



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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数字化背景下现代条件下国家对中小企业状况的监管
STATE REGULATION OF THE STATE OF SMALL AND MEDIUM-SIZED BUSINESSES IN MODERN CONDITIONS IN THE CONTEXT OF DIGITALIZATION

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注释。 文章讨论了当前数字经济发展条件下俄罗斯联邦的创业状况。 分析了数字经济中创业活动的国家管理特征。 对创业领域进行了分析,这得益于国家监管的广泛发展和提供的支持。 还明确了2019年以来疫情期间创业活动的发展情况和后续范围。

关键词。 创业、数字经济、政府监管、数字化、竞争力。

Annotation. *The article discusses the conditions of entrepreneurship in the Russian Federation in the current conditions of the development of the digital economy. The features of state management of entrepreneurial activity in the digital economy are analyzed. The areas of entrepreneurship are analyzed, which, thanks to the widespread development and provision of support for state regulation. The development and subsequent scope of entrepreneurial activity during the pandemic since 2019 are also identified.*

Keywords. *Entrepreneurship, digital economy, government regulation, digitalization, competitiveness.*

Entrepreneurship is an integral part of a developed economy. It is entrepreneurship that acts as a conductor of innovations in mass production. The leaders of small and medium-sized businesses, organizing their organizations, take risks for the sake of profit and self-realization. The result of such efforts are new organizations of small and medium enterprises.

Entrepreneurship in Russia has its own characteristics, the analysis of which is based on data up to 2021. These features include both positive and negative aspects [1].

Positive aspects of entrepreneurship in Russia:

1. Large domestic market: Russia is the largest country in the world by area, and this provides entrepreneurs with ample opportunities to develop business in the domestic market;

2. Emerging economy: Russia has significant potential for economic growth in various sectors. Some sectors, such as information technology, energy and tourism, show dynamic development and offer new opportunities for entrepreneurs;
3. Availability of a skilled workforce: Russia has many highly qualified specialists, which allows entrepreneurs to find talented employees for their projects.

State support: The state provides various programs and benefits for the development of entrepreneurship. In recent years, tax incentives have been introduced, business registration procedures have been simplified, and credit has been made more accessible [2].

However, there are also negative aspects of entrepreneurial activity in Russia:

1. Bureaucracy and Corruption: Russia continues to face problems of bureaucracy and corruption that can make it difficult to start and grow a business. The need to comply with numerous regulatory requirements and interaction with government agencies can be challenging for entrepreneurs;
2. Lack of available funding: For some entrepreneurs, funding can be a problem. Bank loans can be expensive and access to risk capital is limited. This can make it difficult to expand a business or launch new projects;
3. Legislative instability: Laws and regulations change frequently in Russia, creating uncertainty and making it difficult to do business. Changes in tax and legal regulation may require additional efforts and costs on the part of entrepreneurs to comply with them;
4. Lack of competition: In some industries, the market in Russia may not be competitive enough. The presence of monopolies and restrictions on entry into the market can make it difficult to develop new enterprises and innovations [3-6].

Entrepreneurship development in Russia requires further efforts to remove obstacles such as bureaucracy, corruption and legislative instability. Improving the business climate, providing affordable financing and supporting innovation can contribute to the development of entrepreneurship and the creation of a favorable environment for business in Russia. State regulation of business activity is a set of measures, actions used by the state to create and approve basic economic processes, then with the regulation of foreign trade and control over the distribution of income, the state should coordinate the process of digitalization.

Digitalization is the application of existing digital technologies in various areas of activity of small and medium-sized businesses and manufacturing enterprises [7].

In the context of digitalization, such aspects of the activities of organizations as:

1. analysis of current indicators, with indicators of past years;
2. creation of reports for a selected period of time (a report on current activities is generated at the effective level);
3. free access to archival data, etc.

Today, the situation is developing in the following way: the more competitive small and medium-sized organizations of the industrial sector of the economy, construction and innovation that are effectively operating in the market, the greater the contribution of this sector to GDP and the higher the country's economic growth rates [7].

Achieving sustainable development of Russian entrepreneurship and increasing its competitiveness, subject to regulation of the activities of small and medium-sized businesses by the state, is one of the most pressing problems of modern economic policy of the state: Russia's position in the world economic system largely depends on the success of its solution [7].

State regulation of entrepreneurship includes a set of laws, rules, policies and measures taken by the state to control, support and stimulate entrepreneurial activity. It is carried out with the aim of providing a legal and economic environment in which entrepreneurs can freely conduct business, complying with rules and regulations [7].

State regulation of entrepreneurship may include the following aspects:

1. Licensing and permitting system: The state may require entrepreneurs to obtain special licenses, permits or certifications to carry out certain types of business. This allows you to control the quality and safety of goods and services, as well as protect the interests of consumers;
 2. Tax regulation: The state sets the tax policy and rates that apply to entrepreneurs. This may include income tax, value added tax, property taxes and other taxes. The government may also provide tax breaks and incentives for certain industries or regions;
 3. Regulation of labor relations: The state establishes rules and regulations regarding labor relations between employers and employees. This includes labor laws, minimum wages, workplace health and safety standards, and other aspects related to labor rights and responsibilities [8].
- Competition protection: The state regulates and controls competition in the market to prevent monopolies, restriction of competition and unfair practices [8].

This may include antitrust laws, antitrust regulations, and the creation of regulators. Support and encouragement of entrepreneurship: The state can provide various forms of support and incentives for entrepreneurs [8].

This may include financial support, grants, subsidies, training and advisory programs, access to credit and investment resources, and the creation of

infrastructure and technology parks. The purpose of state regulation of entrepreneurship is to create equal conditions for business development, ensure a stable and transparent market environment, protect the interests of entrepreneurs and consumers, and stimulate economic growth and innovation. However, it is important to note that the effectiveness of state regulation can be different and depends on many factors, including the political situation, the level of corruption, the quality of the legal system and the implementation of regulatory measures [8].

The main objectives of state policy in the field of increasing competitiveness can be identified as follows:

1. Elimination of barriers to entrepreneurial activity, reduction of tax pressure;
2. Improvement of legislation in the field of entrepreneurial activity;
3. Stabilization of the national currency, strengthening of the monetary and banking system;
4. Ensuring effective demand of the population;
5. State support for newly created enterprises: allocation of grants for development, bank support for young companies;
6. Financial incentives for innovative activities of enterprises to create new goods and services;
7. Creation of competitive transnational corporations, arming with global marketing strategies, technologies of large international cooperation projects;
8. Diversification of the geographical structure of foreign trade, minimization of critical dependence on individual states (markets), strengthening the economic security of the country;
9. International cooperation of the country with various government organizations [8].

These measures will help to increase the competitiveness of the organization and its products and the entire economy of the country as a whole. The competitiveness of small and medium-sized businesses can be defined as the ability of organizations to be flexible, adaptable to constant changes in the external environment in order to increase, decrease, or maintain their market share, depending on the organization's strategy [8].

The state in Russia takes a number of measures to regulate entrepreneurial activity. These measures are aimed at creating a favorable business climate, stimulating economic growth and supporting entrepreneurs. Below are some of them:

Reducing tax and administrative barriers: In recent years, the Russian government has taken steps to reduce the tax burden on businesses. This includes lower income tax rates and social contributions, as well as simplification of tax procedures. In addition, electronic document management systems were introduced,

which allow reducing administrative barriers and increasing the efficiency of interaction with government agencies.

Infrastructure Development and Benefits for Small and Medium Enterprises: The state provides various incentives and support for the development of small and medium enterprises. This includes financing programs, loan subsidies, support for the training and development of entrepreneurs, and the creation of innovation and technology parks.

Public Procurement Programs: Public procurement is a significant market sector, and the Russian government is taking steps to increase the availability of public contracts for small and medium-sized enterprises. This includes granting preferences in awarding contracts and facilitating procedures for participation in government tenders [9-13].

Development of innovations and start-ups: The state actively supports innovation and the development of start-ups. Special funds and financing programs have been created to support start-ups and the commercialization of scientific developments. Achieving sustainable development of Russian organizations of small and medium-sized businesses and increasing their competitiveness, subject to the regulation of the activities of small and medium-sized businesses by the state, is one of the most pressing problems of modern economic policy of the state: Russia's position in the world economic system largely depends on the success of its solution.

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十九世纪初中俄女性诗歌的“世纪智慧”——论文学文本理解的游戏策略问题
“CENTURY WISDOM” IN THE WOMEN’S POETRY OF RUSSIA
AND CHINA AT THE BEGINNING OF THE 19TH CENTURY: ON
THE ISSUE OF GAME STRATEGIES FOR COMPREHENDING A
LITERARY TEXT¹

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抽象的。文章提出了一种通过游戏的方式将两位作家的诗进行创作的形式，利用竞争的元素。该研究的作者基于以下事实出发：使用文学材料的游戏形式已经证明了其有效性。它们激活学生的注意力，让他们不仅感知内容，而且感知文本的情感、伦理和审美方面，个性化获取新知识的方式。吴藻《我研究离骚……》与卡罗琳娜·帕夫洛娃《狮身人面像》的比较分析，通过主题的统一（面对永恒的男人）、立场的接近（面对永恒的女诗人）来证明其合理性。男性世界和文本的情绪。提出了文本分析的问题和任务系统。

关键词：棋盘游戏、文学研究、女性诗歌、浪漫主义、吴藻、卡罗琳娜·巴甫洛娃。

Abstract. The article proposes a form of work with the poems of two writers through the game, using elements of competition. The author of the study proceeds from the fact that game forms of working with literary material have proven their effectiveness. They activate the attention of students, allow them to perceive not only the content, but also the emotional, ethical and aesthetic side of the text, individualize the way of obtaining new knowledge. Comparative analysis of the poems by Wu Zao “That I study Li Sao that...” and Karolina Pavlova’s “Sphinx” is justified by the unity of the theme (a man in the face of eternity), the proximity of positions (a poetess in the male world) and the mood of the texts. A system of questions and tasks for text analysis is proposed.

Keywords: board game, study of literature, women’s poetry, romanticism, Wu Zao, Karolina Pavlova.

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Comparative analysis of texts, to which the teacher refers directly to the lesson (in our case, extracurricular, since the proposed material is not included in the “Approximate basic educational program of basic general education”, but is in close contact with topics studied, for example, in grade 9 as part of the study literature of the first half of the 19th century [2]), makes it possible to directly develop the skills of literary analysis and significantly broaden one’s horizons by attracting material from Chinese literature. In addition, the texts we have chosen contain a pronounced intertextual layer, which will require cultural reference, make us turn to historical material, talk about the specifics of a particular national culture. Theme of the lesson: “The age-old wisdom” in the women’s poetry of Russia and China at the beginning of the 19th century (based on the poems of Wu Zao “That I study Li Sao that ...” and Karolina Pavlova “The Sphinx”). The purpose of the lesson: to conduct a comparative analysis of the texts of Wu Zao and Karolina Pavlova at the level of meaning, mood and associative parallels of poems using quest technology in the format of a board game.

Planned results

1. Personal:

- civic education (willingness to conduct joint activities, including within the framework of school literary education),
- spiritual and moral education (the ability to assess the situation, including that presented in a literary work, and make informed decisions, focusing on moral norms and values, characterizing the behavior and actions of characters in fiction),
- aesthetic education (aesthetic attitude to the world, including the aesthetics of everyday life; the ability to perceive various types of art, traditions and creativity of one’s own and other peoples, to feel the emotional impact of art, including literature).

2. Metasubject:

2.1. Cognitive:

- basic logical actions (to independently formulate and update the problem inherent in a work of art, to consider it comprehensively; to establish an essential feature or grounds for comparing literary heroes, works of art and their fragments, classification and generalization of literary facts),
- basic research activities (identify cause-and-effect relationships and update the problem in the study of literary phenomena and processes, put forward a hypothesis for its solution, find arguments to prove your statements, set parameters and decision criteria; evaluate new situations, evaluate the experience gained, including reading; be able to integrate knowledge from different subject areas),

2.2. Communicative:

- communication (to communicate in all spheres of life, including in the literature lesson and in extracurricular activities on the subject; to express your point of view in a detailed and logical way in the process of analyzing a literary work using language means),
- joint activities (perform positive strategic behavior in various situations, show creativity and imagination, be proactive).

2.3. Regulatory:

- self-organization (to promote the formation and manifestation of broad erudition in various fields of knowledge, including in matters of literature, to constantly improve their educational and cultural level).

3. Subject: inclusion in the cultural and linguistic space of Russian and world culture, the formation of a value attitude towards literature as an integral part of culture; awareness of the relationship between the linguistic, literary, intellectual, spiritual and moral development of the individual; knowledge of the content, understanding of key issues and awareness of the historical, cultural and moral and value mutual influence of works of Russian classical literature; the ability to identify images, themes, ideas, problems in works of fiction and express one's attitude towards them in detailed, reasoned oral and written statements; the ability to compare works of Russian and foreign literature and compare them with artistic interpretations in other arts (graphics, painting, theater, cinema, music, etc.).

Used technologies: problem-dialogical learning, working with text, development of critical thinking, game technology.

Supporting concepts, terms: lyrics, lyrical hero, composition, image, motive, intertext, women's poetry.

Game set: playing field; cards with analyzed texts in Russian and in the original (in Chinese); 5 chips; question cards; six-sided cube.

Preparing for the game:

1. Place the playing field on the table and divide into 5 teams with an equal number of players, place the chips at the beginning of the playing field;
2. Mix the question cards and put three groups of cards: 1) comment and understanding 2) associations 3) analysis;
3. Roll the die to determine the order in which the teams play.

The winner is the team or player that reaches the center cell first.

Game order:

1. Roll a six-sided die and move the number of cells along the red dotted line in a clockwise cell according to the rolled result;

2. Complete the task, pass the move to the next player

We use Wu Zao's poem "That I study Li Sao tom ..." (1829) translated by M. I. Basmanov and Karolina Pavlova «Sphinx» (1831). Both poetesses received a

versatile home education, actively composed and translated, performed in different genres (not only poetry, but also prose and drama). In both cases, the unhappy and even scandalous marriage dramatically changed the life of the poetesses, and the analyzed poems are largely associated with such a biographical turn. In their poems, “the severe mental pain of the poet” [4, p. 309] becomes a new theme of “women’s” poetry. Reading the great texts of antiquity, lyrical heroines seek to decide on the choice of their life path and destiny. Zao and K.K. Pavlov start from the intertextual plan, turned into the depths of centuries, to the origins of the national (Chinese) and pan-European (Greek) culture in order to comprehend modern man in relationship with the classics. No wonder K. Pavlova wrote in her “Phantasmagoria”: “I remember, they said once in the presence of a great poet that one gentleman wrote the poem “Lotus”. “What gave him a lotus?” answered the poet. “If he could not say anything new about the rose, then he did not say anything new about the lotus either.” It is so” [1, p. 212]. The new content is the main object of her creative search: “It was Karolina Pavlova, who endured all sorts of hardships of life, who died in a foreign land, turned out to be spiritually stable and faithful to poetic creativity ... From now on, poetry has become not only a male, but also a female craft [3, p. 310]. Both poetesses recorded in their poems important trends of the 20s and 30s of the 19th century, which manifested themselves in an obvious cultural upsurge in Russia and China.

A list of questions

1) Comment and understanding:

What is the lyrical heroine of Wu Zao's poem reading?

The first text is Qu Yuan's poem “Li Sao” (accepted translation of “Complaint of Departure”, often referred to as a mournful poem, a poem about meeting with trouble). The second text is the Buddhist sutras - sacred books that describe the moral norms and laws by which a believer must live.

What is the content of the poem “Li Sao”?

This is a poem in which an ancient poet faces slander and persecution. He is expelled from the country and, cursing the vices of liars, hypocrites and bribe-takers who surrounded the royal court, Qu Yuan goes on an unknown journey, in which he encounters magical powers and patrons, gets the opportunity to renounce earthly troubles, but chooses earthly poetry and longing. Between mystical eternity and the social life of a person, the hero chooses a good name in society and an active social position, between natural and human - human.

What Code of Canons are we talking about?

About the sutras that Wu Zao studied a lot in her maturity, comprehending the basic laws of Buddhism: non-intervention, humility, “non-harming”, striving for eternal life in harmony with nature and admiring it.

Who is the Sphinx? What mythology is it borrowed from? Why does Karolina Pavlova's poem emphasize that he is “half-beauty and half-beast”?

A terrible creature in Greek and Egyptian mythology with the body of a lion, the wings of a bird and the head of a woman. It combines fear and beauty. Her riddle was told to her by the Muses, but she uses this knowledge to punish. She is the embodiment of cruelty and the inevitability of fate, the proximity of suffering and pleasure, beauty and death. The Greek tragedians embodied in the Sphinx the idea of man's struggle with fate.

Which way is the Sphinx blocking? Where is it not allowed? What alternative does the traveler have?

The monster lived not far from Thebes in a cave, in Mount Fikion or Sphinxion. According to Theban tradition, the Sphinx was sent to the Hero, or Ares, or Dionysus to ruin the country as a punishment for Cadmus, who killed Aresov. The Sphinx lay in wait for those passing by and asked a riddle, promising to kill himself if the riddle was solved; those who did not solve the riddles, he devoured (or threw them off the cliff). To get rid of this misfortune, Creon, who had ruled the country since the death of Laius, offered the hand of his sister Jocasta and with her royal power to the one who would solve the riddle. So the alternative of the one who entered the fight with the Sphinx: either love, glory and power in the city of Thebes, or death.

What is the essence of the question that the Sphinx asks travelers? Why is this a "fatal mystery"? In what generalized sense does this question appear in the poem?

The riddle itself is simple: "Tell me, who walks on four legs in the morning, two in the afternoon, and three in the evening? None of all the creatures living on earth changes like him. When he walks on four legs, then he has less strength and moves more slowly than at other times. It is about a man who crawls in infancy, walks on two legs in his prime, and leans on a cane in old age. But at the same time, it is about the essence and variability of a person, about the fact that he is an object incomprehensible to himself. "Who ... believing in himself in vain / Did not solve the fatal riddle" [1, p. 75] - who did not find himself, did not realize his fate.

What does the expression "Sphinx of Being" mean in K. Pavlova's poem? What is the technique used?

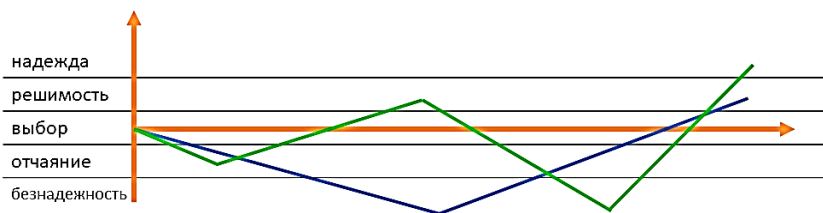
In this case, the mystery of life. The type of transfer that is used in this case is synecdoche: not "an unsolvable question that combines the problem of what a person is with the problem of what his past, present and future are," but a character asking this question.

Who is a pilgrim?

Traveler, pilgrim, wanderer. And that means not just a person traveling or even walking the path of life, but a hero leading a religious moral search

1) Associations

Before you is a graph of the moods of the lyrical heroes of the poems, determine which line belongs to a particular poem.



The blue line is a poem by Wu Zao (from disappointment to tears and awareness of one's strength), the green line is a poem by K. Pavlova (from indecision to determination, to despair and yet the desire for victory).

Determine the poem by the degree of illumination at the end of the poem.

The first picture conveys the color scheme and mood of the poem of the Chinese poetess with its immersion in itself and the feeling of the impossibility of mutual understanding with the world. The second - bloody flashes of sunset - carry the mood of the "Sphinx".

Match emojis and poems.



K. K. Pavlova
"Sphinx"



Wu Zao "I study Li
Sao volume..."

3) analysis

What choice does the lyrical hero of both poems have? How is the "two-facedness" of fate represented?

Between happiness (including love, determination and a mysterious future, the city of Thebes unknown to the hero) and death, the hero of Karolina Pavlova chooses. It bears all the meanings of the exceptional personality of the era of romanticism, it was not for nothing that K. K. Pavlova was reproached for the untimeliness and excessive enthusiasm for romantic poetry, which has already lost its relevance, and A. D. Galakhov and M. E. Saltykov-Shchedrin. Between "Li Sao" and Buddhist sutras - that is, between Confucianism and Buddhism, at the same time between youthful passion (Wu Zao loved Qu Yuan's poem very much in her youth) and new values the heroine Wu Zao chooses. This is a choice between the demands of duty, order and possible sobering, like the lyrical hero Qu

Yuan, who is determined to remain faithful to the ideals of the ancient sages and follow the path of order, harmony and justice, and the requirements of humility, peace, purity and restraint.

What is the fundamental difference in understanding time in the two poems? On what scale does Wu Zao measure time (“Already ten years have passed in the occupation”) and on what scale does K. Pavlova (“Like in the old days, and to us, later descendants”)?

Wu Zao measures time on the scale of one life (using the mythological number 10 - a symbol of integrity, completeness, circle, according to Dante). The choice between two understandings of life: as an active struggle and subsequent disappointment, on the one hand, and as “negligence” (ahimsa) and humility, on the other, is given by long years of humility. K. Pavlova Time is measured by generations and centuries. It proclaims the unchanging nature of man, seeking to understand himself and incapable of a firm knowledge of what he is.

How is the symbolism of death, dying, extinction created in both texts?

In the Chinese poem, details are sequentially built that create an autumn landscape (“It is raining on a palm tree, knocking on the foliage”, a blue lamp shade, bananas): the picture of the dying of nature is realized in sound, visual and tactile sensations. The onset of autumn forces us to sum up the intermediate results of life, to comprehend ourselves and our destiny. In a Russian poem, those who dare to try their luck clearly see that “the path around is doused with human blood, / The whole country is littered with bones,” but the temptation to become the chosen one, to show one’s strength and talent in the fight against fate is stronger than fear.

What is the purpose of man and his life in both texts? Is it achievable?

The goal of humility in Wu Zao’s poem has not been achieved, passions still torment her heart, feelings prevail, rationality and calmness are only appearances (“He who called me clever, he / Was misled by me”). The goal of finding the unattainable (“to the sphinx again, with mysterious love”) in K. Pavlova’s poem has not yet been achieved, but this additionally inspires the following characters.

In what way, with what feelings do the lyrical heroine Wu Zao and the people in the poem “Sphinx” go to the goal?

In a Chinese poem, the path is reading and establishing inner peace. In Russian - inspiration, determination, self-confidence (“believing in yourself in vain, / Did not solve the fatal riddle, / Who lost heart ...”).

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关于健康跑步和步行的好处
ABOUT THE BENEFITS OF WELLNESS RUNNING AND WALKING

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注解。 在本文中，有关休闲跑步和步行的信息被系统化。 列出了跑步和步行对人类健康和延长寿命的积极影响的基本方面。 这些类型的活动相互比较以及其他形式的身体发展的优势是确定的。 因此，已经创造了刺激健康过程中这些有希望的领域发展的先决条件。

关键词：健康跑步、步行、有氧运动、有氧运动、有氧训练、身体状况、抗硬化作用、预防缺血、免疫力、身体防御、情绪状态、体重校正、内啡肽、抗压能力、表现。

Annotation. *In this paper, information about recreational running and walking is systematized. The essential aspects of the positive impact of running and walking on human health and prolongation of his life are listed. The advantages of these types of activities in comparison with each other and other forms of physical development are determined. Thus, the prerequisites have been created that stimulate the development of these promising areas of the wellness process.*

Keywords: *wellness running, walking, aerobic exercise, aerobic exercise, aerobic training, physical condition, anti-sclerotic effect, prevention of ischemia, immunity, body defenses, emotional state, weight correction, endorphins, stress resistance, performance.*

Relevance. *Recreational running and walking have gained immense popularity around the world as a means of reducing the risk of cardiovascular diseases and maintaining the physical fitness of the population at the proper level. They have gained incredible popularity in European countries and America as a means to combat physical inactivity and its attendant adverse effects. According to the most conservative estimates, more than 100 million middle-aged and elderly people on our planet use running as a health remedy. No less impressive success and*

wellness walking! In the US alone, about 40 million citizens consider themselves ardent fans of this form of health improvement [12]. However, according to scientists, only 20% of the population of developed countries are engaged in sufficiently intensive physical culture, which provides the necessary level of energy consumption [13]. In our country, the situation is no better. A high percentage of cardiovascular morbidity requires the use of immediate measures to promote an active lifestyle. Unfortunately, students are also among those “doomed” to a “sedentary” lifestyle. Their motor activity is especially reduced during the period of passing exams [2].

