld is structured and interacts with each other. The new physical quantity that determines the substance of outer space was popularly described in the scientific and practical journal "Higher School" No. 18 for 2017, page 27. Publishing house "Infinity", city of Ufa. At present, the "ether" and substance of outer space have their own density, which is currently = 0.31260053456501934429716951029 kg/m^3.

If you extract the solid mass from one cubic meter of the substance of outer space and distribute it over an area, you will get a film less than one micron thick.

In the application for invention No. 2005129781/06 (033405) dated September 28, 2005 and the application for invention No. 2005140396/06 (033405) dated December 26, 2005, the mechanisms of formation of the planets of the Solar system in outer space from hot material bodies separated from the surface of the Sun were described in detail. All discovered mechanisms of formation of the planets of the Solar system are subject to the laws of nature and provide an opportunity to learn and take a new look at the existence of previously unknown properties and phenomena of the material world, which include:

- the mechanism of formation and production of thermoelectricity in the sphere of a material body located in space,

- the mechanism of formation and production of a magnetic field in the sphere of a material body located in space,

- the mechanism of formation of magnetic poles in the sphere of a material body located in space,

- the mechanism of starting and beginning the rotation of the magnetic system in the sphere of a material body located in space, counterclockwise, using the planet Earth as an example,

- the mechanism of placement of the planets of the Solar system, which have a magnetic field, in one plane of outer space,

- the mechanism of autonomous rotation of the magnetic system in the sphere of a material body located in space, counterclockwise, using the planet Earth as an example,

- the mechanism of starting and beginning the rotation of the magnetic system in the sphere of a material body located in space, clockwise, using the planet Venus as an example,

- the mechanism of autonomous rotation of the magnetic system in the sphere of a material body located in space, clockwise arrow, using the planet Venus as an example,

- the mechanism of formation of gravitational forces, interaction and reaction,

- the mechanism of formation of volcanic activity on planet Earth,

- the mechanism of formation of geopathogenic zones on planet Earth,

- the mechanism of formation of tsunamis and tornadoes on planet Earth,

- the mechanism of formation of earthquakes on planet Earth and etc...

It is necessary to especially emphasize that the mechanism of formation of acceleration of free fall of bodies in space, Fig. 1, on any planet of the Solar system consists of force 1 formed from rotation of the outer shell 2 in one direction and rotation of the inner part of the core 3 in the opposite direction as on planet Earth. In this case, the inner part of the core 3 can be motionless as on the Sun and then the force of acceleration of free fall of bodies in space will be directed at an angle to the outer shell or vice versa as on the Moon where the outer shell is motionless, and its inner part is in constant motion.
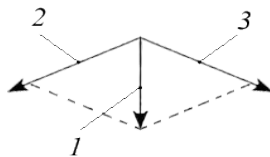

Figure 1.

For example, on planet Earth, the outer shell 2 rotates in one direction, and the inner part of the core 3 rotates in the other direction. When the outer shell of our planet rotates in one direction and the inner part of the core in the other direction, the acceleration of free fall of bodies in space 1 is created.

However, it should be especially emphasized that in addition to the created acceleration of free fall of bodies in space on planet Earth, the mass of the air column acts on any material body located on the surface of our planet.

Moreover, when the measuring instrument is removed from the surface of our planet upward, the acceleration of free fall of bodies in space decreases, but if the measuring instrument is moved deeper into our planet, then the acceleration of free fall of bodies in space increases. The acceleration of free fall of bodies in space on planet Earth was formed from a hot material body and is proven by a specific law, which was set out in the scientific and analytical journal "Scientific Observer" No. 1 (25) for 2013, pages 68-73. Publishing house "Infinity", city of Ufa.

The law of acceleration of free fall of bodies in space was formulated as follows:

The modulus of acceleration of free fall of bodies in space is equal to the square of the sums of the vector of the rotation speed of the outer shell of a material body in one direction and the vector of the rotation speed of the inner part of a material body in the opposite direction, along the midline of the intermediate layer divided by the difference between the radius of the outer shell of a material body and the radius of the inner part of a material body, along the midline of the intermediate layer plus the sum or difference of the measurement of the distance up or down from the surface of the outer shell of a material body.

$$ g = \frac{(V_{эк} + Vnc)^2}{R_э - Rnc + h} = \frac{(м/с + м/с)^2}{м} = \frac{м^2}{м \cdot с^2} = \frac{м}{с^2} $$

where:

g - modulus of acceleration of free fall of bodies in space, m/s²

V эк - speed of rotation of the outer shell of a material body around the circumference of the equator counterclockwise, m/s

V пс - speed of rotation of the inner part of a material body along the midline of the intermediate layer, m/s

h - positive height or negative depth of measurement from sea level at the equator to the surface of the outer shell of a material body, m

R пс - radius of the inner part of a material body, m

R э - radius of the outer shell of a material body, m.