Purpose: To systematize information about the effectiveness of health-improving running and walking as factors in prolonging human life for further popularization of these types of physical exercises among the population, up to turning them into elements of a healthy lifestyle.

Results of the study: The work takes into account significant aspects of the positive impact of health-improving running and walking on human life. The advantages of these types of activity in comparison with other forms of physical development are determined. Thus, outlines are given that stimulate the further development of these areas of the healing process.

General characteristics of aerobic exercise

Aerobic exercise is considered the best way to improve health and maintain an active vitality.

During such loads, the general physical condition improves. Improves lung function, blood composition. Such exercises help to reduce the level of cholesterol in the blood. They can be used to achieve an anti-sclerotic effect, to prevent ischemia. Joints, tendons become more flexible, ligaments and the skeletal system are strengthened. Muscles are strengthened, muscle mass is increased. Improves blood circulation, which has a beneficial effect on the condition of the skin. Growth hormone is produced. Immunity is strengthened, the body's defenses grow. The content of fat in the body decreases, weight is corrected. The emotional state improves due to the production of “hormones of good mood” - endorphins. Increased resistance to physical and emotional stress. Mental activity is activated. Efficiency increases. Chronic fatigue is gone.

Aerobic activities include running, walking, cycling, skiing, swimming, rhythmic gymnastics (aerobics), dancing, etc., i.e., loads in which most of the muscles of the human body are involved in work, approximately 2/3 of the entire muscle mass, and the duration of continuous exercise is at least 20 minutes.

The most unpretentious of them are running and walking.

Health-improving running (jogging), which has gained immense popularity all over the world as a means of reducing the risk of cardiovascular diseases, maintaining a proper level of physical fitness, is one of the topics of methodological and practical classes in physical education [4].

Medical and biological aspects of recreational running

For recreational purposes, slow running is mainly used in the speed range from 1.5 to 4 m / s, i.e. 1 km is run in (4 min. 10 sec - 11 min.). The main goal of jogging is to improve the physical condition of a person and, consequently, increase his working capacity. At the heart of the physical performance of a person is the ability of the body to better use oxygen.

Jogging speeds up blood flow and increases blood pressure. This forced increase in pressure can help flush out some of the fats and waste products from the arteries and throughout the body. Similarly, if exercise is intense, the body uses cholesterol as an additional source of energy.

Running, since it affects most muscle groups to some extent, leads to the expansion of the arterial system. The veins, arteries, and capillaries that have essentially ceased to function due to an inactive lifestyle open up and become «active» as well. The presence of a large number of vessels for blood flow makes it freer.

In addition to the main health effects of running associated with the impact on the circulatory and respiratory systems, it should also be noted its positive effect on carbohydrate metabolism, liver and gastrointestinal tract function, and the skeletal system.

The improvement in liver function is explained by an increase in oxygen consumption by the liver tissue during running by 2-3 times. In addition, with deep breathing while running, the liver is massaged with a diaphragm, which improves the outflow of bile and the function of the bile ducts, normalizing their tone.

Regular training in health running has a positive effect on all parts of the musculoskeletal system, preventing the development of degenerative changes associated with age and physical inactivity (decreased mobility). Restriction of the inflow of joint fluid during hypodynamia leads to malnutrition of the cartilage and loss of elasticity of the ligaments, a decrease in the depreciation properties of the joints and the development of arthrosis. Cyclic exercises (running, cycling, swimming) increase the flow of fluid to the articular cartilage and intervertebral discs, which is the best prevention of arthrosis and sciatica.

Running has a great influence on the psycho-emotional state of a person. While running, there is often a feeling of joy, fun, which for many runners is the main motivation for running. After a workout, as a rule, a good mood, self-confidence, a surge of vigor, and an increase in mental performance appear. This condition is associated with the release of endorphins, which circulate in the blood for about a day.

Benefits of running over other types of aerobic exercise

Health running is the simplest and most accessible (technically) type of cyclic exercises (they include running, walking, swimming, etc.), and therefore the most massive. According to the most conservative estimates, more than 100 million middle-aged and elderly people on our planet use running as a health remedy.

This is perhaps the easiest, fastest and cheapest way to get in shape. You can run «solo» and with a partner, for this you do not need to have special simulators and do not need to spend too much time. Three or four times a week for 20-30 minutes is enough to feel great. You can run at any time of the day. Running attracts the attention of people of all ages due to a number of its features [10]:

- is a natural locomotor act;
- the load in running is easily and accurately dosed according to the state of health or according to the pulse rate;
- shown to persons of different ages and gender;
- Available at any time of the year;
- does not require special conditions and devices for classes;
- With the help of a long, calm run, a tangible healing effect is quickly achieved.

The advantage of running lies in the fact that the training regimen can be chosen for almost any person.

Depending on your goals, you can run both in the morning and in the evening.

Morning running is the best option for awakening the entire body (from skeletal muscles to the logical mind), this is the best way to stimulate the digestive system for breakfast (note to those who suffer from lack of appetite in the morning).

Evening running is the best way to get rid of the stress of a working day, relax, recharge your batteries. For many people, this can be a convenient way to get rid of evening gluttony and get a healthy and sound sleep at the same time.

The most simple, financially inexpensive and accessible to every means is recreational walking [7].

Walking has gained incredible popularity in European countries and America as a means to combat physical inactivity and its attendant detrimental consequences. A health trail project has been developed, the goal of which is to involve the largest possible part of the population in walking. Finland, Sweden, Denmark, Canada and Germany have already joined this project. In Germany, mass walks are organized on certain days, in which thousands of people participate. All the advantages of walking listed below seem to explain the boom observed in the world today and associated with it. For example, about 40 million Americans consider themselves ardent fans of this form of recovery.

Health walking is the simplest and most accessible form of aerobic exercise.

Walking is the safest form of physical activity. It works for almost everyone. Wellness walking is the simplest and most affordable way to improve your health and maintain an active lifestyle for many years.

Walking is a great way to improve your health, especially if you are just starting to get involved in sports. Regular walking will help you establish a healthy weight and burn excess fat. In one hour of brisk walking, 35 g of fat is burned [11].

The body and knees are slightly stressed when walking, so walking is suitable for everyone without exception.

One recent study indicates that walking 3 km a day at any step will reduce the risk of cardiovascular disease. (Although it is traditionally believed that we should walk 7-8 km per day and take 10 thousand steps - the minimum rate prescribed by doctors [11].) Moderate walking will lower blood cholesterol levels, help strengthen bones, and protect against osteoporosis. It's also a great way to «let off steam» or overflowing energy. Rhythmically repetitive movements calm and even stimulate creative activity.

Its healing effect is quite high. Walking, in terms of its physiological effect on the body, is one of the effective aerobic cyclic exercises and can be used both to increase the volume of motor activity and to correct risk factors for the development of cardiovascular diseases, as well as to improve the function of breathing and blood circulation, musculoskeletal motor apparatus, metabolism in people over 50 years of age and with a low level of health. The large muscles involved in walking play the role of a “peripheral heart”, improving blood flow from the lower extremities, abdominal organs and pelvis. Walking has a stimulating effect on the function of the digestive glands, liver, and gastrointestinal tract. At the same time, the natural foot massage that occurs while walking also plays a role. Like other cyclic exercises, walking causes a favorable restructuring of nervous processes, improves the activity of analyzers, increases the emotional state, and normalizes sleep [10].

Walking in any weather contributes to the hardening of the body, which affects the increase in the body's resistance, the growth of its adaptive capabilities.

As the practice of physical culture and health-improving classes shows, walking and running are effective in the fight against smoking. Among those engaged in these types of physical activities, the number of people who quit smoking is significantly higher compared to the average data. The motive for quitting smoking is associated with a decrease in the need for smoking [10].

When walking at a sufficiently high pace on a relief terrain, the whole body shakes, as a result of which there is an increase in blood flow, an increase in vascular tone, and an outflow of venous blood from the lower extremities occurs.

Walking has no contraindications, it can be a means to restore former harmony or be used as a therapy after illnesses, walking also helps to develop endurance, improve physical fitness, prevent various sores and the ability to remain active for many years.

It will help to easily compensate for the lack of physical activity and solve many other problems associated with the modern lifestyle.

It is desirable that the classes are daily. Let them be less than an hour on weekdays doing a supportive task. And on weekends, the training will be more intense and longer [3].

The author of the brochure «Healthy Walking» I. A. Gais offers a long-term program of health walking classes, dividing it into 3 stages: a preparatory (duration 2-3 months) stage, a stage of increasing walking speed, and, finally, a stage of further improving walking techniques and maintaining necessary for this physical form [3].

Benefits of walking over running

1. Availability. For jogging, you need to use paths with soft ground to protect your legs from bruises and injuries, especially if you are overweight [5]. But where in the city to find such a place for everyone who decides to run?

2. Atraumatic. When walking, unlike running, there is no phase of flight and, accordingly, moments of landing, which are the cause of injuries when running [5]. Softly, rolling from phase to phase of movement without flight, the pedestrian moves forward. Of course, legs can also hurt from prolonged walking, but such pain is most often not traumatic in nature, and it does not become an insurmountable obstacle to regular exercise.

3. Convenient time for classes. A business person constantly feels that strong nervous tension after a working day with insufficient physical activity (lack of exercise) creates a serious danger to his health, but he can't carve out at least an hour for himself to compensate for the motor deficit. Walking, on the other hand, allows part of physical activity to be included in the working day: walking to work and back, walking at lunchtime, overcoming short distances at a fast pace during the day. True, it should be warned that such loads practiced during the day, even with a 30-40-minute walk (in parts or small segments), are completely unequal to those under which, as N. M. Amosov says, you can suffocate and sweat [1].

4. Ability to overcome conventions. A running person attracts attention - a fast walking person is just in a hurry somewhere [5].

5. Ability to adjust the load. Very often, beginners in fitness jogging harm themselves with excessive exercise. No wonder the New Zealand coach Arthur Lydiard in his book "Running for Life" writes that the most difficult thing in recreational running is "...learning to maintain a low running speed" [4]. It can be compared that the load when running is boiling water, and when walking - fresh milk. The fact is that fast walking skills are gradually formed from the very beginning of classes, and by the time you learn to develop a sufficiently high speed, you will have many kilometers of the road to health behind you. It is they who create the ability to gradually and with the benefit of the body to withstand ever greater loads. When walking, as it were, the very form of movements is a load limiter at the beginning of classes.

6. Possibility of continuous loading. This factor determines the effectiveness of training the cardiovascular system. How much can an unprepared person run in continuous mode? Make no mistake, even 5-7 minutes of continuous running is

not an easy task, and 30 or more minutes of continuous movement is imperative to achieve and maintain good shape. Often, beginners pretend to run rather than run, barely dragging their feet. The sight is rather unaesthetic. It is much easier to compensate for the necessary long-term load by walking. In addition, this uses a natural and most natural skill for a person.

7. Ability to combine mental activity and walking. Many creative workers have noted that walking enlivens the activity of the mind. This was written by Jean-Jacques Rousseau, L. N. Tolstoy, A. S. Pushkin, who walked the distance from Tsarskoye Selo to St. Petersburg (about 18 km). Walking is a highly automated skill. On the usual track, the brain has the opportunity to be distracted for productive work [5].

8. If running is prohibited for heart disease, some forms of diabetes, kidney disease, in which body shaking should not be allowed, then the doctor may allow walking, since it is easy to regulate the load here. So from September 2016 to March 2017, an experiment was conducted at the Nizhny Novgorod State Engineering and Economic University (Knyaginino) on the use of health-improving walking in physical education classes in a special medical group. Among the students were suffering, including chronic pyelonephritis. The experiment showed that recreational walking improved their functional state and somatic health [9]. The same conclusion was reached by the teachers of the Omsk Law Institute, who spent several years monitoring students of a special medical group involved in recreational walking. At the same time, teachers especially noted the desire of students to “repeat walks, turn them into a pattern” and concluded that they had a need for movement for many years with the help of health-improving walking [8].

Conclusions

1. Healthy running and walking today have become one of the most popular health methods in the world.

2. Moreover, walking is the most accessible type of aerobic training, surpassing even running in terms of simplicity and indications.

3. However, walking as an independent health remedy can be recommended only if there are contraindications to running (in the early stages of rehabilitation after serious illnesses, with overweight, in elderly people with a low level of physical fitness).

4. In the absence of serious deviations in the state of health, walking can only be used as the first (preparatory) stage of endurance training for beginners with low functionality. In the future, as fitness increases, health-improving walking should be replaced by running training.

5. Running is the most effective means of combating physical inactivity.

6. The optimal form of an active lifestyle: sports games and long country trips - on weekends, running in the morning and (and) in the evening with brisk walking during the day - on weekdays.

Further research involves conducting experimental studies to obtain data in order to ensure a higher quality of methodological training of future physical education teachers.

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教育环境作为创造力发展的工具
**EDUCATIONAL ENVIRONMENT AS A TOOL FOR THE
DEVELOPMENT OF CREATIVITY**

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抽象的。创造力的形成与周围空间有直接关系。这里我们谈论的不仅是教育项目，还包括空间、人员和内部环境。是否有可能将创造力转化为可管理的能力以及如何实现这一目标。

关键词：教育计划、创造性能力、教育环境、意识、技能、教育空间。

Abstract. *The formation of creative competencies is directly related to the surrounding space. And here we are talking not only about the educational program, but also about space, people and internal settings. Is it possible to turn creativity into a managed competence and how to achieve this.*

Keywords: *educational program, creative competencies, educational environment, awareness, skills, educational space.*

Over the past few years, the community has been actively discussing the importance of creativity for the economy, society and the whole world. Why has it become important? It is difficult to call our world a VUCA - a world, we have rather moved into an even more uncertain and changeable mode. If within the framework of the VUCA-world we can talk about forecasting for 1-3 years, then the existing reality limits us to months or even weeks. That is why it is important to accumulate all the knowledge and skills that existing professionals have and quickly respond to challenges. That is why the era of creativity began.

It is important at the entrance to understand the meaning of the word “creativity” - a competence that allows an individual to create new solutions that significantly change the original object in order to solve a specific end user request. From the proposed description, we see two important components “solving a specific problem” and “end user request”. Why it is important to understand these two important details, creativity is an applied tool that gives a measurable result, including solving a specific problem of its user. While creativity is a manifestation

of the state of its author, conveys his thoughts and feelings, it may not solve any problems. However, creativity also appeared from creativity, so this part must be taken into account when developing creativity.

Many people think that creativity is an inborn gift that cannot be developed in oneself. But is it? Consider the proposed list of skills that are included in creative competencies:

1. Leadership
2. Curiosity and observation
3. Critical thinking
4. Adaptability
5. Riskiness
6. Lateral thinking
7. Motivation
8. Concentration
9. Inner freedom

In order for creativity to be a conscious competence that can be used in your work, you need to develop the skills presented above. This will help connect different objects together and combine different properties and states with each other. However, this set of skills develops more slowly in adults. This can be explained both from the point of view of neurobiology and from the point of view of ordinary everyday examples. Our task is to start developing the skills that form creative competencies from a younger age.

When developing creative competencies, it is important to take into account several factors at once: the educational program, the educational environment, and the educational space. Why are these aspects critical to the development of these skills? Each of these aspects is responsible for the formation of the presented skills, according to the following distribution:

Educational program	Educational environment	Educational space
Curiosity and insight	Leadership	Curiosity and insight
Critical thinking	Curiosity and insight	inner freedom
Motivation	adaptability	Motivation
Concentration	Riskiness	Concentration
Lateral thinking	inner freedom	

From the presented table, we see some distribution where it is easiest to form skills. How this happens, we will analyze on the example of several private educational schools that focus on the comprehensive development of their students, including the development of their creative competencies.

ANPEO "School "LETOVO" is one of the brightest examples of the organi-

zation of space, educational activities, as well as the environment in such a way that the child receives knowledge every minute of his time. Students have the opportunity to use the spaces of the entire school for their activities, whether it be a project, an individual lesson, just a meeting with friends. In addition, each class is equipped in such a way that it can be easily transformed for those tasks that are relevant for a particular process. In addition, an individual learning trajectory allows you to develop awareness, observation and assessment. How it happens - the student is offered a choice of a number of disciplines that he can attend after the main part of the training. Each student chooses additional disciplines on his own, in fact, based on his interest and preferences. Often, it is difficult for students to cope with the thirst to try and learn everything, and this thirst for new experience and knowledge can lead to great overload. In order to prevent such cases, the educational institution appoints tutor support for each group. This helps students maintain a balance between study and leisure, focus on the necessary areas of development, organize their time and learn how to say “no” to any type of activity. In addition, you can see how the student develops several skills at once:

- curiosity is when interest is followed by positive and exciting consequences;
- inner freedom - you yourself determine your vector of development, you do not in the state - you must, but in the state - I want;
- adaptability - the ability to adapt to the conditions while not feeling discomfort from the result.

As a result, motivation, concentration, risk taking and leadership appear. Students are involved in the process, as they see a clear value for themselves. Where is the creativity here? Creativity is developed through non-trivial tasks, when students are encouraged to immerse themselves in the project and look for the most sought-after solution.

Consider the example of the second school - “New School”. Pupils from grades 1 to 11 study at this school and a different approach is applied for each grade. For example, all the walls of the school are used for exhibitions of the work of their students, including for placing their drawings directly on the walls and messages to each other.

This school also has an individual learning path, which allows the child to consciously approach his choice and receive a lot of additional information that expands his horizons. In the New School, every inch of the building is used for the development of children, even if at first glance it seems like a game format. For example, in several recreations you will find a field where the guys during the break can come and play with a soft sword. Within the walls of the school you will find many classes where you can sculpt with clay, use a 3D printer, draw, and much more. As part of educational programs, teachers often connect directions with each other and give related projects for implementation, thereby teaching

children cross-functionality. As for creativity, here it is also used everywhere, especially when children need to choose thematic events of the year that the whole school is preparing.

The first thing I want to note is that the experience of private educational schools can be applied in any educational institution. In fact, it all depends on the tasks that teachers set for children, how the environment and space are used to help children learn the necessary skills. Numerous studies evaluating how the environment affects student creativity and engagement show that a private school approach increases these rates by more than 80%. The second thing that can be said based on the results of studying the experience of schools is that it is necessary to give students the choice of their additional activities. Thus, they learn to make decisions, take responsibility for them, and most importantly, understand what they really like and what they don't. This, in turn, will help them with the choice of their future profession. And finally, the third conclusion is that the educational environment should not be implemented on the model of total obedience to the rules, otherwise the child will not be able to form inner freedom, which will entail other skills, including curiosity and observation. That is why educational institutions need to create individual learning paths on a mandatory basis, since this is what will help students develop comprehensively, including developing creative competencies.

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十九世纪至二十世纪初俄罗斯学龄前儿童的文学教育
**LITERARY EDUCATION OF PRESCHOOL CHILDREN IN RUSSIA
AT THE TURN OF THE XIX-XX CENTURIES**

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抽象的。 本文致力于探讨19世纪至20世纪之交学前儿童文学教育的形成和发展的特征,当时学前儿童文学教育领域存在着积极的积累、理解和系统化的过程。 让孩子熟悉一本书。

关键词: 学前儿童文学教育; 文学教育的内容; 使用本书的方法。

Abstract. *The article is devoted to the consideration of the features of the formation and development of the literary education of preschool children at the turn of the 19th-20th centuries, when there were active processes of accumulation, comprehension and systematization of pedagogical experience in the field of familiarizing a child with a book.*

Keywords: *Literary education of preschool children; content of literary education; methods of working with the book.*

Literary education of preschoolers is a purposeful process of comprehensive formation of a child's personality under the influence of a book. Literary education as a pedagogical process is aimed at solving a set of problems: the formation of ideas about literature as the art of the word; development of aesthetic perception and aesthetic taste; development of mental processes (thinking, speech, attention, memory, imagination); fostering interest in folklore and fiction; education of moral feelings.

The term "literary education" was widely used at the end of the 19th - beginning of the 20th centuries in pedagogical works that reveal the issues of the methodology of teaching literature in various types of educational institutions in Russia. Literary education was interpreted as "a great state, patriotic cause in the sense of raising the mental and moral level of society" (V.P. Ostrogorsky).

The origins of the literary education of preschoolers as a branch of pedagogical science are clearly found in the literary-critical works of the 17th-mid-19th centuries, affecting the most important problems of raising and teaching children

by means of literature (V.G. Belinsky, N.A. Dobrolyubov, V.F. Odoevsky, L.N. Tolstoy): the role of the book in the upbringing of the child, taking into account the age-related characteristics of the perception of the work by the child, methods of familiarization with the work of art, criteria for selecting books for reading to children, the formation of a reading circle for children, etc.

The tradition of including folklore and fiction in the pedagogical process with the aim of all-round development of the child's personality was founded by K.D. Ushinsky, who developed the doctrine of the native language in the middle of the 19th century. He saw one of the goals of the initial teaching of the native language in the child's assimilation of "forms of the language developed both by the people and literature." The "duty" of the teacher is "through the word to introduce the child into the area of the spiritual life of the people" [4, p. 41-42].

K.D. Ushinsky pointed out that "when studying samples of folk art, one should keep in mind the preparation of material for the future study of the history of literature and not only inform children of this material, but also help them understand the true meaning of a particular work, making critical assessment accessible to the age of students" [4, p. 43]. The teacher primarily cared about aesthetic education, about the perception of works in the unity of content and form. As for moral education, K.D. Ushinsky emphasized the self-sufficiency of works and the connection between moral and aesthetic feelings: "the moral feeling should be directly affected by the work itself, and this influence of literary works on morality is very great: that literary work is moral, which makes the child fall in love with a moral act ... In addition, any sincere pleasure graceful is in itself a source of moral feeling" [ibid.].

E.N. Vodovozova, a follower of K.D. Ushinsky, continuing the teacher's thought, wrote about the relationship between aesthetic feelings and the moral improvement of the individual: "The development of an aesthetic feeling should not only not be hindered, but it must be called out, since it, elevating the human soul, ennobles it. It has been noticed that in children a sense of beauty and love for music are manifested even in infancy ... Under the strong impression of any kind of aesthetic pleasure, musical, artistic or poetic, a person becomes softer, more sensitive, nobler, kinder, more easily forgives insults and insults, rather, he does good to his neighbor, becomes more attentive to others [1, p. 106-107]. E.N. Vodovozova developed and tested an original system of education and upbringing of children, the substantive basis of which was oral and poetic creativity (small folklore forms, fairy tales, songs), included in conversations, games. She practiced explanations in the process of reading works.

The development of literary education for preschool children was largely based on the methodology of teaching the Russian language and literature in elementary school. Ideas K.D. Ushinsky, V.Ya. Stoyunina, V.I. Vodovozova, V.P. Ostrogor-

sky and other domestic methodologists-linguists proved to be productive for the system of preschool education, for example, the construction of pedagogical work on the basis of the cultural heritage of the Russian people.

The development of public preschool education in the 1860s-1910s was facilitated by theoretical achievements in various fields of scientific knowledge (physiology, psychology, psychiatry, pedagogy, literary criticism, linguistics, etc.) and the generalization of empirical data.

This period is characterized by the close attention of a wide range of researchers (psychologists, teachers, doctors, writers, editors, directors of educational institutions, etc.) to the issues of reading children of different age groups. As a separate stage in the development of the reader, preschool is singled out. Love for reading A.E. Korolkov calls “an innate human need”, as well as curiosity, inquisitiveness of mind, desire for communication [5, p. 3]. In order to «help parents and educators understand children’s literature, to establish the suitability of a particular book for a certain age group,» extensive critical and bibliographic literature is published: reference books, catalogs containing systematized lists of books; collections of reviews of the best children’s books and magazines; pointers; guidance articles; notes for parents, librarians, folk teachers. Many publications were the result of understanding the experience of parent circles and special commissions that served as a kind of social and pedagogical centers in St. Petersburg and Moscow (Moscow Commission under the Society for the Propagation of Technical Knowledge, the Commission of Storytellers at the Griboedov People’s Library and Reading Room, the Parents’ Circle at the Pedagogical Museum military schools, etc.).

At the beginning of the twentieth century, “Publicly available courses on preschool education” were published, which included lectures by P.P. Blonsky, M.M. Rubinstein, K.N. Wentzel, L.K. Schleger, M.Kh. Sventitskaya and others, read at the Moscow City University named after A.L. Shanyavsky for «beginners» in the upbringing of young children. The authors of the courses, summarizing the results of their pedagogical experience, formulated provisions that subsequently formed the basis of the theory of preschool education.

At the turn of the century, well-known figures of preschool pedagogy, organizers of folk kindergartens in Russia - M.Kh. Sventitskaya,

A.S. Simonovich, E.I. Tiheeva, L.K. Schleger - contributed to the process of separating preschool pedagogy into an independent branch of pedagogical science. Developing the content, forms and methods of education and upbringing of children at preschool age, they determined the place of literature and folklore in the work of the kindergarten. It should be noted that the content of pedagogical work in preschool institutions at the turn of the nineteenth and twentieth centuries varied.

So, «the best literature for young children» E.N. Vodovozova, M.Kh. Sventitskaya, E.I. Tikheev considered a fairy tale, and the best method of presenting it to children is storytelling. “A fairy tale is always interesting, as it is full of events and provides rich food for the imagination; it takes you to a tempting world where everything is possible, and where the most diverse feelings and situations are experienced together with the hero, and this is the life of the soul that captivates and gives pleasure. The very content of fairy tales, where... goodness and justice triumphs, where courage, boldness and nobility of the soul give the best results, involuntarily affects the soul of a small person, awakening in him the first rudiments of high moral feelings» [3, p. 14]. However, in kindergartens organized according to the Montessori system, fairy tales were not read or told to children under 7 years old. “... I don’t want to support the credulity inherent in the immature mind of a small child, devoid of experience and knowledge of reality, which still lacks the critical ability to distinguish the true from the false, the beautiful from the rude, the possible from the impossible. Fairy tales develop an illusory imagination in children ... based on empty gullibility ... In them, goodness is often quite suspicious, and there is a sufficient amount of both injustice and cruelty in them ... Through fairy tales, children cannot be made either kinder or nobler”(Yu. I. Fausek).

The content (what texts to acquaint preschoolers with?) determined the method of working with the text: storytelling, reading with explanations, reading by heart, dramatization, etc. E.I. Iordanskaya, summarizing the experience of folk kindergartens, wrote: “Playing with singing, learning simple melodic songs, poems, stories, reading the leader - all this is carried out in kindergartens without encountering any special difficulties” [2, p. 34-35]. Russian fairy tales, fairy tales of the Brothers Grimm and G.Kh. were widely used. Andersen, educational books by K.D. Ushinsky («Native word», alphabet, literacy primer).

L.K. Schleger, speaking of “the material that is in the hands of leaders and which serves to satisfy the needs of children, for their constant mental and moral development”, divided it into two groups: 1) tangible material and 2) purely spiritual material ... - conversations, storytelling fairy tales, reading, music, games, rhythmic movements [6, p. 21]. Schleger criticized the programs of American kindergartens and Pestalozzi-Frebel kindergartens for the fact that they “provide material and instructions for mental development” (tangible material), “but do not touch the inner life of the child, his psyche, and this side is just the most important at this age, the most hidden, and does not lend itself to any program» [6, p. 55].

M.Kh. Sventitskaya in the list of books for children of the fifth and sixth year of life included picture books (where pictures, not text, occupy a central place) and books with text that is being told. In work with children of the sixth year of life, collections of Russian folk and author’s fairy tales were also used, «serving as material for storytelling» [3, p. 67].

Materials covering the experience of working in kindergartens (reports on work, pedagogical essays of leaders, etc.) indicate that teachers are aware of the idea of integration and types of children's activities at different stages of acquaintance of preschoolers with works of folklore and literature to solve the problems of the comprehensive development of the child.

Laying the foundations for the methodology of literary education for preschoolers, teachers looked for the most effective methods and techniques for influencing the child (teaching storytelling from pictures, reading and telling literary works, talking with children after reading, dramatization, teaching reading and writing). On the one hand, it was important to support the activity of children in the process of perceiving works, on the other hand, to achieve an understanding of the text, to preserve the «freshness of impressions» (M.Kh. Sventitskaya). Solving these problems, teachers followed the following paths: «from the child» - starting from the peculiarities of the child's perception and understanding of works; «from the text» - relying to a greater extent on the artistic and aesthetic originality of a work of art, its interpretation. Of decisive importance was the objectivity of the data obtained on the specifics of the perception of works by preschoolers of different age groups. Practical solutions to the problems of education and upbringing by means of literature in preschool institutions were associated with the selection of literary texts accessible in content and form and the determination of the methodology and work with the book (primary presentation of literary material, activation of activities related to the content of the work).

Due to the recognition of the requirement of accessibility as mandatory, it was proposed to change the author's text, add some explanations or shorten it. Later, in pedagogical and literary works, many critical statements were made against practitioners who freely dealt with the author's text, which is primarily a cultural asset. More E.N. Vodovozova urged teachers to treat the Russian classics with extreme caution, believing that «the alteration of classical works can only be entrusted to a writer.»

The turn of the century can rightfully be called a period of accumulation and systematization of pedagogical experience in the field of familiarizing a child with a book; it was marked by the serious attention of scientists and practitioners to the early period of acquaintance with a work of verbal art. A retrospective analysis gives grounds to assert that, simultaneously with the generalization of empirical experience, there was an accumulation of contradictions both in the selection of works for children and in the methodology of working with them. Contradictions in literary education, in a sense, were a stimulus for the development of this scientific direction.

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跨文化能力为基础的外语教育学视角的翻译专业的大学生学习汉语的过程中真实的宣传视频材料的使用方式

**THE USAGE OF AUTHENTIC VIDEO ADVERTISING MATERIAL
IN THE PROCESS OF TEACHING CHINESE LANGUAGE
TO STUDENTS-INTERPRETERS IN THE FRAMEWORK OF
AN INTERCULTURAL COMPETENCE-BASED METHODIC
APPROACH**

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摘要：在以人为主的能力范式的教育学理论及跨文化能力培养的前提下，现代教育学家有需要研究语言大学学生的（尤其是读翻译及翻译学专业的大学生）学科能力、个人能力以及专业能力的新的提升和形成方式。此文章研究一些通过使用真实宣传材料发展上述能力的教学方式。

关键词：以人为主的能力范式、跨文化能力培养、汉语教学、外语科学中真实材料的使用方法、外语教学中的宣传视频材料的使用方法

Abstract. *In the context of the anthropocentric competency-based paradigm and intercultural approach, it becomes necessary to study new ways of forming educational, personal, and professional competencies of students in language universities and students studying Chinese and specializing in “translation and translation studies” in particular. The article contains various ways of developing these competencies with the help of authentic video advertising materials.*

Keywords: *anthropocentric paradigm, intercultural approach, methods of teaching foreign languages, teaching Chinese, use of authentic materials, video advertising in teaching foreign languages.*

In the modern world, the knowledge of foreign languages is becoming more and more significant. From a simple academic discipline, a foreign language has become a basic element of the modern education system, a means of achieving the personal professional realization. For a long time, the English language dominated in the international arena as a bridge in interethnic communication. However, in the last few decades, the interest in learning Chinese, the language of a most powerful economic country with the largest population on the planet, has risen significantly.

As a result of the change in the Russian educational paradigm and the rapid increase in the flow of information in the world space, cardinal changes are taking place in the field of teaching foreign languages.

At the moment, the anthropocentric paradigm is adopted in methodological science (which includes the thesis “a man is the main subject of knowledge” [3, p. 96]), which takes the development of various educational, personal and professional competencies in students as a basis. The discipline “foreign language”, being interdisciplinary and having unlimited opportunities for the development of both the future professional and the individual skills, is able, with the help of different tasks and exercises aimed at studying the language material, to achieve more than basic mastery of vocabulary, grammar, and language norms. In modern science, the fundamental skill is the ability to communicate in a foreign language, based on the understanding of both foreign linguistic culture and one’s own, and the principles by which communication is held, which requires from a student to be aware of the essence of tolerance – “recognition of identity and an adequate perception of otherness” [2, p. 34].

For students in the field of translation, it is especially important to understand the principles of transformation of linguistic and cultural material with respect for both other and their own culture. It demands readiness to learn more deeply about their own language and people through understanding other people’s lifestyles, in this way students come to the understanding of the dialogue and equality of both linguistic cultures. This approach is called “intercultural” and is being studied by Elena Genrihovna Tareva [7], who emphasizes the respect for one’s own culture and greater awareness of students, who, while studying the foreign language and culture, improve themselves, form a national identity and develop as active citizens of their country.

Using this innovative model of language education in recent years, it becomes possible to use any authentic materials to enrich the content of the educational process and develop personal and general professional competencies.

The aim of this article is to describe the ways of developing general cultural and general professional competencies among students studying Chinese at the department of “translation and translation studies” using authentic video advertising materials.

For students-translators studying Chinese, it becomes especially important to understand the equivalence of the three translated aspects (according to Leonid Konstantinovich Latyshev [5]): vocabulary, grammar and communicative effect. Under the communicative effect, one must understand the reaction of the audience, which the initiator of communication (the sender) wanted to achieve. This is the key of particular concern in translation teaching: the ability to make translation decisions and use the required strategies for transforming language material to maintain communicative effect, so that indirect communication should still be equivalent to non-mediated (direct) communication. The nature of professional translation competence, according to Tatyana Leonidovna Guruleva [6], is a combination of two competencies: intercultural communication and translation. This makes it possible to use not only a communicative technique in foreign language classes, but also to study the specific characteristics of the translation process.

These tasks are included in the practical course of the Chinese language, through using the communicative method and introducing elements of translation to achieve the set goals.

Foreign video advertising has already been successfully used in the educational process of sinologists as an authentic material that allows them to better understand a different linguistic culture and, as a result, understand the axiological system of the people of the language studied. Video advertising provides the teacher with the opportunity to interact with students when studying lexical and grammatical material, stylistic aspects, means of influence (rational influence, emotional influence and inclusion in a certain discourse – classification of Elena Georgievna Borisova [1]) and cultural features.

This article provides the development of this practice, considering the above achievements in the methodology for teaching students-translators specializing in Chinese.

The selection of such material must first be carried out by the teacher together with the Russian material for comparative consecutive study. The integration of such exercises into the educational process can take place as a warm-up activities at the beginning of the lesson, an element of parsing the lexical and grammatical material of the unit according to the main educational and methodological complex, or as a separate module, for example, a course on the localization of literary texts, video advertising messages and translation adaptation. This practice will allow increasing the creativity of students, introduces elements of interactivity, follows the principle of an individual approach and the tasks of teaching and developing professional translation competencies.

Here is an example of one pair of ads in Russian and Chinese using video ads for tea that would share a common theme and/or values. One of the authors of this article has already investigated and seen that “the performance and content (video ads) will differ in connection with the target audience” [1, p.384].

For example, the stated topics of the session might be “patriotism” or “culture”. In this case, we suggest considering 2 video ads: the Chinese video advertisement of the brand 《醉春秋》 and the Russian one – ‘Майский чай’ (‘The Maysky Tea’).

The Chinese advertising message emphasizes the deep long history of pu-erh tea, as its text says: “把时间藏进这柄茶里，把情意融进这柄茶里，为生命中的真诚、时光历久、真情永存——一杯普洱，《醉春秋》”。The voice is accompanied by images of stones on which the water is flowing, the fog – mountain landscapes of China in miniature or against the background of a porcelain bowl with tea. Emphasis is placed on time, eternity of sincere and true feelings that were put into the laborious process of growing this kind of tea; harmony, adopting the experience of previous generations, connection with ancestors are greatly valued. Questions to students can be based on their audiovisual observations. Among the means of appealing to values, students can single out harmony with nature, peacefulness, the fluidity of life, patriotism – pride in the history of tea, the tea ceremony, etc.

After watching the first video, the Russian video is immediately turned on. The Maysky Tea brand bases its messages on the appeal to authorities: for example, to the great Russian poet Alexander Pushkin, excerpts from classical literature are quoted (or the advertising text is introduced as a poetic style) and a video clip is shown with the characters of the 18th century who participate in balls or spend evenings on their estates, classical music is played in the background. The language is stylized as a sublime literary one, along with the preservation of the communicative effect (positive positioning of black leaf tea). The words “the ball has opened”, “high society”, “important figure”, “noble”, “waltz” are heard. The slogan “Maysky tea – revives the golden traditions of taste” contains a certain presupposition: the tea adopted the traditions of the Russian Empire, has a noble taste. It implies the presence of a long history connected with the history of the state.

Students can highlight the following values mentioned in video ads and discuss them as a result of observations: patriotism (love for the country and its history, pride in Great Russian literature), nobility and dignity (high society, aristocracy), communication, joy.

The final educational comparison may include a conclusion about the displacement of patriotic elements associated with cultural characteristics: in the Chinese picture of the world, tea is associated with harmony (mountains, water, fog, tea plantations, serenity, nature) and weak taste (porcelain, transparency, freshness, tenderness, green color), in the Russian picture of the world – with balls, the aristocratic world, bohemian life, with palace tea parties, and at the same time with family, love, friendship, sincerity (heartfelt conversations) and the rich tart taste of black tea.

In the comparison model, students should mention both differences and similarities: for example, Russian and Chinese linguistic cultures share a common value – patriotism (love for one's country, traditions and history), etc.

A reinforcing task can be given by the teacher for the synthesis of new material – a task for localization (adaptation) of a Russian video for a Chinese audience, considering extralinguistic factors.

This task can be simplified and used for a simple translation of a video while maintaining the communicative effect: the ability to use pre-translation text analysis is developed – highlighting the sender's intention, the expectations of the target audience, the differences between Russian and Chinese audiences, etc.

Upon completion of the task, students can reflect: comprehension of the translation while maintaining the communicative effect, mechanisms for changing and adapting video advertising; opinions can be expressed about difficulties identified and solutions chosen: whether a direct equivalent translation will be effective, minor deviations for the sake of preserving the communicative effect be appropriate, other language means of influence be used [4] or if there is a need for a complete restructuring of the source material and, possibly, recommendations for a complete change in the video.

Thus, when teaching students the Chinese language using an intercultural approach, it is necessary to use the material both in a foreign and native languages to develop various personal and professional competencies with a system of exercises that meets the real needs of translation students. In this case, the knowledge, skills and abilities gained in practical classes in the Chinese language at the university will become the basis for achieving the set professional goals, further self-development and professional growth in the future.

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俄罗斯联邦航空航天部队飞行人员身心训练的特点
**FEATURES OF THE PHYSICAL AND PSYCHOLOGICAL
TRAINING OF THE FLIGHT PERSONNEL OF THE AEROSPACE
FORCES OF THE RUSSIAN FEDERATION**

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抽象的。 本文讨论了飞行机组心理和身体训练的准备工作的准备工作，并考虑到训练，提供了发展这些素质所需的建议和建议。

关键词：身体健康、体质、飞行员、心理、力量指标。

Abstract. *The article discusses the preparation of psychological and physical training of the flight crew, the article provides recommendations and advice necessary for the development of these qualities, taking into account training.*

Keywords: *physical health, constitution, pilots, psychology, strength indicators.*

Today, dynamic changes in the military and geopolitical situation in the world dictate increased requirements for the development of military aviation to ensure the national security of the Russian Federation. Our country is on the list of the most combat-ready aerospace forces of the Russian Federation (AF RF) in the

world, thanks to the rapid development of aviation technology and the complication of the nature of flight activities. All this together causes increasing requirements for the professional selection and training of future and current pilots.

The pilot, as you know, is one of the most demanding professions in terms of physical condition, flights on modern fighters are associated with strong overloads, so this profession is suitable only for people with good health and a stable psyche.

Theoretical knowledge, professional skills, physical fitness and endurance are just some of the mandatory factors. Future or current pilots must have impeccable health, high moral and volitional qualities, psychological stability, so training and activities aimed at this are always relevant.

Special attention is given to the peculiarities of the physical and psychological training of the flight crew of the Russian Aerospace Forces. So, psychological training is an integral part of the entire system of training and education of cadets and pilots, it is the purposeful formation of such features of mental processes and personality traits that they need as military leaders and educators.

The main content of the process of formation of psychological readiness for service and combat operations is the strengthening of professional motives of behavior, strong-willed and mental traits of character, improvement of knowledge, skills, mental processes in connection with the specialty.

To improve the readiness of future pilots to fulfill their duties and tasks, it is advisable:

- put cadets in real service conditions when it is required to organize and conduct a lesson;
- increase the pace of activity, reduce the time for making a decision, completing a task for cadets and active pilots;
- to practice solving tactical problems with a lack of information, active counteraction of the enemy, with the presence of elements of risk and danger;
- introduce unforeseen obstacles and unexpected complications into the lesson;
- exercise in comparing and classifying the individual goals of their activities by importance, complexity, timing of achievement;
- set tasks that require independent and creative solutions;
- create situations leading to private failure and requiring increased activity in the future.

In higher military aviation educational institutions, training facilities are widely used for the purpose of moral and psychological preparation. Training complexes and equipment make it possible to visualize and repeatedly play difficult situations, simulate interference, determine and improve flight skills, stimulate creative thinking, and increase emotional and volitional stability.

The flight personnel must be able to maintain and restore their positive mental states in extreme situations, to overcome the emotional consequences of failures

and mistakes. To do this, it is important to form in everyone the ability to translate involuntary emotional reactions in difficult situations into conscious, regulated ones, to help them master the techniques of self-management and autogenic training.

A teacher or commander, having studied the individual characteristics of the personality and activities of cadets and pilots, can help him draw up an individual plan for working on himself, foresee the setting of such tasks, the fulfillment of which will lead to the development of flight readiness.

Particular attention deserves the physical training of flight personnel, since for this class of military personnel, the performance of their duties is associated with a constant stay in extreme conditions for the human body: high altitudes and high flight speeds, overload, load on the vestibular apparatus, etc. All this requires a special approach to the development of the physical qualities of the crew.

Along with qualitative selection, much attention is paid to maintaining health, improving and developing basic and special physical qualities, depending on the stage and profile of training. So in the junior courses, the development of basic physical qualities (strength, endurance, dexterity, speed) is carried out with the appropriate sets of exercises for this. Starting from the 3rd year, there is a partial differentiation in physical training:

- for fighter and attack aircraft - the development of coordination and power qualities;
- for long-range and military transport aviation - the development of vestibular stability, strength endurance, and coordination qualities, the development of extensor muscles, which is associated with long distance flights;
- for operational-tactical aviation - increasing the endurance of the muscles of the spinal region, neck, abdominals and legs;
- for helicopter pilots - development of muscles - flexors and extensors of the press and neck, leg muscles.

The physical training of the flight personnel is aimed both at counteracting adverse flight conditions and at hardening the body, reducing the risk of cardiovascular diseases. To this end, systematic exercises are organized for them on special simulators and equipment (stationary gymnastic wheel, turns on loping in two planes, jumps and combinations on a trampoline). In addition, general physical training classes are held in sections: gymnastics and track and field training, athletics, overcoming obstacles, ski training, hand-to-hand combat, sports and outdoor games.

During the physical training of cadets, much attention is paid to the development of their resistance to factors that have a negative impact on the body during the flight. Consider the most significant factors.

In modern highly maneuverable combat, accompanied by high speeds, the pilot has to experience significant overloads on his body. The negative effect is a

violation of blood circulation, due to which there is a decrease in concentration and a deterioration in well-being, up to loss of consciousness.

In order to increase this type of load, the pilot needs to have sufficiently powerful leg and abdominal muscles, so exercises that strengthen their strength and endurance are relevant, such as:

- lifting coup on the crossbar;
- lifting the legs to the crossbar;
- raising legs in a prone position;
- flexion of the body in the prone position;
- running at a distance of 400, 800, 1000, 1500 m;
- swimming at various distances and diving.

In order to simulate accelerations to strengthen the reflex tension of the smooth muscles of the vessels with the military personnel of the flight personnel, exercises are carried out on loping, jumping on a trampoline, from a springboard and into the water, as well as rotations on a stationary gymnastic wheel.

The next factor that has a significant impact on the pilot is motion sickness. It is characterized by irritation of the vestibular apparatus and internal organs (stomach, intestines).

The meaning of physical training is to increase resistance to motion sickness by influencing the most sensitive organs and the vestibular apparatus with acceleration. For this, exercises are performed on special simulators, as well as active training, which includes:

- acrobatic exercises (somersaults, flips, pair exercises, headstand);
- exercises on gymnastic equipment (revolutions on the crossbar, uneven bars, slopes, hangs);
- walking and running with head turns.

An important factor affecting the crew is also hypoxia, which leads to oxygen starvation due to insufficient supply of organs and tissues of the body with oxygen. This leads to impaired coordination, resistance to overload, motion sickness.

In addition to the applied methods of adaptation of the body at high altitudes, physical exercises also help to achieve a high level of resistance to this factor. To do this, the following exercises are included in the training program for the flight crew and maintaining their physical condition in the norm:

- running for 1-3-5 km, carried out by sequential, variable and repeated methods;
- cross-country skiing 5-10-15 km at a steady pace at low speed;
- swimming 100, 200, 400, 800 m and 1.5 km freestyle at a slow pace.

Breathing under excess pressure is also one of the factors affecting the body during the flight and requires special attention. Modern protective suits make it possible to pump oxygen into the lungs in the required amount, without displac-

ing carbon dioxide with accumulated vapors and gases, but at the same time, the breathing cycle is disrupted and a sharp increase in heart rate and a drop in blood pressure, which has a negative impact on the condition of the crew.

In order to develop resistance to this factor in the pilot's body, directed physical training is organized, which includes deep diving, swimming distances from 200 to 1500 m, which helps to strengthen and develop the respiratory muscles.

Vibration has a great negative effect on the body, as a result of which there is a decrease in concentration, sensorimotor coordination, a reduction in the field of vision, and an increase in blood pressure.

The body's resistance to vibration in pilots is increased by special physical exercises aimed at general relaxation of the muscles, due to which the internal organs are subject to less stress.

In view of the fact that the main significance of general physical training is to develop the qualities necessary for the flight crew to counteract and resist adverse flight factors, the formation of emotional stability, attention, motor and spatial coordination, reaction speed and other skills is achieved through special physical training, in which includes:

- exercises that require suddenness and speed of reaction, aimed at developing the speed of sensory reaction;
- exercises with the limitation of the visual field, ballistic exercises, exercises to determine the distance, which contribute to the development of orientation in space;
- exercises accompanied by psycho-emotional stress, complex coordination exercises that develop the ability to quickly restore working capacity;
- exercises with clearly limited time parameters, a specific number of repetitions per unit of time, designed to improve temporal orientation;
- exercises with or without objects at the maximum pace, developing the intensity of movement;
- exercises with dosing or varying efforts on weight machines, designed to develop static, general and strength endurance;
- relay races, sports games and overcoming obstacles, training the functioning of auditory and sound analyzers.

High physical fitness is one of the main components of a professional pilot-specialist. It requires the development and improvement of both general physical skills and special flight qualities, such as resistance to overload, motion sickness, vibration, hypoxia, low oxygen content, etc. Due to the correct organization of classes, the physical fitness of all categories of flight personnel is growing significantly, which favorably affects the quality of their training, morale and psychological state and the result of their fulfillment of their assigned tasks in extreme flight conditions, as well as the measures taken, have a significant positive impact

in maintaining and strengthening the health of pilots, which is achieved by organizing both general and special physical training.

Undoubtedly, the success of the moral and psychological, as well as physical training of the flight crew directly depends on the psychological and pedagogical preparedness of teachers, their competence. Therefore, the role of mentors in this matter is extremely important.

The combination of all the factors of preparation, physical, psychological, is capable of eventually obtaining a highly qualified specialist, an ace, capable of performing the most difficult task in a real battle.