For example, according to the law of acceleration of free fall of bodies in space, we determine the modulus of acceleration of free fall of bodies at the equator of planet Earth.

$$g = \frac{(V_{эк} + Vnc)^2}{R_э - Rnc + h} = \frac{(м/c + м/c)^2}{м} = \frac{м^2}{м \cdot c^2} = \frac{м}{c^2}$$

$$g = \frac{(465,10330531127327\,м + 458,74092754269918\,м)^2}{6378160\,м - 6290910\,м + 0\,м} = 9,7820993304016607517746568\,м/c^2$$

where:

g - gravity acceleration module on planet Earth, m/s²

h - altitude above sea level at the equator of planet Earth = 0 m

R э - radius of the outer part of the shell of planet Earth = 6378160 m

R пс - radius of the inner part of planet Earth to the midline of the intermediate layer = 6290910 m

V эк - speed of rotation of the outer shell of planet Earth around the circumference of the equator counterclockwise = 465.10330531127328447687882460188 m/s

V сп - speed of rotation of the inner core of planet Earth along the midline of the intermediate layer = 458.74092754269918253045420097272 m/s.

It is necessary to emphasize that when moving away from the surface of the Earth of a material body, the modulus of acceleration of free fall of bodies in space decreases proportionally, and when approaching the middle line of the intermediate Belashov layer, the modulus of acceleration of free fall of bodies in space increases proportionally. For example, according to the law of acceleration of free fall of bodies in space, we will determine the modulus of acceleration of free fall of bodies in space near the surface of the large Moon at an average distance from the surface of the formed planet Earth.

$$g = \frac{(V_{эк} + Vnc)^2}{R_э - Rnc + h} = \frac{(м/c + м/c)^2}{м} = \frac{м^2}{м \cdot c^2} = \frac{м}{c^2}$$

$$g = \frac{(465,10330531127327\,м + 458,74092754269918\,м)^2}{6378160\,м - 6290910\,м + 384043625\,м} = 0,0022235674593090501105827\,м/c^2$$

where:

g - gravity acceleration module on planet Earth, m/s²

h - height from the surface of planet Earth to the surface of the Moon = 384043625 m

R э - radius of the outer part of the shell of planet Earth = 6378160 m

R пс - radius of the inner part of planet Earth to the midline of the intermediate layer = 6290910 m

V эк - speed of rotation of the outer shell of planet Earth along the circumference of the equator counterclockwise = 465.10330531127328447687882460188 m/s

V пс - speed of rotation of the inner core of planet Earth along the midline of the intermediate layer = 458.74092754269918253045420097272 m/s.

For example, according to the law of acceleration of free fall of bodies in space, we will determine the modulus of acceleration of free fall of bodies at the equator of the hot nascent planet Earth, which has an outer solidified shell 1000 meters thick.

$$g = \frac{(V_{эк} + V_{пс})^2}{R_э - R_{пс} + h} = \frac{(м/с + м/с)^2}{м} = \frac{м^2}{м \cdot с^2} = \frac{м}{с^2}$$

$$g = \frac{(465,103305311273 \, м + 0,00 \, м)^2}{6378160 \, м - 6377160 \, м + 0 \, м} = 216,3210846114714918336941 \, м/с^2$$

where:

g - modulus of acceleration due to gravity, m/s²

h - height above sea level at the equator = 0, m

R э - radius of the outer part of the material body = 6378160 m

R пс - radius of the inner part of the material body to the midline of the intermediate layer = 6377160 m

V эк - rotation speed of the outer shell of the material body around the circumference of the equator counterclockwise = 465.10330531127328447687882460188 m/s

V пс - rotation speed of the inner part of the material body = 0.00 m/s

From these calculations, we conclude that the acceleration of gravity of bodies in space near the surface of the Moon created by the formed planet Earth is 0.0022235674593090501 m/s², which is two and a half times greater than the acceleration of gravity created by the Sun bodies in space = 0.00083675979083361204013377926 m/s².

The magnetic field of the Sun, its rotation and the formation of the acceleration of free fall of bodies in space around it were popularly described in the information and analytical journal "Actual Problems of Modern Science", No. 6 (129) for 2022, pages 13-19. Publishing house "Sputnik +", Moscow.

However, there are many other mechanisms of interaction between the Sun, planet Earth and its satellite the Moon, where we will prove with specific examples that the Moon is a gas satellite of our planet and has an acceleration of free fall of bodies in space 3.67 times greater than on planet Earth, which is fully confirmed by new laws of physics.

To begin with, according to existing and proven laws of physics, we will determine the mass and average density of planet Earth. Let us determine the volume of a cylinder with a cosmic substance having the area of a circle of the planet Earth, between the surface of the Sun and the surface of the planet Earth located at an average distance from the surface of the Sun.

$$V = П \cdot r^2 \cdot h$$

$$V = 3,14159265358979323846264338327950 \cdot 6378100 \, м^2 \cdot 149500000000 \, м = 19106173341356616146930089,016221 \, м^3$$

where:

V - volume of the cylinder with the cosmic substance, m³

r - average equatorial radius of the planet Earth = 6378100 m

h - height of the cylinder between the Sun and the planet Earth = 149500000000 m

П - ratio of the length to its circumference = 3.14159265358979323846264 33832795.

Let us determine the mass of the cosmic substance located between the surface of the Sun and the surface of the planet Earth located at an average distance from the surface of the Sun.

$$m\,к = V \cdot P\,к$$
$$m\,к = 19106173341356616146930089{,}016 \text{ м}^3 \cdot 0{,}312600534565019342971 \text{ кг/м}^3$$
$$= 5972600000000000000000000{,}0025357 \text{ кг}$$

where:

m k - mass of the substance of outer space, kg

P k - density of the substance = 0.312600534565019342 9716951 kg/m³

V - volume of the cylinder with the substance = 19106173341356616146930 089.016221 m³.

Based on Newton's third law, the force of action of one medium consisting of the substance of outer space acts on another medium consisting of the gravitational force of the planet Earth located in the space of the Solar system must be equal in magnitude and opposite in direction.

$$F\,тc = - F\,тco$$
$$5{,}9726 \times 10^{24} \text{ H} = - 5{,}9722 \times 10^{24} \text{ H}$$

where:

F тc - the force of the substance of cosmic space = $5{,}9726 \times 10^{24}$ H

F тco - the force of gravity of the planet Earth to the surface of the Sun = $5{,}9722 \times 10^{24}$ H.

Let's determine the volume of planet Earth.

$$V_з = \frac{4 \cdot П \cdot r^3}{3}$$

V з = [4 · 3,1415926535897932384 · 6378100 м³] : 3 = 1086832411937628837875,0037971403 м³

where:

V 3 - the volume of the planet Earth, m³

r - the average equatorial radius of the planet Earth = 6378100 m

П - the ratio of the length to its circumference = 3.14159265358979323846264338.

Knowing the mass and volume of the planet Earth, we can determine the average density of our planet.

$$P_{\text{з}} = \frac{m_{\text{з}}}{V_{\text{з}}}$$

Р з = 5972600000000000000000000,002 кг : 108683241193762883785,003 м³
= 5495,4194725863178424140909397748 кг/м³

where:

Р з - average density of planet Earth, kg/m³

m з - mass of planet Earth = 5972600000000000000000000.0025357 kg

V з - volume of planet Earth = 108683241193762883785.0037971403 m³.

It should be especially emphasized that to determine the mass and density of the large Moon, it is necessary to calculate the substance of the space between two measured material bodies located in space. Further, to determine the acceleration of free fall of bodies in space on the large Moon, it is necessary to choose one of the two quantities, where not only the force of gravity is greater, but also the acceleration of free fall of bodies in the space between two measured material bodies. In this case, the planet Earth has more influence on the big Moon with its mechanism of gravity and acceleration of free fall of bodies in space by two and a half times than the force of gravity and acceleration of free fall of bodies between the surface of the planet Earth and the surface of the Sun.

Let us determine the volume of a cylinder with a cosmic substance having the area of a circle of the big Moon, between the surface of the planet Earth and the surface of the big Moon located at an average distance from the surface of the planet Earth.

$$V = \Pi \cdot r^2 \cdot h$$

V = 3,14159265358979323 · 1737000 м² · 384043625 м =
364024043955889816584,59623328 м³

where:

V - volume of the cylinder with the cosmic substance, m³

h - height of the cylinder with the cosmic substance from the surface of the big Moon to the surface of planet Earth = 384043625 m

r - average equatorial radius of the big Moon = 1737000 m

Π - ratio of the length to its circumference = 3.141592653589793238462643 3832795.

Let's mentally imagine a cylinder with a diameter from the surface of the big Moon to the surface of planet Earth, inside which is located the mass of the substance of cosmic space.

Let's determine the mass of the substance of cosmic space, which should be equal to the mass of the gas mixture of the big Moon.

$$m_{\text{л}} = V \cdot p$$

364024043955889816584,5962332804 м³ · 0,3126005345650193429716951 kg/m³
= 113794110735131255211 9,3278798377 kg

where:

m l - mass of the substance of outer space, kg

V - volume of the cylinder with the substance of outer space = 364024043955889816458459 m³

p k - density of the substance of outer space = 0.31260053456501 kg/m³.