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论多元文化小说中文化密码之间传播的民族特定概念
ON ETHNO-SPECIFIC CONCEPTS THAT TRAVEL BETWEEN
CODES OF CULTURE IN MULTICULTURAL FICTION

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抽象的。 本文属于致力于研究当代多元文化小说中体现和实现的民族特定概念的系列文章。 本文的重点是特定于民族的概念，这些概念通常与特定的文化准则相关联，但在小说作品的背景下却超越了该准则，如小说《行走在两个世界》（2021 年）所示）和 W. Kinew 的《永恒之路》，并因此在多种文化代码中发挥作用。

关键词：文化代码、民族特定概念、文化精神代码、文化空间代码、文化时间代码、多元文化小说。

Abstract. *The paper belongs to a series of articles dedicated to the study of ethno-specific concepts, as embodied and actualized in contemporary multicultural fiction. The focus of the present article is on the ethno-specific concepts that are normally associated with a particular code of culture but travel beyond this code when in context of a work of fiction, as exemplified by the novels “Walking in Two Worlds” (2021) and “The Everlasting Road” by W. Kinew, and thereupon function within several codes of culture.*

Keywords: *code of culture, ethno-specific concept, spiritual code of culture, spatial code of culture, temporal code of culture, multicultural fiction.*

It is a well-known fact that our mind can turn anything into a sign. What is more, any area of reality perceived through our sensory organs is capable of producing a code of culture (Savitsky, 2019). Being “the innermost spaces of culture” which “define the picture of the world”, the key building blocks that lie at the core of a national culture (Maslova, 2016, p. 80), the way in which these codes of culture manifest themselves varies from culture to culture along with their relative density, which explains why they keep attracting scholars from different fields of knowledge about man, culture and communication. It is not surprising that in cognitive linguistics, linguoculturology and the theory of intercultural communication the most commonly studied codes of culture are the ones that capture fundamental

ideas which determine a culture's way of perceiving the world, Self and Other, and are therefore referred to as "basic". These traditionally include somatic, spatial, temporal, objective, biomorphic, and spiritual codes. Victoria V. Krasnykh emphasizes that "there are and can be no strict boundaries between the codes of culture." (Krasnykh 2001, p. 6).

The focus of the present paper is on the study of ethno-specific concepts that are normally associated with a particular code of culture but travel beyond this code when in context of a work of multicultural fiction, as exemplified by the novels "Walking in Two Worlds" (2021) and "The Everlasting Road" by W. Kinew, and thereupon function within several codes of culture at the same time. The goal is not only to identify such ethno-specific concepts for a particular culture, but also to define the direction of their movement between it's codes.

Wabanakwut Kinew is the leader of the Manitoba New Democratic Party and an influential representative of Canada's First Nations. Being Ojibwe and a status Indian, his cultural identity has made an impact on the author's political trajectory and literary works: the abovementioned books are supposed to resonate at least with Anishinaabe people looking to reconnect with their culture since they make reference to many Anishinaabe teachings. Hence, they abound in names of ethno-specific concepts relevant for Anishinaabe culture in general and Ojibwe in particular. That is the reason why, even though certain details of Anishinaabe cultural teachings have been modified for the sake of preserving the sanctity of the authentic traditions, as declared by W. Kinew in the author's note in "The Everlasting Road", we still find it reasonable to use these multicultural novels to analyze the shift of some Anishinaabe concepts from one code of culture to another.

Considering the restrictions imposed by the required page limit, it is only logical to focus on the Anishinaabe concepts that meet the aforesaid criterion and are of utmost importance to the plot of the two literary works in question. Ethno-specific concepts which are also actualized in "Walking in Two Worlds" and "The Everlasting Road" but are associated with several codes of culture "by default", such as "pow-wow", "dreamcatcher", "Sweat Lodge", are outside the scope of this paper.

The first one of the key Anishinaabe concepts that comply with our requirement is referred to in the novels under scrutiny by the names "northern lights" / "aurora (borealis)" / "waawaate". It should be noted that the third keyword is used in "Walking in Two Worlds" and "The Everlasting Road" not only as an indication of the natural extravaganza, but also in the capacity of the name of both the protagonist's elder brother whom she loses to cancer, and the bot she creates in his image and likeness in the blockchain game called "The Floraverse".

In both multicultural texts the author recurrently underlines the connection between the northern lights and the afterworld, the spirit world. Sources on Anish-

inaabe culture usually describe aurora borealis as ancestral spirits or the torches that they use to light up their path in the afterlife (e.g. Johnston, 1990, Rostoker). This phenomenon is definitely associated with a space that is different from where the person watching the northern lights is located: “ ‘The northern lights are our Ancestors. They’re dancing in the happy hunting grounds, in heaven, the Spirit World.’ ” (Kinew, 2021, ch. 37); “Her people, the Anishinaabe, believed the aurora represented the ancestors dancing in the Happy Hunting Grounds. <...> Bugz thought of her brother and wondered whether he was really still out there somewhere, dancing in the sky or traveling to the Spirit World.” (Kinew, 2023, ch. 34).

Moreover, in accordance with the plot of the novels in question, the ethno-specific concept verbalized by either “northern lights”, “aurora (borealis)”, or “waawaate” due to the author’s intention also operates as part of the spiritual code of Anishinaabe culture. Any activity that can potentially disrupt the borderline between the world of the living and the world of the dead, be it deliberate or accidental, is considered illicit because it will inevitably destroy the existing world order. This is the reason why in both texts the nightly whistle ban is reiterated. That kind of behaviour might lead not only to the occurrence of the beautiful lights in the sky, but also to an individual’s disappearance from the world of the living and their transfer to the underworld, in other words, their death: “ ‘You’re not supposed to whistle at night.’ Feng listened. Bugz took his silence as an invitation to continue. ‘They say if you whistle at night, the northern lights will come and take you away.’ ‘Is that bad?’ Bugz looked at Feng as if he were an innocent child. <...> ‘Yeah, it’s bad.’ ” (Kinew, 2021, ch. 37); “ ‘Anyways, it’s not good because we’re supposed to keep the living and the dead separate. If you invite the northern lights here, you’re inviting death. If they take you away, it means they take you away to heaven.’ <...> ‘All I know is my brother is here now. And I want him to stay with us. Here. On this side.’ <...> ‘Waawaate. His name means ‘northern lights.’ ’ <...> ‘This one time we came out in the bush, a bunch of us kids. We saw the northern lights dancing high above us, green and turquoise. And Waawaate starts whistling. All the kids got scared and yelled at him: ‘No,’ ‘Don’t,’ ‘You’re not supposed to do that!’ <...> One of the kids runs away, and then we all start running away, running for our lives. Waawaate’s chasing after us, yelling through the bush, ‘Waawaate niin! Waawaate niin!!’ — which means ‘I am the northern lights!’ ” (Ibid., ch. 36).

Furthermore, the protagonist’s attempt to replicate her deceased brother in the virtual space of the Floraverse results in a catastrophe for the whole blockchain game, let alone her own psychoemotional state, because the bot that was supposed to be her companion eventually tries to destroy everything and everyone in the Floraverse as well as the game itself: “ ‘Why did you create me?’ <...> ‘Wasn’t I supposed to help you bring your brother back from the other side? Didn’t you in-

vite me to cross from the land of the dead back into the world of the living?' <...> Bugz felt a flash of guilt. All her life, she'd been taught to keep the living and the dead separated. A reminder was right there in her brother's name: Waawaate — the northern lights, the aurora representing those who've passed on, who must not be called back down to earth by whistling." (Kinew, 2023, ch. 29).

Taking this into account, we can conclude that along with the idea about the two types of space that should not be integrated, the image of aurora borealis goes hand in hand with the teachings about culture-specific values, about the proper conduct and the unacceptable patterns of thinking and behavior that are to be transmitted from generation to generation to perpetuate culture, in particular, the unthinkability of even entertaining the idea of changing the existing world order. In other words, the lexemes used to verbalize the aforementioned concept in the multicultural novels "Walking in Two Worlds" and "The Everlasting Road" act as allegories and symbols which reflect a fragment of Anishinaabe axiology.

Another ethno-specific concept which is of great significance not only to the Anishinaabe but also other First Nations and is worth mentioning within the framework of this research is the one represented in the two novels by the English lexical units "(wild) strawberry" and "heart-berry". The role of strawberry in the lives and teachings of many Indigenous people as a traditional medicinal plant and as a symbol cannot be overestimated. The name of this heart-shaped berry in Ojibwe literally means heart berry, hence, it is not surprising that it serves in W. Kinew's fiction as an element of the spiritual code of Anishinaabe culture. According to Ojibwe teachings, strawberry is associated with finding and maintaining personal balance: it symbolizes the peace that comes from the heart, the healing of the soul, the kind of inner freedom that a person attains through reconciliation with death (Pitawanakwat).

Thus, in the final chapter of the novel "The Everlasting Road" strawberries are mentioned in connection with the Sweat Lodge. They are prepared for the purification ceremony along with cedar water and hot rocks ("Bugz's father came from the house carrying a pail of steaming cedar water. His mother followed with a plate of strawberries. 'Well, the rocks are pretty much ready to go. We can go in as soon as Liumei gets here,' Bugz's father said.") (Kinew, 2023, ch. 47). Strawberry is also referred to in one of the chapters dedicated to the journey that the protagonist's brother undertakes to reach the Happy Hunting Grounds in the Spirit World. It operates as the indicator of the character's readiness to achieve his ultimate goal, as well as the measure of perfection of the place on the Path of Souls where he finds himself: "I am not yet in those Happy Hunting Grounds, he thought to himself, for my heart still aches. But I will know that place by its perfection. As he began to walk again, he realized he was at the foot of a large hill. <...> The strong wind blew some of the brush over to his right, and there he caught a glimpse

of a strawberry bush <...>. Waawaate could not resist. <...> Waawaate brought the heart-berry to his face. He could see all the colors of the setting sun in this tiny fruit. He placed it in his mouth. Perfection.” (Ibid., ch. 40).

It is noteworthy that in the abovementioned chapter strawberry is introduced as a signal for Waawaate to keep going, as a means of encouraging him to literally and figuratively pursue his path and find peace of heart and mind: “As he prayed, the gruff voice of the Elder came to him. *There should be a strawberry just up ahead, just a little farther on this path.* <...> He walked for so long that he grew bored, yet Waawaate knew he had to continue moving forward... so he counted his steps. <...> Waawaate looked down to his feet. He came to a standstill. ‘There it is,’ Waawaate said quietly to himself as he stared at a strawberry beaded into the vamp of his moccasin. He brought his other foot in line with his first and found a second beaded strawberry.” (Ibid.). The strawberries that move together with the moccasins of the character are presented not only as a traditional Anishinaabe beadwork pattern, but also as a measure of his inner freedom and the distance he covers on the Everlasting Road. The farther he goes, the lighter his heart is. It becomes even more obvious that, being an important Anishinaabe concept, strawberry functions as part of the spatial code of culture as well as spiritual, when Waawaate sees a wondrous mountain covered with bushes of wild strawberries dancing in the breeze to the music of the ancestors singing and calling to him: “To his left, to his right, straight up ahead, all Waawaate could see were these plants blowing in the breeze, the tiny fruits seeming to dance on their branches. The strawberry mountain. <...> The strawberries danced all over the mountain. The ancestors sang to him, calling him home. His heart ached for all he’d left behind. The Elder spoke again. *There is no looking back, only moving forward.*” (Ibid.). In accordance with the words of the Elder guiding Waawaate, the way to achieve inner peace after death is to advance onward and upward, and as he proceeds along the Everlasting Road, the number of strawberries on his way increases, as does the intensity of the bushes’ dancing moves.

The next ethno-specific concept that should be mentioned in connection with the goal of this research “overflows” the spiritual code of culture similarly to the concept “wild strawberry”. This Anishinaabe concept which is relevant for many First Nations is verbalized in the novels “Walking in Two Worlds” and “The Everlasting Road” exclusively by the English lexeme “hair”. On the one hand, the way the hair of Ojibwe characters is represented in the texts under scrutiny is consistent with traditional teachings: it is seen as a symbol of their cultural identity, a sign of being proud of belonging to their group, being recognizable to their ancestors, even a source of spiritual strength (e.g. Linn, 2015, Treuer, 2023). Hair is decorated in special ways for important events such as pow wows, it indicates a close and trusting relationship between people, it is used as a symbolic shield to

protect a loved one from harm, etc.: “Waawaate walked toward Bugz in his grass dance regalia, long fringes flowing like prairie grass from his shoulders, arms, and legs. <...> A long porcupine-hair roach sat atop his braided hair. Bugz craned her neck to look up at her brother as he stood beside her. He’d inherited their dad’s height and their mother’s looks.” (Kinew, 2021, ch. 8); “Her jingles splayed in all directions, the eagle plume in her hair danced in the breeze, and her expression froze with the realization of her inheritance.” (Ibid., ch. 6); “ ‘I’m your friend.’ Stormy looped a hair tie around the end of the braid she’d finished. ‘Really?’ ‘No, I’m just using you to get to Waawaate.’ They both burst out laughing and Stormy set to work braiding the rest of Bugz’s hair.” (Ibid., ch. 49); “She remembered how her hair had fallen across his face, as though shielding him from what tormented him.” (Kinew 2023, ch. 2). In addition to that, in the second novel the significance of cutting hair as a means of paying respect to a deceased person is described: “ ‘You know, as Anishinaabe people, traditionally we’d cut our hair when we lost somebody we cared about. While people may not do it as often today, I respect the fact you’re trying to honor that tradition.’ ” (Ibid.).

Nevertheless, it turns out that for the protagonist manipulating hair is not just an emotional response to the death of her brother or a way of upholding a tradition. After the funeral she also modifies the looks of her ‘Versona, the avatar in the Floraverse, by shortening it’s hair among other things, whereas some time later, after the incident with hate comments on the Internet and the struggle against Waawaate-bot in the blockchain game, the girl makes the ‘Versona’s hair long again, getting it back to it’s state before the cut: “She tweaked the skin back to the way she looked in real life. She ditched the ‘Versona’s bodysuit for her black hoodie. She scrunched her face at the image of herself on the device. Bugz gave the virtual version of herself long hair again, the way it had been before Waawaate’s funeral.” (Ibid., ch. 38). Transforming her ‘Versona’s appearance, and her hair in particular, the protagonist marks the decisions she makes in the real world, it is her symbolic way of setting milestones. Changes in the hairdo, be it her own or her ‘Versona’s, are used by the girl to capture the most crucial events in her life, they serve as lines between “before” and “after”. Thus, the ethno-specific concept “hair” works in the given multicultural novel not only as part of the spiritual code of Anishinaabe culture, but also as an element of the temporal code, as a means of dividing the flow of time into segments: marking the stages of one’s life and the pivotal decisions, drawing temporal boundaries between the key events.

At the core of the issue in this article is the idea that ethno-specific concepts verbalized in multicultural fiction can travel from one code of culture to another. A balanced assessment of the way Anishinaabe concepts function in the novels “Walking in Two Worlds” and “The Everlasting Road” by W. Kinew would be that, firstly, due to the author’s intention that influences both the plot and the way

in which the message is conveyed to the reader, these ethno-specific concepts operate within several codes of culture simultaneously; secondly, it is possible for these concepts not only to shift into the most spatious, “inherently ontological” (Maslova, 2016) and therefore all-encompassing code of culture, that is the spiritual one, but also in the opposite direction, from the spiritual code to the more compact codes of culture, such as the spatial or the temporal code. This makes it possible for the author to succeed in attracting the readers’ attention to the codes of culture which are not typically associated with the ethno-specific concepts used in the novels. As a result, the target audience, whether familiar with the culture depicted in the text or not, is given a wonderful opportunity to feel, understand and interiorize the fundamental values and behavioural patterns of this culture.

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汉语母语者联想单位的实验研究

**EXPERIMENTAL STUDY OF ASSOCIATIVE UNITS OF NATIVE
CHINESE SPEAKERS**

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抽象的。本文介绍了在中国学生中进行的自由联想实验所确定的以汉语为母语的人的联想领域。特别考虑由百分比频率指数为所有反应总数的10%或更多的反应形成的关联场的中心。同时,实验中注意到影响中国学生联想产生的因素,如中国或俄罗斯文化的影响因素、文化知识的缺乏和先例现象,以及评价、情绪和感受。的测试线人,进行了更详细的分析。

关键词: 联想单位、联想场中心、自由联想实验、文化、先例现象。

Abstract. *The article presents the associative fields of native Chinese speakers identified as a result of a free associative experiment conducted among Chinese students. The centers of associative fields that are formed by reactions with a percentage frequency index of 10% or more of the total number of all reactions are considered in particular. At the same time, the factors noted during the experiment that influence the associations that arise in Chinese students, such as the influence factor of Chinese or Russian culture, the lack of cultural knowledge and precedent phenomena, as well as the assessments, emotions and feelings of the test informants, are analyzed in more detail.*

Keywords: *associative units, center of the associative field, free associative experiment, culture, precedent phenomenon.*

Currently, the human factor has begun to attract more and more attention of linguists, since “anthropocentric trends in scientific research (and not only humanitarian), and the anthropocentrism of scientific approaches, and the development of disciplines somehow related to the study of man, are far from accidental. The focus of attention of scientists is a Person, and not just homo sapiens as an individual, but homo sapiens is a person, a carrier of consciousness, possessing a complex inner world belonging to a particular culture” [Krasnykh, 2003: 8].

The word is the basic unit of the lexical level of the language and, thus, one of the most important concepts of linguistics. In psycholinguistics, the word is also

considered as one of the basic concepts. Words are minimal, relatively well-defined units that can be analyzed at different levels (including at the levels of signs, letters, graphemes, phonemes, morphemes, semantic and syntactic levels) (see, for example, [Zalevskaya 2005: 244]). In addition, it is absolutely obvious that the word plays an extremely important role in the process of perception of the text. In modern psycholinguistics, one of the most important approaches to the study of the meaning of a word and its functioning in speech activity is the associative approach. Since the last quarter of the twentieth century, this approach has attracted increasing attention of researchers (see the works of such scientists as A.R. Luria, A.A. Leontiev, A.A. Zalevskaya, I.N. Gorelov, Yu.N. Karaulov, N.V. Ufimtseva, Yu.A. Sorokin, V.P. Belyanin, V.V. Red, etc.). Within the framework of the associative approach, the focus is on the associative meaning, the specific internal structure, the deep model of connections and relationships that a person develops through speech and thinking, underlies the cognitive organization of his multilateral experience and can be detected through the analysis of associative connections of the word [Krasnykh 2001: 38]. These associative connections are revealed with the help of associative experiments (in parentheses, we note that in psycholinguistics, an experiment as such is an important research method).

According to A.A. Leontiev, any psychological and psycho-linguistic experiment is aimed at putting the subject in a situation of (controlled) choice and decision-making (although the choice and decision can be both conscious and unconscious) [Leontiev, 2005: 74]. It should be noted that the associative experiment is the most developed technique of psycholinguistic analysis of semantics [Belyanin, 2009: 204]. At the same time, various kinds of associative techniques have become widespread in psycholinguistics [Leontiev, 2005: 77].

In order to answer a number of questions: how are Russian words stored in the linguistic consciousness of Chinese speakers? how are they related to each other? what factors influence the associations that arise among native Chinese speakers in the process of understanding the Russian text they perceive? — an associative experiment was conducted, in which 76 Chinese third and fourth year students studying at various universities in China and studying Russian as their main specialty took part. Russian Russian All our test informants (hereinafter referred to as ai.) passed the IV certification level exam in the Russian language, conducted at various universities in China (Chinese students studying Russian as their main specialty take this exam at the end of the second year of study). The age of our AI. it varies from 20 to 25 years. In the experiment, the method of free associations was used, which is considered one of the simplest and most effective methods of obtaining material [Krasnykh, 2001: 39]. Such an experiment, in which the subject is asked to respond with the word R (reactions), which first came to mind when presenting the word S (stimulus), does not limit either the formal or semantic

peculiarities of the word R [Goroshko, 2005: 54]. According to N.V. Ufimtseva, a free associative experiment makes it possible to obtain information about the psychological equivalents of “semantic fields” and to reveal the semantic connections of words objectively existing in the psyche of a native speaker [Ufimtseva, 2004: 4]. During our AI experiment, the following incentives were offered (15 Russian words and phrases): black monk, black man, ravine, chameleon, giggle, official, dissected air, devil, muff, direct gaze, noble guardianship, collegiate assessor, acid, shake three fingers, shuffle foot.

We chose these incentives for a number of reasons. Russian First of all, the goal was to identify the peculiarities of the perception of the Russian written text (primarily artistic) by Chinese students; the words were selected mainly from the stories of A.P. Chekhov, since A.P. Chekhov is one of the most popular Russian writers in China. Secondly, we needed incentives that would be closely related to Russian culture (among those we include a black monk, a black man, an official, a collegiate assessor). Thirdly, we considered it necessary to include in the number of incentives units that would be relevant not only for Russian, but also for Chinese culture. So, for example, the word acid. This can be explained by the fact that the meaning of the word acid (suan1) in Chinese is often associated with the word vinegar (cu4) — a smell or taste like vinegar, and vinegar is a necessary sauce in Chinese cuisine, i.e. the word acid and the word vinegar in Chinese culture are closely related. In addition, in Chinese there is the expression sour words (suan1 hua4), the equivalent of which in Russian is the expression sweet words1; cf. there is also vinegar (chi1 cu4) — in relation to the ‘envious character (usually about women)’. We assumed that the most frequent reaction to the acid stimulus would be vinegar, and, as our experiment showed, we were right. Fourth, some of our stimuli are present simultaneously in Russian and Chinese (ravine, chameleon, devil, muff, giggle, direct gaze, dissected air, shuffle foot), but, in our opinion, AI reactions, against the background of Chinese and Russian cultures, they should belong to different associative fields. Fifthly, we found it important and interesting to introduce into the composition of stimuli units that not only have no equivalent or analogue in Chinese, but are generally untranslatable into Chinese; for example: shake three fingers in the story “Thick and Thin” (in Chinese, only shake hands).

The experiment consisted of two parts: direct contact and indirect contact. 62 ai. reactions were recorded during direct contact. During the experiment, after the distribution of a large test containing stimuli, ai. was offered to respond in writing with words or phrases that first came to mind (giving no more than 5 reactions). The remaining 14 AI. took part in our experiment indirectly. Incentives were sent to them over the Internet, and the next day they sent their responses. The experiment was conducted in Russian, and AI. It was allowed to use a dictionary during the experiment so that, if necessary, they could check the accuracy of understanding the stimulus words and the correctness of spelling the reaction words.

The data obtained as a result of the experiment were combined into associative fields. A.R. Luria conducted a series of experiments, after which the following conclusions were made: (1) there are semantic fields in consciousness, which include words united by a common concept; (2) in the identified semantic field, it is possible to identify the center and the periphery, where the connection between words weakens; (3) the meaning of words included in various semantic fields are concretized in the speech context; (4) words in our consciousness are connected not only in meaning, but also in form. At the same time, the connection in form is significantly weaker than the semantic connection [Luria, 1998: 105-112].

According to A.R. Luria, in the center of the associative field there are words closest in meaning, on the periphery there are words that have a more distant common meaning with the “test” layer [Luria, 2009: 254]. So, we conditionally attributed reactions with a percentage frequency index of 10% or more among all AI to the center. (at least 8 ai.). In this article, we pay attention only to the center we have identified, since it is the frequency, often repeated reactions that reflect the stable, stable components of linguistic consciousness.

Our analysis of the material obtained during the experiment revealed that the data of the Chinese students of the association can be classified into the following groups: genus — species / species - genus: e.g., ravine — nature, chameleon — animal; category: e.g. ravine — mountain (natural phenomenon); devil — devil (evil spirit); juxtaposition: e.g., acid — sweet, devil — angel; Rating: black man is evil, devil is evil; the purpose of the action: for example, to direct the gaze — [to focus] attention, to shake three fingers — [to express] admiration; place of residence of a person: e.g., black monk — monastery, black man — Africa; a person’s position: for example, noble guardianship — rank, collegiate assessor - official; etc.

In general, as a result of the associative experiment we conducted among Chinese students, we came to a number of conclusions. Let’s present the most important ones.