Let's determine the volume of the large Moon.

$$V_{_\text{Л}} = \frac{4 \cdot \Pi \cdot r^3}{3}$$

Vл = (4 · 3,1415926535897932384 · 1737000 m³) : 3 = 21952706175030006419,655904654783 m³

where:

Vл - volume of the Moon, m³

r л - average equatorial radius of the large Moon = 1737000 m³

Π - ratio of length to its circumference = 3.14159265358979323846264338332795.

Let's determine the total density of the large Moon

$$p_{_\text{Л}} = \frac{m_{_\text{Л}}}{V_{_\text{Л}}}$$

p л = 11379411073513125521193278798377 кг **:** 21952706175030006419,65590465478 m³ = 51,836028700901479563889489989583 kg/m³

where:

p l - average density of the big Moon kg/m3

m k - mass of cosmic substance = 11379411073513125521193278798377 kg

Vл - volume of the big Moon = 21952706175030006419.655904654783 m3.

Let's imagine that at the early stage of development, the planet Earth had two satellites - the big Moon and the small Moon, which was four times smaller than the big Moon and had an average equatorial radius = 434250 m

Let's determine the volume of the ball of the small Moon.

$$V_{_\text{Л}} = \frac{4 \cdot \Pi \cdot r^3}{3}$$

V = (3,14159265358979323 · 434250 м³ · 4 м) : 3 = 34301103398484385030712351023099 m³

where:

V - the volume of the sphere of the small Moon, m³

r - the average equatorial radius of the small Moon = 434250 m

Π - the ratio of the length to its circumference = 3.14159265358979323846264338332795.

Let us assume that the density of the small Moon corresponds to the density of the large Moon.

$$m_{л} = P_{л} \cdot V_{л}$$

51,8360287009014795638894898 9583 кг/м³ · 343011033984843850,3071235 1023099 m³

= 17780329802364258626,864498122464 kg

where:

m к - mass of the small Moon, kg

Vл - volume of the small Moon = 343011033984843850.30712351023099 m³

p л - average density of the large Moon = 51.836028700901479563889489 89583 kg/m3 .

Let's determine the distance from the small Moon to the surface of the un-formed planet Earth.

$$V = \Pi \cdot r^2 \cdot h \quad \text{where} \quad h = V : \Pi \cdot r^2$$

h = 343011033984843850,30712351023 м³ : (3,141592653589793238 · 434250 m²) = 579000 m

where:

V - volume of the small Moon = 343011033984843850.30712351023099 m³

h - distance from the surface of the small Moon to the surface of planet Earth, m

r - average equatorial radius of the small Moon = 434250 m

Π - ratio of the length to its circumference = 3.1415926535897932384626433832795.

It is necessary to especially emphasize that the planets of the Solar system are held in their orbits by a new law for determining the distance from the surface of the Sun to the surface of the planets of the Solar system, which was discovered and popularly presented in the scientific and practical journal "Higher School" No. 17 for 2018, page 49. Publishing house "Infinity" city of Ufa and is formulated as follows: The distance from the surface of the Sun to the surface of the planets of the Solar system is directly proportional to the acceleration of free fall of bodies in the space of the measured material body by the diameter of the measured material body and inversely proportional to the acceleration of free fall of bodies around the Sun.

$$L_u = \frac{g_u \cdot D_u}{g_c} = \frac{M}{c^2} \cdot \frac{c^2}{M} \cdot \frac{M}{M} = M$$

where:

L и is the distance from the surface of the Sun to the surface of the planet being studied, m

g и is the acceleration of free fall of bodies in space on the planet being studied, m/s²

g c is the acceleration of free fall of bodies around the Sun, m/s²

D и is the diameter of the planet being studied, m.

Knowing the diameter of the measured planet in the Solar system and the distance from the surface of the Sun to the surface of the measured planet in the Solar system, we can determine the modulus of the acceleration of free fall of bodies in space on this planet.

For example, according to the new law, we will determine the modulus of the acceleration of free fall of bodies in space on the planet Earth, which is located at an average distance from the surface of the Sun.

$$g_{\text{з}} = \frac{L \cdot g_c}{D_{\text{з}}} = \frac{\text{м}}{} \cdot \frac{\text{м}}{c^2} \cdot \frac{}{\text{м}} = \frac{\text{м}}{c^2}$$

$$g_{\text{з}} = \frac{149500000000,000 \, \text{м} \cdot 0,000836759790836 \, \text{м/c}^2}{12756200 \, \text{м}} = 9,80665000000 \, \text{м/c}^2$$

where:

g з - acceleration of free fall of bodies in space on planet Earth, m/s²

g c - acceleration of free fall of bodies in space around the Sun = 0.00083675979083612040133779264214 m/s²

D з - diameter of planet Earth = 12756200 m

L - distance from the surface of the Sun to the surface of planet Earth = 149500000000 m.