1. Associations are greatly influenced by culture

Our experiment once again confirmed the opinion of a number of researchers studying associative connections (see the works of A.A. Zalevskaya, Yu.A. Sorokin, N.V. Ufimtseva, etc.) that associations are largely nationally determined and labeled, and therefore they will differ among representatives of different cultures [Krasnykh, 2001: 40]. It should be noted that the following understanding of culture is presented in psycholinguistics: “culture is a special form of consolidation and transmission of development achievements to subsequent generations, and it is culture that is a specifically human way of transmitting knowledge along with hereditary species memory and individual memory” [Leontiev, 1993: 149]. Thus, according to A.A. Zalevskaya, the word-stimulus bread causes a reaction in

Russians — salt, in French - wine, in Germans and Americans — butter, in Uzbeks — tea (cit. by: [Krasnykh, 2001: 40]). Russian Russian and Chinese cultures simultaneously influence the associations of Chinese students studying Russian, as well as the lack of the necessary cultural knowledge. According to our experiment, we can assert that the associations of Chinese students studying Russian are influenced by Chinese and Russian cultures at the same time.

The cases of the influence of Chinese culture on associations arising among native Chinese speakers noted during the experiment: The reactions of Chinese students clearly demonstrated the active participation of Chinese culture in the process of the emergence of free associations among Chinese students. As an example, let's give a pair of black monk — bald. This is due to the fact that in China the most widespread religion is Buddhism, Buddhist monks are known to be bald, therefore, in the minds of Chinese students, a monk should be bald. Another curious associative chain: acid — vinegar, love, woman. As we noted earlier, acid (cu4) in Chinese culture has several meanings: (1) the necessary sauce of Chinese cuisine, (3) envious nature, jealousy, usually inherent in women. In Chinese, there is an expression there is vinegar (chi1 cu4), usually used in relation to envious/jealous women. For example, when a young man has a close relationship with different girlfriends, his girlfriend will eat vinegar (chi1 cu4). Here is another example. In the story of A.P. Chekhov's "Thick and thin" has such a phrase: "Slim shook three fingers, bowed his whole body and giggled like a Chinese: "hee-hee-hee." In the minds of Russians, as shown not only by Chekhov's text, but also by our aerobatic surveys, the Chinese are giggling, and in the knowledge of the Chinese, the Japanese are giggling. In this regard, it is not by chance that in our experiment, as a reaction to the word-incentive to giggle, eight Chinese students wrote Japanese as the first word that came to their mind.

2. Precedent phenomena play an important role in the process of the emergence of associations

As is known, the following phenomena are among the precedent ones: (1) well-known to all representatives of the national linguistic and cultural community ("having a superpersonal character", according to Y.N. Karaulov); (2) relevant in cognitive (cognitive and emotional) terms; (3) the appeal (appeal) to which is constantly renewed in the speech of representatives of a particular national-linguistic-cultural community [Krasnykh, 2002: 44-45]. In this case, the precedent text is understood as a complete and self-sufficient product of speech-thinking activity; (poly) predicative unit; a complex sign, the sum of the values of the components of which is not equal to its meaning; the precedent text is well known to any average member of the national linguistic and cultural community; reference to the precedent text can be repeatedly revived in the process of communication through precedent statements or precedent names associated with this text. The

precedent texts include works of fiction, lyrics of songs, advertisements, jokes, political publicistic texts, etc. [Krasnykh, 2002: 48].

3. Emotions, feelings, assessments and attitudes to stimuli are reflected in AI reactions.

“Evaluation, as an integral part of the total mutual information of the stimulus and reaction, is more or less present in all the different types of responses in which we see manifestations of linguistic consciousness” [Karaulov, 2002: 761]. The number of reactions noted by us that are in the center of the associative field and express emotions, feelings, assessments and attitudes of AI. to stimuli, it turned out to be equal to 21, which is 28% of all words that are in the center of the associative field. For example: a black man is poor, a chameleon is cunning, a giggle is cunning, an official is rich, a muff is warm, the devil is evil, dissected air is fast, noble guardianship is rich, a collegiate assessor is poor, etc.

Thus, the analysis of the data obtained as a result of the associative experiment we conducted among Chinese students allows us to draw the following conclusions: the associative experiment is an effective method for elucidating reciprocal connections hidden in words stored in memory. The experiment can also clarify the relationship between words, the relationship of the word with culture — both with the native and with the culture of the country of the language being studied. Russian Russian in China, students should pay attention not only to the superficial meaning of words, but also to what is associated with a particular word, namely, the connection of one word with other words and the connection of the word with Chinese and Russian cultures.

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儿童英语文学中的表达语法
**EXPRESSIVE SYNTAX IN ENGLISH LITERATURE FOR
CHILDREN**

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抽象的。 本文致力于研究表达句法在儿童文学中的作用（基于英语材料）。分析了各种表达句法手段。 特别关注括号、省略结构、倒装、句法重复、分组结构、主格句子、反问句的作用、功能和频率。 书中使用的标点符号的表达潜力得到了体现。 研究结果如下：表达句法手段在儿童小说中被广泛使用，并在其中发挥着非常重要的作用。 它们有助于创作情感文本，帮助作者引起对某些信息的注意，模仿口语演讲。 不同的表达句法手段经常在同一个人物中一起使用。

关键词：表达句法、表达句法手段、儿童文学、英语。

Abstract. *The article is devoted to the study of the role of expressive syntax in literature for children (based on the material of the English language). Various expressive syntactic devices are analyzed. Special attention is paid to the role, functions and frequency of parentheses, elliptical constructions, inversions, syntactic repetitions, parcelling constructions, nominative sentences, rhetorical questions. The expressive potential of punctuation marks used in the book is indicated. The results of the study are the following: expressive syntactic devices are widely used in children's fiction and play a very important role in it. They contribute to the creation of an emotional text, help the author to draw attention to certain information, imitate colloquial speech. Different expressive syntactic means are often used together within the same sentence.*

Keywords: *expressive syntax, expressive syntactic devices, literature for children, the English language.*

Expressive syntax plays an important role in the organization of texts of different types. Researchers note the special functions of expression means at the syntax level in media texts, primarily in advertising messages [3; 4; 7; 8; 9]. Many scientific papers have proved the importance of syntactic expressiveness in fiction [2; 5]. As O. V. Alexandrova rightly notes, the expressiveness of the text of fiction is determined by the essence of art, it is used not only to express this or that

content, but, most importantly, to reflect a person's feelings and experiences, to appeal to a person's feelings, to awaken an emotional reaction to what is being communicated – love and hate, joy and sorrow, pride and shame, etc. [2, p.45]. It is obvious that in fiction for children expressive syntactic means should perform a significant function.

The analysis of Mary Norton's book "The Borrowers Afloat" [11] allows us to conclude that expressive syntax is widely used in it. In most sentences in the research material there are some of the syntactic means related to the expressive sphere: parenthetical additions (in 11% of the total number of analyzed sentences), elliptic constructions (in 7% of cases), inversion (3%), syntactic repetitions (3%), parcelling constructions (1.5%), nominative sentences (1%), rhetorical questions (0.5%), as well as various punctuation marks that add a certain expressive coloring to statements, namely, dashes (in 12% of sentences), three dots (7%), colons (4%), semicolons (3%), exclamation marks (2%).

Let's consider these means in more detail.

Parenthetical additions (parentheses) are words or constructions highlighted by punctuation and prosodic means, included by the author in the sentence in order to clarify, draw attention to some ideas, express their attitude to them. Various types of parentheses from the point of view of structure were found in the research material, namely:

1) one-word parentheses:

Out most of the day, though, and the young boy with him.

Well, there isn't really time now.

Other personalities, then.

2) parentheses - combinations of words:

On the whole, they only took things that could well be spared.

As a matter of fact, I believe it's the other way round: I believe he tells it to her.

3) parentheses - sentences:

There they had been now (he glanced at his watch) for a good hour and a quarter, hunched by the window, talking, talking...

Homily followed, her knees trembling, and emerged at last onto the dim-lit platform beside Pod – an aerial landing stage, that was what it seemed like – which creaked a little when she stepped on it and almost seemed to sway.

He seemed a little embarrassed and sat there frowning and tapping the table with a pewter spoon (one of a set of six, Homily remembered angrily; she wondered how many were left).

As can be seen from the examples given, parentheses in the analyzed work are distinguished by various punctuation marks, namely, commas, dashes and brackets. In addition, it can be argued that there are different types of sentences in terms of the positional arrangement of parentheses (they may be used at the beginning,

in the middle or at the end of the statement). As already noted, parentheses are the most frequent expressive means in the analyzed work.

Elliptical constructions traditionally occupy an important place among the ways to achieve emotionality in fiction, especially in dialogues. English children's literature is no exception. The research material contains various types of elliptical sentences, the missing elements in them may be the following ones:

1) subjects:

"Mustn't grumble," he added as Homily came towards him.

2) predicates:

"Kate, my niece."

3) parts of predicates:

"Do you think so?" said Mrs. May.

4) subjects and predicates:

In the village?

5) subjects and predicate parts:

Been poking the fire with it most likely.

Ellipsis is the second most frequently used expressive syntactic means in the research material. It makes a significant contribution to the creation of an emotional, understandable text for children.

The use of inverted word order in sentences is also aimed at enhancing expressiveness and drawing the reader's attention to certain information. Here are some examples:

Below lay hollow darkness, ahead an open door.

Above this landing, high among the shadows, were the two small rooms allotted them by Lupy.

Very dark it was, this strange new home, almost as dark as under the floorboards at Firbank, and lit by wax dips fixed to upturned drawing pins (how many human dwellings must be burned down, Arrietty realized suddenly, through the carelessness of borrowers running about with lighted candles).

It is worth mentioning the incorrect word order in interrogative sentences, which contributes to the imitation of colloquial, often childish speech:

"But you can't deny that it was a strange old house?"

"Oh," said Mr. Beguid, "so there was a rumpus?"

"And this gardener – you mean to say they believed in these creatures?"

Syntactic repetitions are designed to focus attention on important points. Among the types of syntactic repetitions in the analyzed work, the repetition of homogeneous parts of the sentences is most frequently used. Depending on the number of components, the series of repeating sentence parts in the book under study can be divided into:

1) binomial:

And here was Auntie Lupy, plump and polite, begging Homily please to take off her things

2) trinomial:

And this thin, tall, fairylike creature, neither old nor young, who hovered shyly in the background with a faint uneasy smile, who was she?

3) polynomial:

Any kind of food, of course, and any other small movable objects which might be useful – matchboxes, pencil ends, needles, bits of stuff – anything they could turn into tools or clothes or furniture.

Another type of repetition found in Mary Norton's book "The Borrowers Afloat" is parallelism. Here are some examples:

And there are so many voices... so many people...

"You've lived in a boot since," Pod reminded her, "and you've lived in a hole in a bank. And nearly starved. And nearly frozen. And nearly been captured by the gypsies.

As can be seen, depending on the degree of similarity, both complete and incomplete parallel constructions can be found in the research material [10].

Parcelled constructions help to highlight information in a vivid way. In the analyzed work, this expressive means is used infrequently, but it makes a certain contribution to the organization of the text and its emotional saturation:

"He don't come back much. Once a year for his new clothes. Or if young Tom sends 'im special."

"I can stitch it," said Pod, "with me cobbler's thread. Easy."

Nominative sentences also do not belong to the most common constructions in Mary Norton's book, but they give utterances the maximum degree of expressiveness, especially when used with an exclamation mark:

"Rubbish," said Pod.

"Driver! Yes, that was the name."

The exclamation mark is the most effective punctuation way of giving emotionality, however, in the analyzed text it is used infrequently, mainly in dialogues:

Ah, there Kate would agree with you!

No, no—I don't mean that!

"Oh, dear," Homily had muttered incredulously, "they can't live here!"

"Lend us!" hissed Homily. "Everything they've got was ours!"

Much more often other punctuation marks are used in the book – dashes, three dots, colons, semicolons, quotation marks. Here are some examples:

"Well, there isn't really time now. Mr. Beguid will start hooting.... And old Tom's the one to tell it: he seems to know everything—even what they said and did when no one else was there...."

Arrietty never forgot her first sight of that upstairs room: the warmth, the sudden cleanliness, the winking candlelight, and the smell of home-cooked food.

There were chairs upholstered in rep or velvet, some of them too small to sit in and some too steep and large; there were chiffoniers that were too tall and occasional tables far too low; and a toy fireplace with colored plaster coals and its fire irons stuck down all-of-a-piece with the fender; there were two make-believe windows with curved pelmets and red satin curtains, each hand-painted with an imitation view—one looked out on a Swiss mountain scene, the other on a Highland glen (“Egglestina did them,” Aunt Lupy boasted in her rich society voice. “We’re going to have a third when we get the curtains—a view of Lake Como from Monte’S. Primo”); there were table lamps and standard lamps, flounced, festooned, and tasseled, but the light in the room, Arrietty noticed, came from humble dips like those they had made at home.

It is believed that three dots (marks of omission) indicate the presence of emotional pauses in the text, participate in the rhythmic organization of the text, sometimes convey the significance of what is said [6, p. 495]. A dash can be used to indicate a pause before important information, to show the border of parentheses; it may perform expressive, text-forming and compositional functions [1; 7, p. 20]. The colon is used to introduce additional information, as well as to draw the addressee’s attention to the most significant information. A semicolon is often used in large-volume sentences instead of a dot in order to show a closer connection between the components of a complex sentence [2, p. 117]. All of these punctuation marks make a certain contribution to the expressiveness of the sentences in which they are used.

It should be noted that various expressive syntactic means in the research material may be combined within one sentence. This undoubtedly enhances the emotionality of statements.

In general, the analysis of the material of this study allows us to conclude that the expressive syntax plays a very important role in English fiction for children – they contribute to the creation of an emotional text, help the author to convey the necessary mood to children’s readers, set the pace of reading, imitate the reasoning of the characters and their speech, draw attention to certain information.

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1992-2022年尤格拉汉特-曼西斯克自治州的森林保护和重新造林
**FOREST CONSERVATION AND REFORESTATION IN THE
KHANTY - MANSIYSK AUTONOMOUS OKRUG OF UGRA IN
1992-2022**

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抽象的。 文章分析了尤格拉森林的状况以及森林面积减少的原因。 其中包括通信系统的扩建以及工业和社会设施的建设、“黑伐木者”的非法采伐、森林火灾。 人们注意到它们对该地区生态状况的负面影响。

特别关注在联邦州森林控制框架内“尤格拉自然监督”活动的特点，在实施联邦州森林控制的过程中实施预防性措施以保护该地区的森林面积。 “森林保护”项目。 强调了汉特-曼西斯克自治区-尤格拉地区在实施自然和人工造林方面取得的重大进展。

关键词：林分、重新造林、黑伐木者、森林火灾、休闲退化、环境、环境保护、自然监督、生态。

Abstract. *The article analyzes the state of the forests of Yugra and the reasons for the reduction of their areas. Among them is the expansion of the communication system and the construction of industrial and social facilities, illegal logging by “black loggers”, forest fires. Their negative consequences for the ecological situation in the district are noted.*

Particular attention is paid to the characteristics of the activities of the “Natural Supervision of Yugra” within the framework of the federal state forest control of the implementation of preventive measures to preserve the forest area of the district in the course of the implementation of the federal project “Preservation of forests”. Significant progress in the implementation of natural and artificial reforestation in the Khanty-Mansiysk Autonomous Okrug-Yugra is emphasized.

Keywords: *tree stand, reforestation, black loggers, forest fires, recreational depression, environment, environmental protection, nature supervision, ecology.*

An integral part of the favorable ecological state of the living space of the population of the Khanty-Mansiysk Autonomous Okrug was the preservation of forests and reforestation. However, only during the construction of Surgut in

1997-2002. the area of forest lands of the district decreased by 158 hectares. At the same time, 12487 m³ of wood was cut down [5].

The main reason for deforestation was the need to expand communication systems and build industrial and social facilities. During their construction, timber was cut down on an area of 133.38 hectares with a volume of 11,648 m³. Less damage to the forest fund was caused during survey work, respectively 1.6 ha and 121 m³. It is no coincidence that a veteran of the development of the Tyumen North, First Deputy Minister of Construction of Oil and Gas Industry Enterprises in 1982-1991 G.I. Schmal bitterly wrote about this, referring to the example of Surgut: "In Surgut, it would be more bold to develop the floodplain territories of the Ob River for development, and not cut down the forest in the western part of the city for this" [6, c.185].

Due to the felling of a significant part of the taiga forest during the development of cities, widespread peat removal, violation of the thin soil cover, damage to the root system during mass walking, and changes in the groundwater level, such a forest was subjected to recreational degression. According to the Committee for Nature Management and Ecology of the Surgut Administration, in 2002, 41.6% of the total urban forest area was subject to change. In the undergrowth and undergrowth, damaged and drying specimens accounted for 5-20%. In the forest stand, the proportion of diseased trees increased to 20% of their total number. The forest environment has degraded by 2.5% of the urban forest area. Here, more than 70% of the forest required restoration [5, c.94].

Due to the reduction of forests, not only hydrothermal parameters within the cut forest massif changed, but even microclimatic conditions. Moreover, cases of changes in the meteorological regime were noted: in recent years, wind speeds in Western Siberia have increased to the parameters of tornadoes. At the beginning of 2000, in the Ob valley, a powerful hurricane damaged a fir forest on an area of 800 hectares [2].

Great damage to the ecological state of Khanty-Mansiysk Autonomous Okrug - Yugra was caused by logging and timber trafficking of illegal or dubious origin, which were one of the most acute environmental, social and economic problems of the district. Not infrequently, the construction of roads, power lines and oil pipelines, the construction of wells was accompanied by a violation of the legal grounds established by law for cutting down trees, destroying young growth and forest litter. According to the data of the "Service for Control and Supervision in the Sphere of Environmental Protection of the Khanty-Mansi Autonomous Okrug – Yugra", only in 2014, "black loggers" and oil companies destroyed a significant forest area of the taiga, valued at a nominal value of 2 billion rubles [7].

Commercial felling reached a large scale in the district in areas where "commercial timber" was widespread. There were fellings for the purpose of logging,

which were not carried out by enterprises, but by private individuals. The bulk of entrepreneurs involved in small forestry businesses did not want to invest in improving logging technologies and reviving the forest fund. For this purpose, they attracted “black lumberjacks” to their business, who supplied them with cheap raw materials for processing.

It can be assumed that the low wages of forestry workers and their everyday unsettledness for these reasons provoked them to receive bribes from representatives of profitable businesses and tacitly agree to violate environmental legislation.

No less damage to the economy and ecology of the district was caused by forest fires, the causes of which were the irresponsible behavior of people who made fires without even fearing criminal prosecution. They were also often caused by arson, used by «black lumberjacks» to cover up their crimes. Natural causes also contributed to this: frequent periods of hot and dry weather, frequent thunderstorms.

It should be noted that, despite the significant forest cover of the district, the presence of large areas with swampy soils and its flat surface did not create favorable conditions for the emergence and rapid spread of forest fires. But in the context of global warming, as well as in dry years, a large number of fires occurred in the region, accompanied by a rapid spread of fire. Large fires (more than 100 hectares) in the district accounted for only 6-10% of the total number of fires, but they accounted for 35 to 75% of the entire area damaged by fire. The largest number of forest fires (more than 80%) occurred in the logging zone, along logging and railway roads. This was especially pronounced in the years of intense fire. For example, in 2012, the number of large fires was 26%, and the area affected by fire was 90%, causing especially great damage to remote sparsely populated areas[1].

In addition to material losses and expenditure of funds, forest fires in the Khanty-Mansiysk Autonomous Okrug - Yugra caused great damage to the natural environment. And these losses, outwardly hardly noticeable, were much more significant than those that were taken into account and reflected in the acts on forest fires. For a number of years, mushrooms and berries disappeared from the burnt areas, the species composition of the fauna was sharply depleted, and at the same time insect pests of the forest and fungal diseases became widespread. They spread to neighboring areas untouched by fire. The burnt area became dead, the production of plants and animals stopped. After forest fires in the district, swamp-forming processes intensified, which led to water erosion of the soil.

Nature Supervision of Yugra, within the framework of the federal state forest supervision, carried out a number of preventive and control measures to preserve the forest massif of the Khanty-Mansi Autonomous Okrug - Yugra. To implement the activities of the federal project «Preservation of Forests» in 2020, 74.6 million rubles were allocated from the federal budget to the region. Of these, almost 40

million rubles were allocated to equip the district with forestry and forest fire equipment, as well as the necessary equipment. The region purchased at the expense of the federal budget more than 200 units of forest fire equipment and 80 units of forestry equipment. Only during the period of the state of emergency on the territory of Yugra from July 7 to August 10, 2020, 266 fires were extinguished on an area covered by fire, more than 95 thousand hectares. Of these, 97% accounted for extinguishing hard-to-reach and remote fires [9].

The implementation of control measures contributed to a noticeable decrease in the number of illegal logging. Their number decreased by almost 40% in 2016 compared to 2015. For 8 months of 2022, 31 cases of illegal logging of forest plantations were detected, which is 18 cases less than in the same period of 2021, when 49 cases of illegal logging were recorded. The volume of illegal logging in 2022 decreased by 77% compared to the same period last year[8].

An important component of the process of preserving the forest area of the district was the reproduction of forests. Loess restoration was natural when it was carried out by preserving tree species during felling, soil mineralization, fencing, and artificial when it was carried out by creating forest plantations, planting saplings, seedlings, etc., as well as in a combined way, implemented through a combination of these two methods [8].

Compensatory reforestation in the region has been carried out since 2008. The Okrug is the first region in Russia where this practice was introduced even before the relevant law came into force. For 2008-2018 the area of restoration of valuable cedar forests in Khanty-Mansiysk Autonomous Okrug amounted to more than 5,000 hectares. In 2020, the Khanty-Mansiysk Autonomous Okrug ranked first among the Ural regions in terms of the planned area of artificial reforestation[9].

Thus, during the study period in the Khanty-Mansiysk Autonomous Okrug-Yugra, large-scale work was carried out to preserve and restore the forest, as evidenced by Table No. 2.

Table 2.
The volume of forest reproduction in KhMAO-Yugra. ha

Index	Year of the event					
	2017	2018 г.	2019 г.	2020	2021	2022
Reforestation in the forest fund, including: - planting a forest	20 452,3	17 485,3	25 983,8	27 809,1	34 035,4	32 082,84
Index	2 253,5	1691,5	1 435,9	3 411,6	6 863,9	3 833,19

The materials of the table show that as a result of the hard work carried out to preserve and increase forest plantations in Khanty-Mansiysk Autonomous Okrug-Yugra, the area of restored forests increased from 20,453.3 hectares in

2017 to 32,082.8 hectares in 2022, including due to planting from 2253.5 ha to 3833.19 ha respectively[3].

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区域一体化作为发展之路——以拉丁美洲为例
**REGIONAL INTEGRATION AS A PATH TO DEVELOPMENT ON
THE EXAMPLE OF LATIN AMERICA**

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抽象的。拉丁美洲的区域化是由各国经济落后和缩小富国与穷国之间差距的愿望决定的。20世纪60年代,许多区域集团成立,如南方共同市场、东南拉经济联盟、南美国家联盟等,寻求经济一体化。20世纪初,这些板块的合作范围开始扩大,同时创建了新的共同体,也寻求区域一体化,但利益放在社会情境领域。作者考察了区域一体化形成的历史,并分析了最大的拉丁美洲组织(南方共同市场、拉美和加勒比国家共同体、阿拉迪)的活动。

关键词:合作、拉丁美洲、区域一体化、南方共同市场、拉美和加勒比国家共同体、阿拉迪。

Abstract. *Regionalization in Latin America was dictated by the economic backwardness of countries and the desire to bridge the gap between rich and poor States. In the 1960s, many regional blocs were formed, such as MERCOSUR, SELA, UNASUR and etc., which sought economic integration. At the beginning of the twentieth century, the spheres of cooperation of these blocks began to expand, at the same time new communities were created, which also sought regional integration, but interests laid in social situation sphere. The author examines the history of the formation of regional integration and analyzes the activities of the largest Latin American organizations (MERCOSUR, CELAC, ALADI).*

Keywords: *cooperation, Latin America, regional integration, MERCOSUR, CELAC, ALADI.*

Latin America is presented as a region with a broad integrationist vocation reflected in a multiplicity of integration processes and regional summits whose antecedents date back to 1960 with the signing of the Montevideo Treaty that gave rise to the Latin American Free Trade Association (ALALC) and that was replaced years later, under the Montevideo Treaty of 1980, by the Latin American Integration Association (ALADI). This is how the signing of the aforementioned Treaty responded to the need to renew the integrative impulse in the region that

had been built on the basis of the development model, with the aim of overcoming the difficulties of the previous process, thus creating a new project in a framework of more open, gradual and flexible relations between the countries that make up it.