Knowing the diameter of the Moon's satellite and the distance from the surface of the Sun to the surface of the Moon, we can determine the modulus of the acceleration of free fall of bodies on the large Moon.

For example, we will determine the modulus of the acceleration of free fall of bodies in space on the large Moon, a satellite of planet Earth, which is located at an average distance from the surface of the Sun.

$$g_{\text{л}} = \frac{L \cdot g_c}{D_{\text{л}}} = \frac{\text{м}}{} \cdot \frac{\text{м}}{c^2} \cdot \frac{}{\text{м}} = \frac{\text{м}}{c^2}$$

$$g_{\text{л}} = \frac{149500000000 \, \text{м} \cdot 0,00083675979083612040133779264214 \, \text{м/c}^2}{3476280 \, \text{м}} = 35,98547548816551 \, \text{м/c}^2$$

where:

g л - acceleration of free fall of bodies in space on the Moon, m/s²

g c - acceleration of free fall of bodies in space around the Sun = 0.00083675979083612040133779264214 m/s²

D л - diameter of the satellite of the big Moon = 3476280 m

L - distance from the surface of the Sun to the surface of planet Earth = 149500000000 m.

For example, we will determine the modulus of acceleration of free fall of bodies in space on the small Moon, a satellite of the nascent planet Earth, which is at an average distance from the surface of the Sun.

$$g_{\text{л}} = \frac{L \cdot g_c}{D_{\text{л}}} = \frac{\text{м}}{} \cdot \frac{\text{м}}{c^2} \cdot \frac{}{\text{м}} = \frac{\text{м}}{c^2}$$

$$g_{\text{л}} = \frac{149500000000 \text{ м} \cdot 0{,}0008367597908361204013377926421 4 \text{ м/}c^2}{868500 \text{ м}} = 144{,}0363715947035 \text{м/}c^2$$

where:

g л - acceleration of free fall of bodies in space on the small Moon, m/s²

g c - acceleration of free fall of bodies in space around the Sun
= 0.0008367597908361204013377926421 4 m/s²

L - distance from the surface of the Sun to the surface of the nascent planet Earth = 149500000000 m

D л - diameter of the satellite of the small Moon = 868500 m.

The acceleration of free fall of bodies in space around the large and small Moon was calculated using a new law published in the scientific and practical journal "Higher School" No. 18 for 2018, pages 61-67. In the scientific article, it was proven that the sphere of the Moon consists of a solid shell of frozen gas, which is covered with cosmic dust (the substance of outer space). It is difficult to determine the internal composition of the gas from the average density of the Moon, since the total density of the Moon is 51.8360287009014795638894898 95 kg/m3. The gas inside the sphere of the large and small Moon can consist of many chemical components. Even gas mixtures consisting of helium and hydrogen can create the outer sphere of the Moon and remain in a solid state at the temperature of outer space - 270.45 ºC. Inside the solid shell, the gas mixture with particles of cosmic dust is in constant motion, since one side of the Moon is constantly heated. The sunny side of the Moon can warm up to a temperature of +107 ºC, and the side of the Moon in the shadow can have a temperature of -268.9 ºC, which makes the gas mixture inside the sphere of the Moon constantly rotate with the help of natural convection, in which internal energy is transferred by jets and flows of gas and occurs spontaneously in the substance when it is unevenly heated in the gravitational field. When the gas mixture rotates inside the sphere, the acceleration of free fall of bodies in space is created, which exceeds the Earth's by 3.67 times, which is fully confirmed by the new law of physics. Next, we will determine the gravitational force between the planet Earth and the large satellite Moon according to the law of gravitation between two material bodies located in the space of the Solar (or other) system, which was formulated as follows: The gravitational force

between two material bodies located in the space of the Solar system is equal to the sum of the product of the mass of the first material body by the modulus of the acceleration of free fall of the first material body, the product of the mass of the second material body by the modulus of the acceleration of free fall of the second material body and the product of the square of the distance from the surface of the first material body to the surface of the second material body, and is inversely proportional to the product of the distance from the surface of the Sun to the surface of the first material body and the distance from the surface of the Sun to the surface of the second material body.

$$F_{TC} = \frac{[(m_1 \cdot g_1) + (m_2 \cdot g_2)] \cdot L_M^2}{L_{c1} \cdot L_{c2}} = \frac{H \cdot M^2}{M^2} = H$$

where:

F тс - the gravitational force between two material bodies located in the space of the Solar (or other) system, N

L м - the distance from the surface of the first material body to the surface of the second material body, m

L c 1 - the distance from the surface of the Sun to the surface of the first material body, m

L c 2 - the distance from the surface of the Sun to the surface of the second material body, m

g 1 - the modulus of the acceleration of free fall of the first material body, m/s²

g 2 - the modulus of the acceleration of free fall of the second material body, m/s²

m 1 - the mass of the first material body, kg

m 2 - the mass of the second material body, kg.

According to the law of gravitation between two material bodies that are located in the space of the Solar system, one can determine the gravitational force of the large Moon to the formed planet Earth.

$$F_{TC} = \frac{[(m_3 \cdot g_3) + (m_Л \cdot g_Л)] \cdot L_M^2}{L_{c3} \cdot L_{cЛ}} = \frac{H \cdot M^2}{M^2} = H$$

$$F_{TC} = \frac{[(5,9736 \cdot 10^{24} \cdot 9,8) + (1,1379 \cdot 10^{21} \cdot 35,98)] \cdot 384043625 \, M^2}{149600000000 \, M \cdot 149600000000 \, M} = 386329811754388433631,265 \, H$$

where:

F тс - gravitational force between the formed planet Earth and the big Moon, N

g з - acceleration of free fall of bodies in space at the equator of the formed planet Earth = 9.80665 m/s²

g л - acceleration of free fall of the big Moon = 35.985475488165510258091 983384517 m/s²

L сз - distance from the surface of the Sun to the surface of planet Earth = 149600000000 m

L сл - distance from the surface of the Sun to the surface of the big Moon = 149600000000 m

L м - distance from the surface of the Earth to the surface of the big Moon = 384043625 m

m з - mass of planet Earth = 5973600000000000000000000 kg

m л - the mass of the large Moon = 1137941107351312552119.3278798377 kg.

Moreover, it is necessary to especially emphasize that the formed mass of the planet Earth consists of the mass of the unformed planet Earth plus the mass of the small Moon.

According to the law of gravity between two material bodies located in the space of the Solar system, we will determine the force of gravity of the small Moon to the unformed planet Earth.

$$F_{\text{тс}} = \frac{[(m_з \cdot g_з) + (m_л \cdot g_л)] \cdot L_м{}^2}{L_{сз} \cdot L_{сл}} = \frac{H \cdot м^2}{м^2} = H$$

$$F_{\text{тс}} = \frac{[(5,9736 \cdot 10^{24} \cdot 216,32) + (1,77 \cdot 10^{19} \cdot 144,036)] \cdot 579000 \, м^2}{149600000000 \, м \cdot 149600000000 \, м} = 76724827546,716742939 \, H$$

where:

F тс - the force of gravity between two material bodies located in the space of the Solar system, N

L сч - the distance from the surface of planet Earth to the surface of the small Moon = 384043625 m

g з - the acceleration of free fall of bodies in space at the equator of the nascent planet Earth = 216.3210846114714918336941 m/s²

g л - the acceleration of free fall of the small Moon = 144.03637159470351180195739781224 m/s²

L сз - the distance from the surface of the Sun to the surface of planet Earth = 149600000000 m

L сч - the distance from the surface of the Sun to the surface of the small Moon = 149600000000 m

L м - the distance from the surface of the Earth to the surface of the small Moon = 579000 m

m з - mass of the unformed planet Earth = 5973528878680790542965492.5420075 kg

m л - mass of the small Moon = 17780329802364258626.864498122464 kg.

It should be especially emphasized that the gravitational force of the large Moon towards our planet is greater than the gravitational force of the unformed

planet Earth towards the small satellite of the Moon. However, the distance between the formed planet Earth and the large Moon is greater than the distance between the nascent planet Earth and the small Moon. These circumstances forced the unformed planet Earth with the acceleration of free fall of bodies in space = 216.3210846114714918336941 m/s², and the small Moon with the acceleration of free fall in space = 144.0363715947035118019573978 m/s² to unite with the help of gravity and the acceleration of free fall in space. This natural phenomenon could have been helped by a meteorite that split the solid base of the gas shell of the small Moon. The main components of the gas mixture of the small and large Moons are hydrogen and helium. After the unification of the small Moon with the unformed hot planet Earth, chemical reactions of combination, decomposition, substitution and exchange appear. Thermonuclear reactions, which occur only at very high temperatures, also join the chemical reactions. Under these conditions, the nuclei of light elements, moving with high kinetic energies, will approach each other at short distances and combine into nuclei of heavier elements.

Moreover, it is necessary to especially emphasize that in the early stages of its development in the unformed hot planet Earth, the strongest thermoelectric currents occurred due to the large temperature difference, which contributed to the emergence of chemical reactions of electrolysis. From all chemical and thermonuclear reactions, an air shell begins to form and, as a consequence of these compounds, an aqueous medium.