The first stage of Latin American regionalism (1960-1990), was called “active regionalism” and was characterized – among other factors – by encouraging intra-zone trade flow, in order to first enhance regional development through a combined policy of export promotion and import substitution to accelerate the industrialization of the region. The model was also based on the elaboration of common policies aimed at deepening the various aspects of integration (economic, social and political). In short, the theme of development was the key to understanding the integration process [1].

The idea of “regionalism” implies the gathering of a limited number of geographically linked States with a high degree of interdependence between them. It can also be understood as a supranational subsystem of the international system or as an emerging regional formation with its own dynamics. This region is characterized by its geographical proximity, interdependence (mainly economic) and homogeneity (in the case of Latin America it would be sharing a common history, similar language and custom, among others) [2].

It was from the diversification of the idea of regionalism that other integrationist alternatives with their own characteristics, rhythms and models of integration emerged, such as: the Central American Common Market (today transformed into the Central American Integration System, SICA); the Andean Community of Nations (CAN), and the Caribbean Community (CARICOM). All these processes – currently in force – have achieved from their origins, greater or lesser degrees of integration, depending on their objectives, the relationships generated with other actors and the internal factors themselves that have impacted on the life of the processes.

The nineties was the second integrationist impulse of the region, which was known under the slogan of “open regionalism”. This model promoted trade liberalization and involved a process of restructuring regional integration. The States in general deepened the neoliberal policies designed under the “Washington Consensus” internally, which also impacted on the concept of regional integration and the position of the States regarding it. In this context, the Common Market of the South (MERCOSUR) emerged in 1991, as an integration process that was located in the transition between the development model of the first stage of regional integration and the neoliberal model.

It was from then on that Latin American history and foreign policy followed different directions in terms of integration and with them various processes and projects were developed that, at times, complicated the understanding of an existing reality in the Latin American region, fluctuating between integration and fragmentation and the choice of different models over the preceding decades.

On the one hand, several integration schemes persist that account for a diversity of “Latin Americas”: one from the North (with the axis placed on Mexico and the Caribbean countries); one from the South (which in turn presents a subdivision between Andean and Southern Cone countries); one Latin America with a linking scheme centered on the Pacific Ocean (with the formation of the Pacific Alliance) and another from the Atlantic (with an eye towards Europe). On the other hand, we find another Latin American region that aims to break with old forms of relationship: constituted by the “Bolivarian” project, based on the Venezuela-Cuba-Bolivia axis and other schemes that present a more diversified global strategy, this is the case of Brazil and the “attraction” policy that it exercised from the 2000s on the South American States gathered in the UNASUR (2008). Finally, in the map of Latin American regional integration of the nineties and 2000s we also identify countries such as Mexico and Chile that distanced themselves from the integrationist rhetoric of Latin America, creating their own models of foreign relations: in the case of Mexico, this country signed a Free Trade Agreement (1994) with the United States and Canada and another with the European Union in 2000. And Chile tried a model of unilateral openness with the signing of trade association agreements with the United States and the European Union in 2000 and subsequently with an intensive trade policy towards the countries of Asia Pacific. These States increasingly perceive themselves as having greater autonomy in reference to the region, which is mainly reflected in the diversification of their foreign policies towards the rest of the world and in the rejection of their incorporation as full members to the existing integration processes at that time.

These different schemes have resulted in the creation/reformulation and maintenance of simultaneous integration initiatives and bilateral alliances, some of them with overlapping objectives, which makes it difficult to build a Latin America with a common integration strategy. However, it is important to note that from the early years of the 2000s we identified a new stage in the region that several authors called “post-liberal regionalism” or “autonomous regionalism”, where the emphasis was no longer on free trade and policies to attract capital, but on strategies for the accumulation of regional power and achieve political and social integration [3]. Likewise, this new model questions the role of the periphery in the World Order and tries to establish endogenous development strategies to position the region as a power bloc in a multipolar scenario [4]. There has been a shift towards the incorporation of new topics on the agendas (security, infrastructure, energy, health and migration, among others) and there has been a change in the objectives and expectations about integration. The emblematic case of this model was the UNASUR, which we will delve into later.

It is also recognized the rise of new extra-hemispheric actors, which in the relationship with the different Latin American States, produced changes and re-

visions towards the integration processes: such is the case of China, India, Russia and South Africa, among others. This has happened in almost all the integration processes created in the region, from which new centers of gravity and situations of dependencies are generated that modify the integration schemes. This logic occurred in the Andean Community (CAN), in the Latin American Integration Association (ALADI), Mercosur, Central American Integration System (SICA), Unasur, Pacific Alliance (AP) and the Bolivarian Alliance for the Peoples of Our America (ALBA).

Finally, to crown the complex network of Latin American regional integration processes, in 2011 the Community of Latin American and Caribbean States (CELAC) was created at the Caracas Summit, based on which it was possible to demonstrate that it was possible to think about Latin American integration under a single body, which mostly assumed the functions of the various forums, groups and organizations that dealt with the issue of political integration in the region, whose main objective was to create a “representative mechanism of political, cooperation and integration of Latin American and Caribbean States and as a common space that guarantees the unity and integration of our region” (and without the presence of the United States and Canada – unlike what happens in the Organization of American States). In this way, one of the biggest obstacles to integration would be eliminated: the dispersion and proliferation of subgroups, which inevitably leads to fragmentation.

To conclude this introduction it is necessary to emphasize that Latin American States in recent years have continued to bet on a foreign policy of diversification of their agendas, which implies simultaneously maintaining regional integration projects – in some cases minimized to their maximum expression - at the same time that bilateral and biregional initiatives were activated with diverse approaches to relations that coexist peacefully in the region so far.

We will advance on the main regional integration processes that have been developed in the Latin American region, namely: Common Market of the South (Mercosur), Union of South American Nations (UNASUR) and Community of Latin American and Caribbean States (CELAC).

The Common Market of the South (MERCOSUR)

The Common Market of the South (MERCOSUR) is a regional integration process initially instituted by Argentina, Brazil, Paraguay and Uruguay to which in later phases Venezuela and Bolivia have joined, the latter in the process of accession. MERCOSUR is an open and dynamic process. Since its creation, its main objective has been to promote a common space that generates commercial and investment opportunities through the competitive integration of national economies into the international market. As a result, it has established multiple agreements

with countries or groups of countries, granting them, in some cases, the character of Associated States – this is the situation of South American countries. They participate in activities and meetings of the bloc and have trade preferences with the States Parties. MERCOSUR has also signed commercial, political or cooperation agreements with a diverse number of nations and organizations on five continents.

There are several main agreements – signed by all members – that laid the foundation of the organization's activities and should be named:

- Treaty for the establishment of a common market (1991);
- Educational integration protocol and recognition of certificates, degrees and studies of primary and secondary non-technical level (1994);
- MERCOSUR cultural integration protocol (1996);
- Ushuaia protocol on democratic commitment in MERCOSUR, the republic of Bolivia and the Republic of Chile (the protocol was signed with non-members: Bolivia, Chile, Ecuador, Colombia, Peru) (1998);
- There were several agreements between members of MERCOSUR and Chile, Bolivia and Peru on legal assistance (2002), migration (2000, 2002, 2006, 2008, 2014), energy (2005), education (2002, 2008, 2010), regional security (2006), political consultations (2002, 2006, 2010), human rights (2022) and etc [5].

After analyzing documents of MERCOSUR we can conclude that at the beginning it had just goals in economic sphere but every year the scope of partnership expanded. Economic and legal cooperation continues to exist, but greater priority is given to cooperation in the field of education and social sphere (migration and human rights).

The Community of Latin American and Caribbean States (CELAC)

The Community of Latin American & Caribbean States (CELAC) is an inter-governmental mechanism for dialogue and political agreement, which includes permanently thirty-two countries in Latin America and the Caribbean. It is a regional forum that brings together all of Latin America and the Caribbean countries. CELAC aspires to be a unique voice and structured decision-making policy decisions in the political and cooperation in support of regional integration programs.

It was created with a commitment to advance the gradual process of regional integration, unity and carefully balancing political, economic, social and cultural diversity of Latin America and the Caribbean of 650 million people. Since its launch in December 2011, CELAC has helped to deepen respectful dialogue among all countries in the region in areas such as social development, education, nuclear disarmament, family farming, culture, finance, energy and the environment.

After two years of work, CELAC has encouraged Latin American and Caribbean vision itself as a community of nations, capable of dialogue and consensus

building on issues of common interest. By mandate of the Heads of State and Government, CELAC is the unified voice of the region on issues of consensus.

If MERCOSUR was created in 1990th for economic development of the region and then promoted cooperation in different spheres, CELAC was created in 2010 in a context of loss of legitimacy of the inter-American system (symbolized in the Organization of American States, OAS) and prioritizes social development. Regional integration takes place through high-level meetings of heads of State and the signing of agreements. Between 2017 and 2021, CELAC had a four-year pause without meetings of presidents. Since they were reestablished at the request of Mexico, the meetings between the heads of state and government have been held and the range of topics addressed has diversified.

The coronavirus pandemic, which caused enormous damage to Latin American countries, revived the activities of the community. During the meeting in September 2021 there was signed an agreement that included the launch of a space agency, the creation of a regional fund for natural disasters, seeking equitable financial mechanisms, promoting intraregional trade, food security, technological and cultural exchange, with the creation of an Ibero-American institute of indigenous languages.

Next meeting that took place in January 2023 in Argentina. The most outstanding aspect of the regional conclave was the return of Brazil, after in January 2020 when Jair Bolsonaro decided to withdraw his country [6]. Brazil has the highest GDP in the region, so its participation in the community is significant. There were also signed several agreements.

The Latin American Integration Association (ALADI)

ALADI is the largest Latin American integration group. Its thirteen member countries include Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Ecuador, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela, together representing 20 million square kilometers and more than 510 million inhabitants. (See socio-economic indicators)

The Treaty of Montevideo 1980 (TM80), the global legal framework constituting and regulating ALADI, was signed on August 12, 1980, establishing the following general principles: pluralism in political and economic matters; progressive convergence of partial actions towards the formation of a common Latin American market; flexibility; differential treatments based on the level of development of the member countries; and multiplicity in the forms of agreement of commercial instruments. The ALADI promotes the creation of an area of economic preferences in the region, with the ultimate goal of achieving a Latin American common market

The ALADI makes room in its legal structure for the most vigorous subregional, plurilateral and bilateral integration agreements that are increasingly emerging

on the continent. Consequently, it is up to the Association – as an institutional and normative framework of regional integration – to develop actions aimed at supporting and promoting these efforts in order to make them gradually converge in the creation of a common economic space.

ALADI was created in the 1980s, when economic blocs were being formed. However, if MERCOSUR declared the economic goals of integration, and then expanded the spheres of cooperation, then ALADI initially laid the foundation for versatile cooperation among Latin American countries. Today, all countries have signed agreements on a common market, regional tariff preferences, on cooperation and exchange of goods in the cultural, educational and scientific fields, and a Framework agreement on overcoming technical barriers to trade [7]. ALADI is a significant organization, and CEPAL attempts economic integration at the continental level of this organization and through the Economic System of Latin America (SELA). Brazil has also decided to return to this organization.

Conclusions

In the nearly seventy-year history of the development of regional integration in Latin America, many organizations have been created that aim at integration. Some organizations created at the very beginning of the considered process aimed only at economic integration, and then expanded the spheres of interaction. Organizations created at the end of the XX - beginning of the XXI century are more focused on interaction in the social sphere (science, culture, knowledge exchange, etc.), but economic integration occupies a prominent place.

The considered largest organizations in the Latin American region were created at different times, hence there is a slight difference in their activities. It is worth saying that the countries of the region strive to participate in many organizations and make a choice towards integration, as evidenced by the return of Brazil to CELAC and ALADI, MERCOSUR has expanded its membership during its existence.

It is also worth highlighting the problem of integration in the region: there are smaller integration organizations, for example MERCOSUR, with fewer participants and aimed at integrating the southern countries of the continent. However, the existence of large unions and the intensification of their activities indicates the desire of countries for regional integration. Additionally, it is worth noting that there are various cooperation programs that support integration in the region (South-South cooperation and triangular cooperation).

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早期老年学预防单纯性 2 型糖尿病中的过度活动综合征

EARLY GERONTOLOGICAL PREVENTION OF HYPERMOBILITY SYNDROME IN UNCOMPLICATED TYPE 2 DIABETES MELLITUS

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抽象的。健康衰老的生物决定因素,即具有良好功能能力和生活质量的年龄增长,包括与年龄相关的病理的存在,最近引起了生物老年学领域专家越来越多的关注。作者制定了预防老年2型糖尿病患者活动能力不足综合征的措施,如纠正降糖治疗、使用维生素D和含钙药物、调整心脏保护治疗、营养支持以及形成良好的习惯。健康的生活方式。

关键词: 老年患者、2 型糖尿病、活动能力低下、老年预防。

Abstract. *The biological determinants of healthy aging, which means an increase in age with good functional ability and quality of life, including in the presence of age-associated pathology, have recently attracted more and more attention from specialists in the field of biogerontology. The authors have developed measures to prevent hypomobility syndrome in elderly patients with type 2 diabetes mellitus, such as the correction of hypoglycemic therapy, the appointment of vitamin D and calcium-containing drugs, the modification of cardioprotective therapy, nutritional support and the formation of a healthy lifestyle.*

Keywords: *elderly patients, type 2 diabetes mellitus, hypomobility, geriatric prophylaxis.*

Introduction

The adaptive capabilities of the body of an elderly person are largely determined by the nature and state of energy metabolism. Modern views on energy metabolism during aging were mainly formed by understanding the role of insulin

resistance, as well as the contribution of obesity and type 2 diabetes mellitus, which are associated with impaired insulin resistance and are highly prevalent in people of older age groups. Hence, the relevance of developing preventive measures for this contingent of people [1, 2].

The purpose of the study is to substantiate measures for early gerontological prevention of hypomobility syndrome in elderly patients with uncomplicated type 2 diabetes mellitus.

Material and research methods. The study included 162 elderly people aged 65 to 74 years, incl. 72 men and 90 women, the average age of the patients was 69.2 ± 3.4 years. All patients were divided into 4 groups. The 1st (control) group included practically healthy elderly people (38 people), the 2nd - obese, but not having sarcopenia (46 people), the 3rd - elderly people with sarcopenia, but not suffering from obesity (37 people), in the 4th - patients suffering from type 2 diabetes mellitus (41 people).

Results. In accordance with the data obtained, we have developed measures for the early gerontological prevention of hypomobility syndrome in elderly patients with type 2 diabetes mellitus. They included the following items:

- Correction of hypoglycemic therapy;
- Appointment of vitamin D and calcium-containing preparations, with the criterion T -2.5 or less - the appointment of antiresorptive agents;
- Modification of cardioprotective therapy in order to reduce heart rate to 75 per minute or less (sartans, highly selective beta-blockers, etc.);
- Nutritional support (increasing the level of consumption of protein foods with a simultaneous decrease in the level of fat intake);
- Increasing aerobic activity up to 150 minutes per week and more;
- Increased aerobic activity up to 90 minutes per week;
- Inclusion in physical activity programs of exercises aimed at training balance and stretching;
- Stop smoking or reduce the number of cigarettes you smoke.

As a result of the implementation of our proposed program of gerontological prevention of hypomobility syndrome in elderly patients with type 2 diabetes, it was possible to significantly improve the glycemic profile, reduce heart rate, eliminate the risk of developing malnutrition syndrome, increase most indicators of physical activity, and slow down anti-osteoporotic processes (Table 9).

Table 9

Dynamics of indicators in the process of implementing programs for gerontological prevention of hypomobility syndrome in elderly patients with type 2 diabetes

Index	Patients' groups			
	Control group		Study group	
	Before	After	Before	After
Glycated hemoglobin	8,2±0,3	7,5±0,2*	8,1±0,4	6,9±0,2*,**
Heart rate, in 1 min	89,3±2,5	88,4±2,6	90,0±3,1	73,2±4,1*,**
MNA points	19,8±2,1	20,0±2,0	19,9±0,7	27,0±2,4*,**
25(OH)D, ng/ml, in autumn	32,2±2,1	34,1±2,0	32,5±1,9	44,4±2,8*,**
1.25(OH)2D, pmol/l, autumn	42,3±2,7	41,3±3,2	42,8±2,2	60,7±2,9*,**
Deoxypyridinoline in urine, mmol/mm creatinine	8,2±0,4	8,3±0,2	8,5±0,3	6,6±0,2*,**
Aerobic load, min/week	139,4±9,2	138,0±5,6	137,5±7,6	181,1±4,9*,**
Anaerobic load, min/week	26,5±2,8	27,2±3,2	24,6±2,4	49,2±2,2*,**
Balance exercises, min/week	6,4±1,3	6,1±1,3	6,5±1,2	12,3±1,8*,**
Stretching exercises, min/week	7,4±1,8	7,6±1,5	7,4±1,8	8,9±2,0
Number of cigarettes smoked	6,9±0,2	6,8±0,3	6,8±0,2	3,1±0,3*,**
Hospitalization rate	1,2±0,1	1,3±0,2	1,3±0,2	0,5±0,1*,**

*p<0.05 compared to the indicators before the implementation of prevention programs

**p<0.05 compared to the control group

This led to a significant improvement in the total index of carpal dynamometry in men from 53.3±2.0 to 64.4±2.5 kg, in women from 42.5±1.8 to 55.8±2.6 kg. This dynamics testified to the overcoming of dynopenic phenomena (Figure 5).

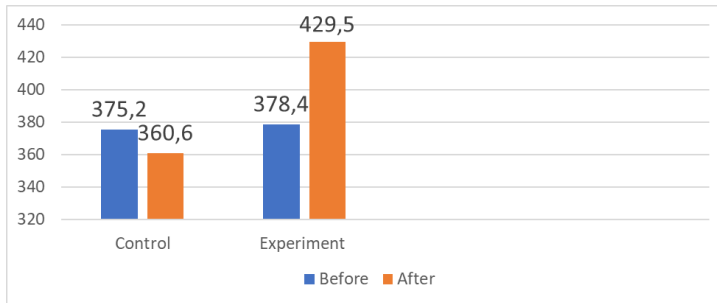


Figure 5. Characteristics of carpal dynamometry in elderly patients with type 2 diabetes during the implementation of the program of gerontological prevention of hypomobility syndrome

** $p < 0.05$ compared to before model implementation*

As a result, in the study group, the speed of movement increased according to the results of the test with a 6-minute walk from 378.4+8.2 meters to 429.5+6.7 meters (Figure 6).

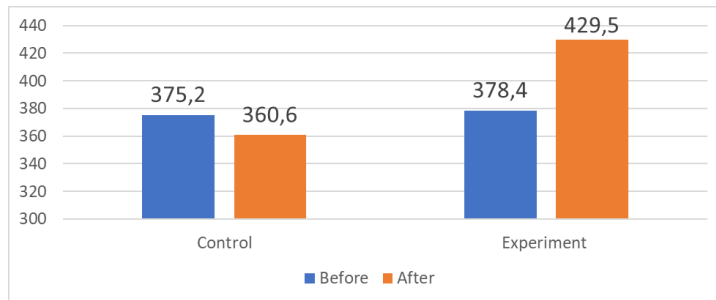


Figure 6. Characteristics of the 6-minute walk test in elderly patients with type 2 diabetes as a result of the implementation of a preventive program

** $p < 0.05$ compared to before model implementation*

Conclusion. Early manifestations of motor disorders in uncomplicated type 2 diabetes mellitus in old age are manifested by hypomobility syndrome, which is accompanied by dynapenic phenomena in the muscles of the thigh and muscles of the upper extremities. These processes are associated with the risk of developing malnutrition syndrome in the variant of protein-vitamin deficiency, the interest of the cardiovascular system and the increase in osteopenic phenomena.

Evidence-based measures for early gerontological prevention of hypomobility syndrome in elderly patients with uncomplicated type 2 diabetes mellitus, including correction of hypoglycemic therapy, administration of vitamin D and

calcium-containing drugs, administration of antiresorptive agents, modification of cardioprotective therapy to reduce heart rate, nutritional support (increased intake protein food with a simultaneous decrease in the level of fat intake), an increase in aerobic, anaerobic activity, the inclusion in physical activity programs of exercises aimed at training balance and stretching, smoking cessation or a decrease in the number of cigarettes smoked, improves motor function in the form of a significant increase in the effectiveness of the test from 6 -minute walk from 378.4 to 429.5 m. This undoubtedly contributes to an increase in the quality of life of the elderly.

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吉尔吉斯共和国奥什州新型冠状病毒感染 (COVID-19) 传播特征的估计
**ESTIMATES OF THE FEATURES OF THE SPREAD OF A NEW
CORONAVIRUS INFECTION (COVID-19) IN THE OSH OBLAST OF
THE KYRGYZ REPUBLIC**

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抽象的。 本文根据吉尔吉斯斯坦共和国卫生部国家卫生流行病学监测司网站统计数据, 对吉尔吉斯斯坦共和国人口发病水平和结构进行分析 以及奥什地区出现新的冠状病毒感染。 研究了这些指标的变化趋势, 证明了2020年、2021年、2022年三年间冠状病毒感染在各地区的波浪式传播。 比较了奥什州 COVID-19 地区的发病率。

关键词: 新型冠状病毒感染、COVID-19、发病率、共和国、地区、死亡率、PCR。

Abstract. *In this article, based on statistical data from the website of the Department of State Sanitary and Epidemiological Surveillance of the Ministry of Health of the Kyrgyz Republic, an analysis was made of the level and structure of the incidence of the population of the Republic of Kyrgyzstan and the Osh region with a new coronavirus infection. The trends in these indicators were studied and the wave-like spread of coronavirus infection in the regions over the three years 2020, 2021, 2022 was proved. The incidence rate was compared in the context of COVID-19 districts in the Osh Oblast.*

Keywords: *new coronavirus infection, COVID-19, incidence, republic, region, mortality, PCR.*

Introduction: World experience has shown that the unpreparedness of countries to counter a pandemic can have huge negative consequences associated with the loss of labor resources and economic damage. Statistical analysis and constant monitoring of the incidence rate for coronavirus infection is one of the important tasks of each state. Constant monitoring, current and retrospective analysis makes it possible to identify the threatening growth rates of the incidence in time, and to act in due time preventing the further spread of the infection. Also, an assessment of the incidence makes it possible to predict a further scenario for the development of the situation, which is extremely important for determining the list of preventive measures [1,2].

The epidemiological situation of the new coronavirus infection in the Kyrgyz Republic remains relevant. The first case of coronavirus infection in Kyrgyzstan was registered in Suzak district, Jalal-Abad region, further cases of COVID-19 were noted in Bishkek and Osh region, followed by a shift in the spread vector to other regions [5,6,7,8]. During the onset of a pandemic due to the lack of a vaccine, the main preventive public health measures are based on generally accepted non-specific approaches around the world, including personal hygiene, isolation of patients and contacts, physical distancing, closure of public places and restrictions on movement and travel. The definition of risk areas played one of the main tasks in the system of epidemiological surveillance of infectious diseases [1,2,3]. Since the beginning of the epidemic in the Kyrgyz Republic in 2020, 19,024 laboratory-confirmed cases of the disease have been registered (data as of 09/09/2020). The incidence rate was 289.7 per 100 thousand population (0/0000). The average growth rate is 3.04% (relative to March 25, 2020). It should be noted that the peak incidence is observed in 2021. The clinic-laboratory confirmed case of a new coronavirus infection was 82328 in the republic, i.e. 1232.3 cases per 100 thousand population. Despite the relative stabilization for the epidemic process of spreading along a straight line trend of a new coronavirus infection, COVID-19 is still relevant, according to the Department of Disease Prevention and State Sanitary and Epidemiological Surveillance of the Ministry of Health of the Kyrgyz Republic, from February 27 to March 5, 35 cases were registered for 2023 .

Purpose: to analyze the epidemiological situation with respect to the new coronavirus infection (COVID-19), to identify some regional features of the Kyrgyz Republic that contribute to the spread of the infection in order to rationalize the set of preventive measures in the existing system of epidemiological surveillance.

Materials and methods of research

To study the incidence of a new coronavirus infection in a pandemic and epidemic, a retrospective epidemiological analysis was carried out, 22,057 people who recovered from a new coronavirus infection and patients living in hot climates in the Osh region of the Kyrgyz Republic were studied and data from the

State Sanitary and Epidemiological Surveillance Department of the Ministry of Health were used Kyrgyz Republic for three years from 2020 to 2022.

Results and its discussion

As evidenced by centuries of experience, in cases of pandemic spread of aerogenic (respiratory, inhalation) infections with airborne transmission of the pathogen, only the acquisition of immunity in 70-80% of the population as a result of the disease or through immunoprophylaxis using a vaccine can stop the epidemic. Therefore, unlike neighboring countries, where the epidemic began 1-1.5 months after the epidemic in China in December 2019, in the Kyrgyz Republic - in March 2020. The spread of the new coronavirus infection in the Kyrgyz Republic is uneven.

A retrospective analysis of the incidence of a new coronavirus infection for the three years 2020, 2021, 2022 was carried out according to the Department of Disease Prevention and State Sanitary and Epidemiological Surveillance of the Ministry of Health of the Kyrgyz Republic, the number of cases was 143,645 in total, of which 108,520 were laboratory-confirmed, i.e. intensive indicators for 6,747,300 of the population amounted to 1,608, 3. Clinical and epidemiological confirmed cases amounted to 35125 cases over three years. Epidemiological characteristics for three years, according to the result of PCR diagnostics in the Kyrgyz Republic, when differentiating the territories of the region by the number of patients, a variety was established for every three years. During the beginning of the 2020 pandemic, Batken region (707.0 cases) was included in the group of territories with a very high level of cases (over 10,000 patients), and Bishkek (539.9) in the category with a high level (from 250 to 600 patients) and Issyk-Kul region (325.6), Osh city (322.2), Talas region (251.4). The group with an average number of patients (from 100 to 249) included Chui region (212.2), Jalal-Abad region (211.2), Osh region (102.2). The lowest incidence rate was shown by the Naryn region (11.7). All territories of the Kyrgyz Republic are involved in the epidemic process.

An analysis for three years from 2020 to 2022 shows the type of spread of coronavirus infection in the regions of the Kyrgyz Republic. Table No. 1 shows the prevalence of coronavirus infection according to laboratory-confirmed data using PCR diagnostic methods. The most affected territory - an area of a high degree of real epidemic danger for all these three years falls in the city of Bishkek 68549 (6236.6 in intensive terms), 2021 (4506.7), 2022 (1226.9) of the total incidence of new coronavirus infection. This is due to the fact that, according to official data, the country's population lives in two large cities (where 21% of the total population lives), medium-sized cities (13% of the population) and rural areas (66% of the population), i.e. internal migration. In practice, however, the share of small towns and rural areas in the total population is less than official statistics

say, since many residents registered in these areas actually migrated to Bishkek city and, to a lesser extent, to Osh city. Second, there may be a large number of hospitals (national, republican, city hospitals) and laboratories, which have a high detection rate.

The second place was occupied by the Batken region, which for 3 years revealed 8672 (1552.4) cases of coronavirus infection by PCR diagnostics. Third city Osh 3862 cases, 1157 in intensive rates.

Today, it can be noted without exaggeration that epidemiological zoning has become an integral component of the basis for the organization of epidemiological surveillance in relation to almost all nosological forms of infectious diseases. With the onset of the pandemic, Osh oblast took 3rd-4th place in terms of the spread of morbidity, the implementation and observance of preventive measures, as well as the detection of diseases, play an important role here. In the Osh Oblast of the Kyrgyz Republic, the number of patients with COVID-19 totaled 10889 people, respectively, the number of patients diagnosed with coronavirus infection confirmed by laboratory tests (ICD code 10U07.1) was 3084 cases (2020 n= 1915; 2021 n=1169); of these, clinical and epidemiological (ICD code 10U07.2) were n=7805 cases (2020 n= 5979; 2021 n=1826) in Tables 3,4,5. An analysis of the condition of patients diagnosed with coronavirus infection, confirmed by laboratory studies in the Osh region in the context of districts, showed that high mortality with a high incidence is the city of Osh: in 2020, 38 deaths out of a total of 345 morbidity, coronavirus infection confirmed by clinical and epidemiological was Uzgen region 48 deaths from 1537.

Table 1.

The number of patients diagnosed with coronavirus infection confirmed by laboratory tests (ICD code 10U07.1) for 2020 in the Osh region of the Kyrgyz Republic table

Name of districts and cities	Patients		According ICD 10 U07.1 CoV-2				PHK SaRS- By PCR	
	2020		N=1915		Discharged N=1809		Number of dead N=99	
	n	%	n	%	n	%	n	%
Alaiskiy	111	5,8	111	5,8	98	5,5	13	13,1
Aravanskiy	340	17,8	340	17,8	323	18,0	11	11,1
Karasuiski	318	16,6	318	16,6	303	16,7	14	14,1
Karakulzhinskiy	124	6,4	124	6,4	123	6,8	11	11,1
Uzgenskiy n	278	14,5	278	14,5	268	14,7	5	5,1
Nookatskiy n	347	18,1	347	18,1	335	18,4	6	6,1
Chon-Alaiskiy	52	2,7	52	2,7	51	2,8	1	1,1

Osh	345	18,1	345	18,1	308	17,1	38	38,3
Total for the region	1915	100	1915	100	1809	100	99	100

Table 2.

The number of patients diagnosed with coronavirus infection confirmed clinically and epidemiologically (ICD code 10U07.2) for 2020 in the Osh Oblast of the Kyrgyz Republic.

Name of districts and cities	ICD code 10 U07.2					
	Were admitted N=5979		Discharged N=5650		Number of dead N=199	
	n	%	n	%	n	%
Alaiskiy	330	5,6	315	5,6	15	7,5
Aravanskiy	713	11,9	676	11,9	16	8,1
Karasuiskiy	1093	18,2	1061	18,7	26	13,1
Karakulzhinskiy	306	5,2	302	5,4	17	8,5
Uzgenskiy n	1537	25,7	1501	16,5	48	24,1
Nookatskiy n	1297	21,6	1241	21,9	28	14,1
Chon-Alaiskiy	203	3,4	199	3,6	4	2,1
Osh	500	8,4	355	6,3	45	22,5
Total for the region	5979	100	5650	100	199	100

A year after the start of the epidemic of coronavirus infection, the total number of patients diagnosed with coronavirus infection confirmed by laboratory tests in Osh region is 1169, and patients diagnosed with coronavirus infection are confirmed by clinical and epidemiological studies, which is shown in Tables 5.6. Of all 2,995 reported cases of coronavirus infection, the number of deaths was -147. In 2021, Nookat district was the leader in mortality with a diagnosis of U07.1 and with a diagnosis of U07.2 with a high mortality rate of 64 cases with an average incidence of 197.

It is noteworthy that mortality with COVID-2019 out of all patients n= 10889 was 4.1% of cases. Given in tables 5 and 6 shows that the Karakulzhinsky, Chon-Alai districts are considered an area of potentially epidemic danger and are characterized by a rare registration of the incidence of coronavirus infection in humans. The zone is formed by high-altitude isolated sections of regions. The degree of epidemic danger in relation to coronavirus infection changes in dynamics every year with the onset of the epidemic, depending on the risk factors for infection, the state of the organization and the conduct of anti-epidemic work, vaccination, and laboratory diagnosis of this disease. Therefore, in our opinion, continue conducting epidemiological surveillance of coronavirus infection at the regional and republican levels.

Conclusion: Thus, in general, the epidemiological situation is characterized by a tendency towards stabilization, due to a decrease in the overall and group incidence over the last 6 months of 2022, a decrease in the number of patients and the number of hospitalized patients, localization of epidemic foci in medical organizations, and an increase in the number of recovered. Compliance with measures of specific (vaccination) and non-specific prevention, especially in risk groups, allows us to expect a favorable development of the epidemiological situation in the near future, but does not exclude the possibility of its deterioration. Our analysis allowed us to identify the optimal indicators for assessing the incidence of coronavirus infection in the region and cities. Individual indicators were studied in their dynamics for three years on the example of the Osh region. At the same time, a conclusion was made about the wave-like nature of the spread of infection in the districts of the Osh region. This dictates the need to maintain control over ongoing preventive measures with prompt management decisions based on the current epidemiological situation in the Kyrgyz Republic and taking into account the risk assessment of its possible complication.

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一系列多发性硬化症参数的出现

EMERGENCE OF A CLUSTER OF MULTIPLE SCLEROSIS PARAMETERS

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抽象的。使用互联网技术形成一组多发性硬化症 (MS) 生物标记指标的可能性, 用于构建语义集群, 实施从生物热力学角度对人体功能状态进行形式化评估的程序 展示了在医学诊断任务中使用信息熵的基本概念。

关键词: 多发性硬化症的出现, 医学判断的逻辑。

Abstract. *The possibility of using Internet technologies in the formation of a set of bio-marker indicators of multiple sclerosis (MS) used in the construction of a semantic cluster implementing a procedure for formalized assessment of the functional state of the human body in terms of biological thermodynamics using basic concepts of information enthalpy in the task of medical diagnostics is shown.*

Keywords: *emergence multiple sclerosis, the logic of medical judgment.*

The human body, in terms of biological thermodynamics, is positioned as an open system, in which the ability to maintain many internal functional processes is constantly preserved, aimed at maintaining dynamic balance - the law of homeostasis. Dissipative systems of this type are actively studied by means of mathematical modeling in order to reproduce forecasts for the development of events based on the concepts of the pathology of various diseases. In medical practice, almost any violation of the functional state of the body has a set of indicators that explicitly or almost explicitly identifies the presence of a particular disease. A set of indicators for a specific disease forms a cluster that can formally have a large dimension. For the disease of multiple sclerosis (MS), the most objective diagnostic judgments are made on the basis of the results of studies performed using the technology of magnetic resonance imaging (MRI), as well as the technology of

analysis of blood biomarkers (BBM) [1, 4]. Such clusters, formed using different technologies, can reproduce laconic diagnostic judgments, provided that there is a conjugation of parameters, which is characterized by the emergence property [2]. Emergence, as a unique property of an object or process, manifests itself in a cluster of conjugate indicators that characterize the topological connectivity, expressed in terms of enthalpy, estimated in information units - bits.

Mathematical models are characterized by the use of information structures for describing objects and processes. The information model is created on the basis of biophysical concepts and principles, taking into account the complexity of the observed events. In particular, the discussion of the life of the organism and the creation of a description of natural functionally related flows of events is implemented through a model presented in terms of biological thermodynamics in the enthalpy format, where a bit is considered as an information unit. Through the concept of information enthalpy, it seems possible to single out: excited, inhibited and calm - the neutral functional state of the body.

By definition, enthalpy is a physical quantity that characterizes the qualitative state of a thermodynamic system. Enthalpy is an additive function that characterizes the total potential of all its constituent parts. In terms of biology, this means that the enthalpy of the whole organism is an additive function of the individual functional processes of a living organism.

Another definition of enthalpy can be considered. Enthalpy is the amount of energy of a system represented by several elements grouped in a certain way, expressed in information units that are available for rearrangement. In this sense, a group can be considered as a cluster containing several different elements - parameters that characterize the state of the system.

In this understanding, the study of the features of the manifestation of one functional process in the body can be carried out according to a set of parameters characterizing the change of events for the selected process. Since a large number of functional processes are simultaneously carried out in a living organism, it is a difficult task to establish a unique set of parameters that requires the introduction of additional conditions. Such a formulation of the problem of detecting MS disease is now well known and is being implemented under the thematic line of computer research of brain structures and the thematic line of clinics for laboratory analysis of fluid media.

The use of these representations makes it possible to identify informationally significant fragments on MRI frames that are correlated with MS disease. By analogy, using BBM data, it seems possible to establish the presence of MS disease, provided that there is a criterion for the formation of a diagnostic judgment, determined by the value of the assessment of information enthalpy (He). In this case, the calm - functionally neutral state of the body will be characterized by He

≈ 0 /bit/, and the state with the sign $+He > 0$ /bit/ is excited, while the state with the minus sign $-He < 0$ /bit/ should be considered inhibited, initializing processes natural - natural synthesis of biological tissues.

These variations of the criterion are in good agreement with the results of field studies. Indeed, with an increase in the area of damage to neurons on brain structures, we note an increase in enthalpy values ($+He > 0$ /bit/). In this case, in the case of a decrease in the area of damage to neurons on brain structures, a judgment is made about a decrease in the level of distraction processes, which manifests itself in negative values enthalpy ($-He < 0$ /bit/)

The currently typical disease (MS), observed in different age groups, is characterized by a disorder in the working processes of the central nervous system (CNS) of a person. Fragmentary damage to the central nervous system is manifested by the destruction of the myelin sheath of neurons in the spinal cord and brain. Numerous medical studies of MS have now reproduced information resources on the Internet, where the main biomarker indicators of the disease are concentrated [5, 7, 8]. Despite the availability of the opportunity to get acquainted with the results of clinical studies of different age groups of patients, diagnostic judgments about MS are extremely difficult to interpret. This is primarily due to the high variability in descriptions of MS disorders with similar symptoms [6]. The use of intelligent technologies in the information space of the Internet makes it possible to create logical judgments on the biomarker data of RS in terms and concepts of biological thermodynamics based on the determination of the enthalpy of He (bit).

The morphological feature of myelin is manifested in the ability of spiral entanglement of processes of oligodendrogliaocytes in the central nervous system and Schwann cells on the periphery, around the axons of neurons [9]. It can be said that myelin is the construction of an insulating membrane capable of supporting a high-speed mode of transmission of nerve impulses. Indeed, the violation of the dielectric properties of the membrane is characterized by a change in the chemical composition of the neuron fiber, and therefore changes the level of enthalpy, which in the ideal case for a dielectric corresponds to $He \approx 0$ /bit/.

One of the biochemical characteristics that distinguishes myelin from other biological membranes is its high lipid/protein ratio. Proteins make up 25 to 30% of the dry matter mass of the myelin sheath. Lipids account for approximately 70-75% of the dry weight of the white matter of the CNS. Lipids are involved in the organization of information flows of physiological regulation in the body, in which nerve impulses and substances carried by blood and lymph initialize the working processes of life. The highest centers of neurohumoral regulation are located in the hypothalamus, and the excitation that occurs in the cerebral cortex is transmitted through its subcortical elements through blood and lymph flows to various parts of the body. This fact is known as neurohumoral regulation, in which the biochemical composition of the blood is the object of analysis.

Neurohumoral regulation plays a major role in homeostasis, supporting the internal processes of the body, which ensure the normal functioning of the body, taking into account the constant change of internal and external factors. Let us single out some neurohumoral regulators that form a cluster that are involved in the formation of a judgment about the presence of MS (Table 1).

Table 1.
MS hormonal parameters

№	Cluster element	Chemical formula	atomic mass	Number of elements in a cluster Mole/mL $m \cdot 10^{-12}$
	Dopamine	C ₈ H ₁₁ NO ₂	153.12	0.424
	Adrenalin	C ₉ H ₁₃ NO ₃	183.207	0.436
	Norepinephrine	C ₈ H ₁₁ NO ₃	169.18	4.412
	Serotonin	C ₁₀ H ₁₂ NO ₂	176.21	0.567

Dopamine is a neurotransmitter produced by the endocrine cells of the brain and is realized in the process of cognitive activity. The lack or excess of the neurotransmitter affects the psychophysiological state of the body, in particular, contributes to the development of neuropsychiatric diseases, as well as Alzheimer's and Parkinson's diseases. Timely entry of the neurotransmitter into the body and in the required amount creates comfortable living conditions.

Adrenaline is a hormone produced by the adrenal medulla, which is part of the adrenal gland, which is made up of chromaffin cells that secrete catecholamines, including epinephrine, norepinephrine, and a small amount of dopamine, in response to stimulation by sympathetic preganglionic neurons. In stressful situations, the amount of adrenaline in the blood increases dramatically.

Psychophysiological disorders have a taxonomy. Depending on the time of occurrence of the violation, there are: congenital; acquired. In addition, there are violations: organic (damage to the material structure of the brain); functional (disintegration of various brain structures) disorders.

Additional means of analysis, through models and computational tools, consider the prevalence of the pathological process, which is fixed as a local area (only one area of the cerebral cortex is considered) or a diffuse area of the disorder.

Norepinephrine is a neurotransmitter that is formed in the sympathetic nerve endings, the adrenal medulla, the central nervous system from dopamine. Norepinephrine is synthesized from adrenaline.

Serotonin is a relatively simple chemical substance - it is a biogenic monoamine, which is actively involved in the organization and transmission of neural impulses.

Formally, the elements of the cluster presented for consideration (Table 1), positioned as a MS biomarker, have a semantic similarity, which is established on a series of computational estimates of the He information enthalpy (Table 2).

Table 2.
Calculated indicators for a series of 4 cluster elements.

Series 1		Series 2		Series 3		Series 4	
0,436	4,41	4,41	0,42	0,42	0,57	0,57	0,436
0,42	0,57	0,57	0,436	0,436	4,41	4,41	0,42
Enthalpy He /bit/							
0,254		0,097		0,254		0,097	
Total enthalpy for all series He /bit/						0,701	

Analysis of the data presented in Table. 2. makes it possible to form a judgment that a cluster of 4 neurohumoral regulators has a high degree of compactness (He /bit/ \approx 0) and can be considered as a “norm” when discussing the presence of MS.

Using the basic postulates of biological thermodynamics and operating with the concepts of dissipative processes, on the one hand, constantly maintaining homeostasis, and, on the other hand, implementing many processes of updating biological structures, it is necessary to understand the specificity of launching and implementing energy processes in a living organism. A wide variety of such processes actualizes the question of searching for mining algorithms implemented by computational means in real-scale monitoring of the selected process.

Taking into account the presence in a living organism of at least two categories of conjugated processes of a tonic and sedative nature, the multifaceted problem of choosing biomarkers is actualized. The use of well-known postulates of biophysics and mathematical analysis of complex systems seems to be appropriate in creating cluster models of information content that evaluate the compactness of elements and at the same time make it possible to create a forecast of upcoming events.

In essence, operating with the basic concepts and definitions of biological thermodynamics and taking into account the dissipative nature of processes in a living organism, positioned in terms of informational enthalpy, it seems logically reasonable to consider mathematical models for the analysis of liquid biological media: blood, lymph, cerebrospinal fluid, sweat, lacrimal fluid, urine, saliva, seminal fluid, excretions of various glands. Possessing a well-developed set of medical analytical systems that are able to quickly and accurately determine the quantitative indicators of the ingredients of liquid media, it is possible to use the potential of intelligent computer technologies aimed at reproducing logically sound diagnostic judgments about the functional state of the human body, in particular, those with established signs of MS disease.

The biophysics of mathematical information models that form the basis of logical medical judgments, formed in terms of the tasks of diagnosing the functional state of the human body, allows us to formalize the process of concentrating the necessary arrays of indicators in relation to different age groups, groups with different professional orientations and groups with unique geolocation.

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双侧支架置入术治疗气管支气管恶性狭窄: 病例报告

**BILATERAL STENTING FOR THE TREATMENT OF
TRACHEOBRONCHIAL MALIGNANT STENOSIS: CASE REPORT**

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抽象的。 目的: 本报告评估新的内镜双侧支架置入方法对双侧气管支气管狭窄患者的疗效。

材料和方法: 患有不可手术的恶性双侧气管支气管狭窄和急性呼吸衰竭的患者, 通过 X 射线控制下的新型内窥镜方法缓解了病情。

结果: 使用两个多孔全覆盖金属自膨式支架恢复主气道管腔, 内镜下放置在主

支气管内，两个支架伸入气管，彼此相邻。这减少了呼吸困难并改善了生活质量，从而使患者能够接受化疗。

结论：这种方法需要更少的精力和时间来安装支架，并且允许在操作时进行定制，而不会对结果产生负面影响。

关键词。 双侧气道支架置入术、内窥镜、微创、气管支气管恶性肿瘤、隆突癌、自膨式金属支架。

Abstract. *Objective: This report assesses the efficacy of a new endoscopic bilateral stenting method in patient with bilateral tracheobronchial stenosis.*

Materials and methods: patient with non-operable malignant bilateral tracheobronchial stenosis and acute respiratory failure palliated by a novel endoscopic method under x-ray control.

Results: The lumen of the main airways was restored using two multi-hole fully-covered metal self-expanding stents, endoscopically placed within the main bronchi, both extending into the trachea, adjacent to each other. This reduced breath deficit and ameliorated life quality, thus allowing the patient to undergo chemotherapy.

Conclusion: This method requires less effort and time to install stents, and allows to customize those while operating without negatively affecting the outcome.

Keywords: *Bilateral airway stenting, endoscopy, minimally-invasive, tracheobronchial malignancy, carina cancer, self-expandable metallic stent.*

Case report

A 67-year-old male was admitted to N.V. Sklifosovsky research institute with signs of acute respiratory failure. The patient started exhibiting symptoms four weeks prior to admission, symptoms included dyspnea on minimal exertion, paroxysmal cough with scanty sputum discharge, dizziness, and weakness. On examination, expiratory wheezing was manifested primarily on the left side with moderate shortness of breath requiring oxygen support. A decrease in oxygen saturation to 90–94%, respiratory rate of 21 breaths per minute, pulse of 85 beats per minute, and blood pressure of 115/75 mm Hg were observed.

Chest computed tomography (CT) (Fig. 1A–C) revealed an irregular soft-tissue heterogeneously-enhancing mass in the posterior mediastinum invading the adjacent esophageal walls, pericardium, and left mainstem bronchus along with tracheal deviation to the right. The upper lobe of the left lung was consolidated, and reduced in size (atelectasis).

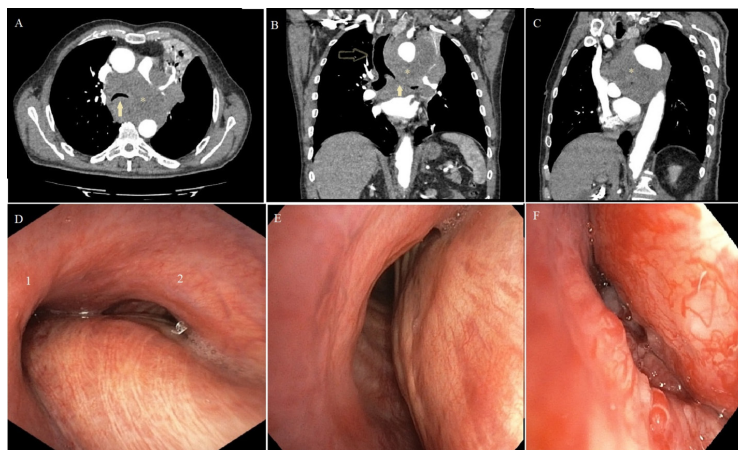


Figure 1. Chest computed tomography (A, axial view; B, coronal reconstruction; C, sagittal reconstruction) and bronchoscopy (D–F) upon admission. Computed tomography demonstrates a large mass occupying posterior mediastinum (asterisk) and left mainstem bronchus lumen narrowing (B, yellow arrow) with lateral trachea deviation (B, black arrow). The endophotographs (D) depict lower trachea extrinsic stenosis (1-left mainstem bronchus lumen; 2- right mainstem bronchus lumen), right (E) and left (F) mainstem bronchi extrinsic narrowing.