It should be noted that basically all scientific theories were based on the fact that the primary thing after the big bang was the gravitational field, which acted equally on all material bodies located in space. This statement is erroneous and contradicts logical thinking. If we talk about the big bang, which expands material bodies in space, then the gravitational field should, on the contrary, restrain this expansion and act on the principle of compression and retention of material bodies in their orbits. In addition to this statement, the scientific community has introduced the "gravitational constant" which, according to modern data, is equal to:

$$G = 6,6720 \cdot 10^{-11} \ H \cdot м^2 / кг^2$$

However, there is no, and cannot be, a "gravitational constant" in the world, due to the constant change in the properties of the planets and galaxies of our Universe. It is necessary to know that the gravitational force in the Solar (or other) system will differ greatly from the gravitational force in the galaxy, and even more so from the gravitational force in the Universe. In the currently used "gravitational constant", there is no direct relationship between active and passive material bodies. There is also no direct connection between the location of material bodies in a system (for example, the Solar), galaxy or in the Universe. For example, according to the law of gravitation between two material bodies located in the space of the Solar system, we will determine the gravitational force of two material bodies

in outer space, which are not affected by the forces of acceleration of free fall of bodies in space.

$$F_{TC} = \frac{[(m_1 \cdot g_1) + (m_2 \cdot g_2)] \cdot L_{M}^2}{L_{c1} \cdot L_{c2}} = \frac{H \cdot M^2}{M^2} = H$$

$$F_{TC} = \frac{[(100 \cdot 0,00) + (70 \cdot 0,00)] \cdot 1_{M}^2}{149600000000_{M} \cdot 149600000000_{M}} = 6,0768108894826326694596 \cdot 10^{-20} H$$

where:

F тc - the gravitational force between two material bodies located in the space of the Solar system, N

L c1 - 149600000000 m

L c2 - 149600000000 m

g 1 - 0.00 m/s²

g 2 - 0.00 m/s²

m 1 - 100 kg

m 2 - 70 kg

L м - 1 m.

After the calculations, we can conclude that in any moving system there can be nothing constant. As for the experiments of the English scientist Henry Cavendish, who used a torsion balance in terrestrial conditions to determine the gravitational forces between two material bodies, this cannot be interpreted as a way to determine the gravitational constant in terrestrial conditions and especially within our entire Universe.

It is necessary to emphasize that the formula of the force of gravity between two material bodies located in space was interpreted by Isaac Newton himself as follows: *"A particle located outside a spherical surface is attracted to the center of the sphere with a force inversely proportional to the square of its distance to the center of the sphere."* In the modern law of universal gravitation, there is no key word of Isaac Newton - "sphere".

The law of gravity between two material bodies of A.N. Belashov is closer to the greatest discovery of Isaac Newton.

The law of gravity between two material bodies located in space of A.N. Belashov

$$F_{TC} = \frac{[(m_1 \cdot g_1) + (m_2 \cdot g_2)] \cdot L_{M}^2}{L_{c1} \cdot L_{c2}} = \frac{H \cdot M^2}{M^2} = H$$

Isaac Newton's law of gravity between two material bodies located in space.

$$F = \frac{m_1 m_2}{r^2}$$

If we compare the attraction of two material bodies in outer space and on planet Earth, we will see a big difference in these readings, which is not taken into account by the law of universal gravitation. By the way, in the law of gravitation between two material bodies located in space by A.N. Belashov, we can say that the distance between one and the second material body is measured to the base of the sphere "to the surface of the Sun". In the falsified law of universal gravitation, there is no place to insert the word "sphere". It is necessary to especially emphasize that the force of gravity between planet Earth and the Moon, at different stages of its development, differed earlier and differs now from the force of gravity of the planet Earth located separately in space to the central star (the Sun) and the Moon located separately in space to the central star (the Sun). This natural phenomenon can be proven by the law of gravitation of one material body located in the space of the Solar (or other) system to the central star (the Sun), discovered and popularly presented in the Scientific and Analytical Journal "Scientific Perspective", No. 1 (35) for 2013, pages 58-63, which was formulated as follows:

The gravitational force of one material body located in the space of the Solar (or other) system to the central star (the Sun) is equal to the product of the mass of the measured material body by the modulus of the acceleration of free fall of the measured material body, by the diameter of the measured material body, and is inversely proportional to the distance from the surface of the Sun to the surface of the measured material body.

$$F_{тсо} = \frac{m\,u \cdot gu \cdot Du}{Lc} = \frac{кг \cdot м \cdot м}{c^2 \cdot м} = H$$

where:

F tco - gravitational force of one material body located in the space of the Solar (or other) system to the central star (the Sun), N

Lc - distance from the surface of the central star (the Sun) to the surface of the measured material body, m

g и - modulus of acceleration of gravity of the measured material body, m/s²

D и - diameter of the measured material body, m

m и - mass of the measured material body, kg.

For example, according to the law of gravitation of one material body located in the space of the Solar (or other) system to the central star (the Sun), we determine the gravitational force of the large Moon located separately in space to the central star (the Sun).

$$F_{тсо} = \frac{m\,u \cdot gu \cdot Du}{Lc} = \frac{кг \cdot м \cdot м}{c^2 \cdot м} = H$$

$$F_{тсо} = \frac{1137941107351312552119{,}3\ кг \cdot 35{,}98\ м/c^2 \cdot 3474000\ м}{149500000000\ м} = 951558861522168853{,}342\ H$$

where:

F tco - gravitational force of the large Moon to the surface of the Sun = H

Lc - distance from the surface of the Sun to the surface of the large Moon = 149500000000 m

g и - modulus of acceleration of free fall of the large Moon = 35.9854758816551 m/s²

m и - mass of the large Moon = 1137941107351312552119.3278798377 kg

D и - diameter of the large Moon = 3474000 m.

For example, according to the law of gravitation of one material body located in the space of the Solar (or other) system to the central star (the Sun), we determine the gravitational force of the planet Earth located separately in space to the surface of the Sun.

$$F_{\text{тсо}} = \frac{m \, u \cdot gu \cdot Du}{Lc} = \frac{\text{кг} \cdot \text{м} \cdot \text{м}}{c^2 \cdot \text{м}} = H$$

$$F_{\text{тсо}} = \frac{5970000000000000000000000 \, \text{кг} \cdot 9{,}80 \, \text{м/с}^2 \cdot 12756320 \, \text{м}}{149600000000 \, \text{м}} = 5000525787817112299465{,}2 H$$

where:

F tco is the gravitational force of the planet Earth to the central star (the Sun), N

Lc is the distance from the surface of the central star (the Sun) to the surface of the formed planet Earth = 149600000000 m

g и is the modulus of the acceleration of gravity of the formed planet Earth = 9.80665 m/s²

m и is the mass of the formed planet Earth = 5980000000000000000000000 kg

D и is the diameter of the formed planet Earth = 12756320 m.

From the calculations performed it follows that the planet Earth is more strongly attracted to the surface of the Sun than to the surface of the Moon, and the Moon is less strongly attracted to the surface of the Sun than to the surface of the planet Earth.

However, it is also necessary to take into account that the planet Earth and its two satellites, the Moon, at an early stage of their development moved away from each other and approached each other, where the distance between them can be calculated by the law of activity of material bodies located in space. When considering this natural phenomenon, in calculations it is also necessary to take into account the law of energy of one material body located in space and the law of energy between two material bodies located in space, which are popularly presented in the Scientific and Methodological Journal "Problems of Modern Science and Education", No. 3 (17) for 2013, pages 13-25. Printing house "PresSto", city

of Ivanovo. However, there are many other accompanying facts that affect the interaction of material bodies located in space...

In addition to the newly discovered laws, I put forward a "New Theory of Multifaceted Dependence", which was formulated as a result of a comprehensive scientific and analytical method for studying the description of the application for invention No. 2005129781 of September 28, 2005 and the description of the application for invention No. 2012142735 of October 9, 2012.

A fundamental law for determining energy within various spaces of our Universe has been discovered, which allows us to calculate the stored energy of any material body on our planet, for example, a certain volume of a certain brand of wood, coal, oil, gas, and so on... The new law completely refutes the assertion about the conservation of energy in the space of our Universe. See the information and analytical journal "Actual Problems of Modern Science", No. 4 (127) for 2022, pages 30-36. Publishing House "Sputnik +", Moscow. A fundamental law for determining the speed of light in the space of our Universe has been discovered, which displays a large dependence of the speed of light passing through space on the power of the light source, the diameter of the light flux and the distance from the light source to the final destination. The new law takes into account the loss of the light flux passing through the substance of space and the acceleration of free fall of bodies in the space of the medium where the light source moves. The new law completely refutes the statement about the constancy of the speed of light. See the journal of current scientific information "Graduate Student and Applicant", No. 5 (138) for 2023, pages 16-23. Publishing House «Sputnik +», Moscow.

In conclusion, we can say that any scientific theory that has been put forward by the scientific community must be supported by known laws of physics, but if there are none, then it is necessary to propose a new law based on physical principles, which will be quite difficult to question and refute according to the existing laws of physics. However, academic science is skeptical about new trends and it is difficult to convince it otherwise. All specialized scientific journals belong to certain departments that do not want to bring confusion into their already known developments that contradict their beliefs. The truth will prevail only when approaches to new scientific theories, new technical developments and scientific communities closed to the public that convince everyone of their rightness are revised.

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