Initial bronchoscopy demonstrated 30–35% narrowing of lower trachea, extending to the bifurcation (Fig. 1D), right (Fig. 1E) and left (Fig. 1F) main bronchi lumen. The biopsy revealed small-cell carcinoma of the left lung with invasion into the mediastinum.

Novel alternative bilateral stenting method (Fig. 2, A) involves the use of fully-covered stents, originally remodeled by authors, and characterized by multiple perforations (3 mm in diameter each). Immediately after being deployed within the lumen of both main bronchi, the mesh-like structure of the stent body overlaps secondary bronchi ostia. For this reason, the holes on the frontal surface of the stent provide the necessary permeability needed to evade air flow blockage. Additionally, this provides secondary fixation.

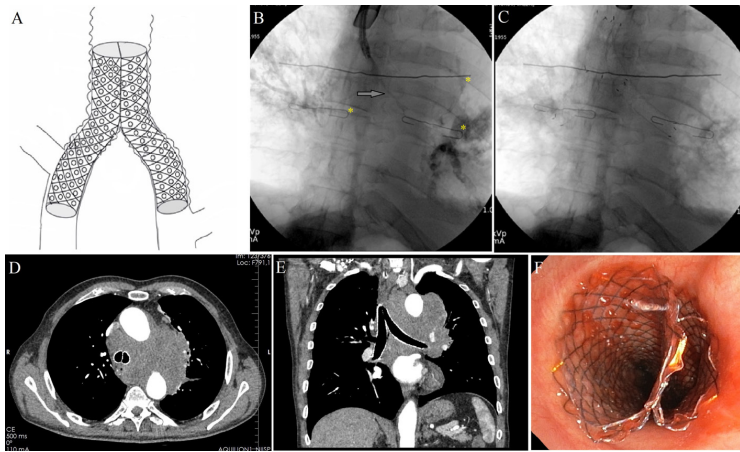


Figure 2. Bilateral airway stenting (A, scheme). X-ray images of the bronchography (B, grey arrow pointing at the stenosis and yellow asterisks indicating skin markers) and deployed stents (C). Control chest CT after stenting (D, E), revealing the alleviation of left upper lobe atelectasis. An endophotograph showing the stents (F).

The stents were installed during a rigid bronchoscopy under total intravenous anesthesia with high-frequency jet ventilation and the aid of C-arm. A rigid bronchoscope was advanced up to the main carinal stenosis. A catheter was inserted beyond the compromised area through the endoscope channel under the fluoroscopy control. The non-diluted contrast media (Ultravist® 370, 30 ml) was injected into the lumen of the left mainstem bronchi, highlighting the prolonged (30 mm) narrowing up to 2–3 mm in diameter (Fig. 2B, grey arrow). Then, the distal and proximal ends of the altered bronchus portion were detected and marked with makeshift skin markers (Fig. 2B, asterisks). Guidewires were inserted into both lower lobe bronchi. Afterwards, both stents were introduced and simultaneously deployed under the fluoroscopy control (Fig. 2C).

Immediately after the treatment the patient's condition stabilized, eliminating the need for oxygen support and improving breathing function. Oxygen saturation was 97% and respiratory rate was 18 breaths per minute.

On the third day after the procedure CT scans demonstrated the re-establishment of airway patency against fully deployed stents and the recovered left upper lobe (Fig. 2D–E). The control bronchoscopy showed the correct positioning of both stents (Figure 2F). The patient was discharged in a satisfactory condition on the seventh day. During the three months of follow-up, the patient exhibited normal breathing.

Discussion

Central airway luminal narrowing, as a result of main carina stenosis caused by either primary or metastatic malignancy, expands to both the lower trachea and mainstem bronchi in the majority of cases [1]. Currently, the only option of maintaining the central airway's patency is by incorporating endobronchial prosthetics [2,6]. With the advent of endoscopy, this method has been reported to be of benefit due to its less invasiveness and minimal traumatism risk [3,4].

Endobronchial Y-shaped silicone stents are currently applied for the palliation of the airway obstruction; these are inexpensive, sustainable under extrinsic compression, and easily removable. However, prior to installing a silicone stent, mechanical tumor debulking is required, which carries the risk of life-threatening complications such as airway wall perforation or post-manipulative bleeding. The most common drawback of the silicon stents - higher migration rate - poses a major issue by aggravating preexisting respiratory disfunction the management of which would require urgent endoscopic repositioning.

Self-expandable metallic Y-stents (SEMS) are often the preferred modality in case of lower trachea, main carina, and both mainstem bronchi malignancy [5,7]. However, SEMS are limited by cost value and the need of individual approach for selecting ones due to unique individual anatomy as well as tumor growth patterns.

In this case, the modified stent was of higher efficacy in terms of intrinsic fixation due to multiple perforations. In addition, the process of installation did not require the narrowed tracheal lumen to be preliminary debulked, which resulted in reduced operative time and minimized complication rates.

The present case has similar results comparing to those presented by Wang T. et al. [1] and Tanigawa [2] in terms of favorable outcome such as dyspnea signs amelioration due to restored patency of trachea and bronchi, on the background of side-effects absence on the follow-up.

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身体康复在缺血性脑卒中患者运动障碍恢复治疗中的应用
**PHYSICAL REHABILITATION IN THE RESTORATIVE
TREATMENT OF MOTOR DISORDERS IN PATIENTS WITH
ISCHEMIC STROKE**

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概括。 本文对物理康复医学问题进行了医学理论和实践的分析。 如今,物理康复医学在急性脑血管意外患者的康复中占据着最重要的地位。 作者在适应性体育综合体的框架内考虑了身体康复,它可以让您更有效地恢复失去的运动功能。 采用Rankin量表、Rivermead流动指数、MoCa和MMSE认知量表进行评估和分析。

关键词: 中风、缺血性中风、恢复性治疗、物理与康复医学。

Summary. *This article presents an analysis of medical theory and practice on the issue of physical rehabilitation medicine. Today, physical rehabilitation medicine occupies the most important place in the rehabilitation of patients who have suffered an acute cerebrovascular accident. The authors consider physical rehabilitation within the framework of the adaptive physical education complex, which allows you to more effectively restore lost motor functions. Assessment and analysis was carried out by Rankin scales, Rivermead mobility index, as well as by MoCa and MMSE cognitive scales.*

Keywords: *stroke, ischemic stroke, restorative treatment, physical and rehabilitation medicine.*

Physical rehabilitation medicine takes its origins from the Ancient World, with the development of human knowledge of natural physical factors, the first experience of rehabilitation in severe diseases began. Today, physical rehabilitation medicine is a system-forming complex of multifactorial, multifactorial diagnostic

measures, methods, techniques, techniques, programs, complexes that carry out physical rehabilitation of patients with acute cerebrovascular accident (ONMK) [1; 2; 5; 6; 9].

At the current stage of society's development, strokes continue to be one of the most important problems of modern society, being the cause of deep and long-term disability of the working-age population, as a result of which significant social and economic damage arises. Vascular diseases of the brain highlight the problem of improving medical care and physical rehabilitation for strokes among the most pressing scientific and practical tasks of restorative medicine [7; 8; 10].

In our department, motor rehabilitation is used to restore lost or reduced body functions. The complex of exercises uses 3-5 basic exercises, as well as passive positioning, kinesiotherapy, mechanical therapy. Physical rehabilitation is primarily aimed at restoring social and professional skills. Here, the psychological component of restorative treatment plays a very important role, which in our opinion is an undoubted guarantor of the recovery of a patient with ONMK. We use therapeutic massage, physiotherapy, mechanotherapy, occupational therapy, occupational therapy, as well as a complex of special physical exercises aimed at restoring motor functions. All appointments are carried out by a doctor in physical rehabilitation medicine (FRM doctor), the sequence of application of its forms and methods is determined by the nature of the course of the disease, the general condition of the patient, the period and stage of rehabilitation, and the motor regime. The physical rehabilitation complex is directly carried out and implemented by a medical physical education doctor (doctor - exercise therapy), as well as an exercise therapy instructor [3; 4].

Analyzing a large variety of molecular cell mechanisms, we found that therapeutic physical activity serves as a trigger for a cascade of reactive neuroprocesses that create new connections at the level of the cerebral cortex. When assessing brain neuroplasticity in our opinion, we have established a number of significant factors:

1. Functional rearrangement of brain neurons under the influence of external factors (physical rehabilitation) and internal (hypnotherapy) create a certain synaptic activity, which allows the formation of a new anatomical connection.
2. Tissue remodeling as a result of the physical rehabilitation complex, as well as the consolidation of neoplasms by hypnotherapy leads to a change in cell membranes, restoration of receptivity and activation of neoangiogenesis.

In modern reality, the number of patients with acute cerebrovascular accident has increased quite massively, the mortality rate has increased in comparison with the last five-year plan. This trend is associated with both the new coronavirus infection COVID-19 SARS-CoV-2 (2019-nCoV) and the sedentary lifestyle of most patients. Many randomized trials have shown that the greatest effectiveness of

restorative treatment for patients who have had an ischemic stroke takes place in specialized primary vascular departments. And also, in this department, the most effective treatment of patients with impaired motor functions in the implementation of the program of physical and rehabilitation medicine [4, p. 95].

The inclusion criteria in our study were: motor deficiency in the form of hemiparesis from 0 to 4 points, cognitive impairment, swallowing disorders, speech impairment, emotional-volitional impairment.

Exclusion criteria: intracerebral or subarachnoid hemorrhage, perceptual aphasia, psychomotor agitation, depressed condition, severe somatic condition.

In total, 654 patients from 27 to 92 years old were examined over the entire period of work of the Bohan PSO, the average age was 46 years. Of the total sample, women made up 57.73% and men made up 42.27%. For our study, we identified two groups of 30 people 50-60 years old, a control group (15 men, 15 women aged 50-60 years), in the experimental group for more detailed study we included 30 people (15 men, 15 women aged 50-60 years), to whom the entire complex of restorative treatment was applied - neuroprotectors, antihypertensive drugs, disaggregants, physical therapy psychotherapy, hypnotherapy kinesiotherapy. The severity of motor deficit in the control group averaged 2.5 points, in the experimental group - 2.7 points. According to the results of the standardized treatment in the control group, the motor deficit on average regressed to 3.9 points. In the experimental group, motor deficits on average regressed to 4.4 points, and in 8 patients (26.7%) up to 5 points, as well as muscle mass recovered almost to the previous parameters, in 17 patients (56.7%) up to 4.5 points, in 5 patients up to 3.7 points (16.6%).

Diagnosis and study of cognitive functions on the MoCa and MMSE scale before treatment in the control group mean MoCa 15 points, MMSE 17 points, in the MoCa experimental group 14 points, MMSE 15 points. At the end of the course of therapy in the control group, the average MoCa value was 19 points, MMSE 21 points, in the experimental MoCa group 23 points, MMSE 25 points, which reliably states the positive dynamics of cognitive functions of patients with ischemic stroke.

Thus, the obtained results of our study demonstrated that the inclusion in the comprehensive rehabilitation of patients with ischemic stroke in the recovery period, the additional inclusion of a program of physical rehabilitation, psychotherapy, hypnotherapy, kinesiotherapy significantly contributes to the regression of motor deficiency, contributes to the positive dynamics of cognitive recovery, improves functional independence in everyday life.

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5-氟尿嘧啶药物治疗期间胃肠道糜烂性和溃疡性病变的预防和治疗
**PREVENTION AND TREATMENT OF EROSION AND
ULCERATIVE LESIONS OF THE GASTROINTESTINAL TRACT
DURING DRUG TREATMENT WITH 5-FLUOROURACIL**

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抽象的。结直肠癌辅助化疗方案的主要成分是5-氟尿嘧啶，具有较高的胃肠道毒性。随着其使用，胃肠道不良事件的发生率约为30-40%。缺乏普遍接受的预防和治疗这些并发症的原则决定了该问题在医生临床实践中的相关性。

关键词：5-氟尿嘧啶，辅助化疗，粘膜炎，胃和十二指肠，胃肠道毒性，幽门螺杆菌。

Abstract. *The main component in adjuvant chemotherapy regimens for the treatment of colorectal cancer is 5-fluorouracil, which has a high gastrointestinal toxicity. With its use, the incidence of adverse events from the stomach and intestines is about 30-40%. The lack of generally accepted principles for the prevention and treatment of these complications determines the relevance of the problem in the clinical practice of a doctor.*

Keywords: *5-fluorouracil, adjuvant chemotherapy, mucositis, stomach and duodenum, gastrointestinal toxicity, Helicobacter pylori.*

Introduction

Oncological neoplasms of various localizations occupy a leading position in the structure of morbidity in the adult population. Scientists all over the world are developing new methods of treatment every day. However, the effectiveness of innovative methods for the treatment of malignant tumors does not always ensure

their good tolerability. Currently, along with the search for antitumor agents, supportive therapy for cancer patients at all stages of treatment is rapidly developing. Accompanying therapy during chemotherapy is the least developed among them.

Chemotherapy is the main and most commonly used treatment for cancer patients. It is used both during radical complex treatment in order to exclude micrometastasis, and in common malignant processes to increase the duration and quality of life of the patient.

5-fluorouracil is one of the most common anticancer drugs [1, 2]. It is more often used in the treatment of tumors of the gastrointestinal tract, as well as in cancer of the mammary glands, skin, and bladder. For the first time, 5-fluorouracil was synthesized in 1957 by R. Duschinsky et al. in the course of work on the synthesis of various fluoropyrimidines [2, 3]. C. Heidelberger et al. studied the properties of 5-fluorouracil and found an antitumor effect among them, announcing to the scientific community the discovery of a new class of cytotoxic drugs [2, 4]. The first clinical trials of 5-fluorouracil were conducted by F. Ansfield and A. Curreru in 1959 [2, 5]. 5-fluorouracil has become the first and one of the main drugs in the class of antimetabolites, which is used in a wide range of cancers, despite a 60-year history.

The half-life of 5-fluorouracil is up to 20 minutes. This fact became the leading one in the development of treatment regimens for neoplasms of the colon and rectosigmoid region with the inclusion of fluorouracil. A. de Gramont et al. in 1997, a popular treatment regimen was developed, named after the author: leucovorin 200 mg/m² intravenously by infusion drip on days 1 and 2; 5-fluorouracil 400 mg/m² intravenously by bolus 1, 2 days; 5-fluorouracil 600 mg/m² intravenously 22-hour infusion 1, 2 days; every 2 weeks [6].

In addition to effective antitumor activity, 5-fluorouracil has many side effects that affect the hematopoietic system, liver, skin, nerve cells, cardiovascular and urinary systems. But most often the mucous membrane of the stomach and intestines suffers [7, 8]. When using 5-fluorouracil, the incidence of these adverse events from the gastrointestinal tract is about 30-40% [7, 8]. All these side effects can occur simultaneously with each other, resulting in multivisceral pathology, which is very early in 5-8% of patients and even leads to death in 0.8% of treated patients [9].

The purpose of the review

Improving the idea of the possibility of toxicity during treatment with 5-fluorouracil in patients with malignant tumors of various localizations and factors that aggravate their course, as well as highlighting the problem of prevention and treatment of gastrointestinal adverse events.

Materials and methods

A review of the literature on the topic "Prevention and treatment of erosive and ulcerative lesions of the gastrointestinal tract during drug treatment with 5-fluo-

ouracil” was performed. The search was carried out on the following keywords: “5-fluorouracil”, “chemotherapy”, “mucositis”, “colon and rectosigmoid cancer”, “gastrointestinal toxicity”, “*Helicobacter pylori*”. The analysis was carried out without the use of specialized software, full-text sources selected during the analysis of abstracts formed the basis of the current review. The search for relevant scientific publications by keywords was carried out in the PubMed, Google Scholar, eLibrary.ru and Russian specialized journals related to therapy, surgery, gastroenterology, oncology for the period from 2010 to 2022.

Results

Mucositis is one of the most common adverse events that develop during chemotherapy. The development of this complication can lead to significant financial costs. World Health Organization experts state that about 22% of patients treated for solid tumors who develop grade 3-4 mucositis require total parenteral nutrition [10]. The presence of grade 3-4 mucositis doubles the risk of transferring the patient to the intensive care unit and lengthens the hospital stay during the next course of cytotoxic treatment by an average of 7 days [10].

The gastrointestinal toxicity of 5-fluorouracil has been studied in many studies with its monotherapy and in combination with other drugs.

In 2012, the results of an open multicenter prospective clinical trial were published, conducted at the chemotherapy departments of the Russian Cancer Research Center named after N.N. Blokhin of the Russian Academy of Medical Sciences, Bashkir Republican Clinical and Astrakhan Regional Oncology Dispensaries from 2008 to 2012 [11]. The aim of the study was to study the toxicity and antitumor efficacy of chemotherapy in the mFOLFOX6 regimen (5-fluorouracil 400 mg/m² intravenously bolus + leucovorin 400 mg/m² intravenous drip for 2 hours + oxaliplatin 100 mg/m² intravenously on day 1 and 5-fluorouracil 2400 mg / m² intravenously infusion for 44 hours), which includes 5-fluorouracil, in the treatment of patients with metastatic colon cancer in the first line. The results of the study provide an assessment of toxicity using the US National Cancer Institute’s toxicity criteria during treatment. A more common treatment adverse event was gastrointestinal toxicity associated with 5-fluorouracil, which was the main reason for delaying chemotherapy courses. According to the study, the percentage of complications from the gastrointestinal tract was distributed as follows: nausea occurred in 37.5% of patients, vomiting - 10%, diarrhea - 32.5%, stomatitis - 27.5%.

In 2019, the results of a retrospective study were published that examined the severity of toxic manifestations in 84 patients with metastatic colorectal cancer when using FOLFOX4 regimens (oxaliplatin 85 mg/m² 1 day, 5-fluorouracil 1000 mg/m² 1-2 days, leucovorin 200 mg/m² 1-2 days, every 2 weeks) and CAPOX (capecitabine 1000 mg/m² 2 times a day for 14 days, oxaliplatin 130 mg/m² 1

day, every 3 weeks). Adverse events from chemotherapy developed in 79.8% of the studied patients. The most common types of toxicity in patients treated with fluoropyrimidine-containing regimens were gastrointestinal (25%) and hematological (23.8%) [12].

We analyzed the clinical observations of the Yakut Republican Oncological Dispensary, studying the toxicity of the standard chemotherapy regimen, including 5-fluorouracil, in patients with colon cancer. The study included 60 patients who underwent cytotoxic therapy according to the regimen 5-fluorouracil 500 mg/m² IV on days 1, 8, 15, 22, 29, and 30; calcium folinate on days 1, 8, 15, 22, 29, 30, interval between courses 2 weeks. All patients received a total of 387 chemotherapy courses. The main toxicity that occurs in the studied patients was gastrointestinal. The most common was diarrhea (15%). Nausea (13.3%) and stomatitis (11.7%) also occurred. In addition to adverse effects on the part of the gastrointestinal tract, hematological toxicity was observed: leukopenia, anemia, thrombocytopenia [13].

Summarizing the above research data, we can conclude that the use of 5-fluorouracil is associated with a high risk of gastrointestinal toxicity. In addition to the symptomatic manifestations of these adverse events (nausea, vomiting), erosive and ulcerative lesions of the mucous membranes of the upper parts of the digestive tract, stomach and intestines may occur.

In addition to the considered causes that can cause mucositis, which leave their mark during cytotoxic treatment with 5-fluorouracil, this undesirable phenomenon on the part of the stomach and duodenum aggravates the presence of *Helicobacter pylori* (*H. pylori*) infection in patients [14]. The average prevalence of *H. pylori* worldwide is 50%: it is detected in approximately 30-35% of the population in childhood and in 50-85% in the adult population [15]. In developing countries, the infection rate is high at 80-90%. Countries with lower levels include Australia (20%), North America (30-40%), Western Europe (30-50%) [15].

The history of the discovery of *H. pylori* is very interesting. The bacterium was first identified in 1875 on the mucous membrane of the human stomach by German scientists [16]. But this discovery has not received due attention due to the lack of nutrient media for the cultivation of *H. pylori* [16]. And only in 1981, Australian scientists Barry Marshall and Robin Warren were able to isolate and isolate the found microorganism in samples of the human gastric mucosa for the first time [16]. The bacterium was isolated from 11 patients and named *Campylobacter pyloridis* (now known as *Helicobacter pylori*). This marked the beginning of a new era in gastric microbiology. For this discovery, Barry Marshall and Robin Warren were awarded the Nobel Prize in Medicine and Physiology in 2005 [14].

H. pylori has microbiological characteristics that allow it to survive in extremely unfavorable conditions, such as the acidic environment of the stomach

[17]. It lives deep in the gastric pits and on the surface of epithelial cells, mostly under the protective layer of mucus lining the gastric mucosa. *H. pylori* is also found in the cells of the gastric mucosa. *H. pylori* does not colonize the intact duodenal mucosa. With frequent acidification of the duodenal bulb, there are areas of gastric dysplasia where *H. pylori* can exist.

Given the above data, we can conclude that if a patient has *H. pylori* infection, as well as a history of erosive and ulcerative diseases of the stomach and duodenum during chemotherapy containing 5-fluorouracil, the risk of developing gastrointestinal toxicity increases significantly. And for the treatment of developed mucositis of the stomach and duodenum, more time will be needed, which will entail an increase in the delay of the next course of chemotherapy and a reduction in cytostatic doses.

The problem under consideration is exacerbated by the lack of generally accepted methods and recommendations for the prevention and treatment of gastrointestinal mucositis.

The recommendations of the Russian Society of Clinical Oncology (RUSSCO 2021) for the prevention and treatment of gastrointestinal mucositis do not provide information on the prevention of inflammation of the gastric and duodenal mucosa. But there is some information on their treatment. These include: adequate hydration, food intake in liquid and semi-liquid form (if necessary, installation of a gastric tube), antibiotic therapy in case of an infection caused by pathogenic flora [7].

The 2015 European Society for Medical Oncology guidelines published a single recommendation regarding gastrointestinal mucositis during standard chemotherapy [18]: oral ranitidine or omeprazole are recommended for the prevention of epigastric pain after treatment with standard doses of cyclophosphamide, methotrexate and 5-fluorouracil or treatment 5-fluorouracil with or without the inclusion of folic acid.

The 2019/2020 Mucositis Treatment Guidelines of the Multinational Association for Supportive Cancer Care (MASCC), in partnership with the International Society of Oral Oncology (ISOO), as well as the 2021/2022 Society for Supportive Care in Oncology (RASSC) Clinical Guidelines, lack evidence on prevention and treatment of gastrointestinal mucositis caused by chemotherapy [19].

The development of methods for the prevention and treatment of gastrointestinal toxicity during chemotherapy is an urgent problem among modern scientists.

Thorpe D. published an article in 2019 in which he shared his findings on the effect of mucin secretion on the development of gastrointestinal mucositis. The author believes that the high content of mucin on the mucosa of the gastrointestinal tract prevents the development of inflammation and reduces the damage caused by mucositis. Therefore, the effect on mucin expression before and during cytotoxic treatment may be a key factor in reducing the severity of this adverse event [20].

Korean researchers led by Deng L. published in April 2022 the results of their work, which studied the effectiveness of Chinese traditional medicine Simotang, consisting of natural plants, in the treatment of gastrointestinal side effects after chemotherapy [21, 22]. The drug was found to effectively reduce gastrointestinal mucositis after cytotoxic treatment by reducing inflammation and thickening of intestinal epithelial cells.

Conclusion. Based on the analysis of the literature, it can be argued that there are no generally accepted methods for the prevention of mucositis of the gastrointestinal tract when using 5-fluorouracil. Also, to date, there has not been developed an effective antidote used for gastrointestinal lesions, as well as a predictive model that would allow oncologists to single out patients with solid tumors in a group with a high risk of developing mucositis. At the same time, the problem was not considered in the context of factors that aggravate the course of damage to the mucous membrane of the digestive tract, including the presence of *H. pylori infection*, which is very common among the world's population. In view of this, the problem is relevant in modern medicine and requires the study and development of methods for the prevention of gastrointestinal mucositis in patients receiving drug treatment with the inclusion of 5-fluorouracil, which will improve the delayed results of antitumor treatment through its full and timely implementation, as well as maintain a high quality of life for patients.

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顿巴斯景观人为改造条件下的植物生态策略
**PLANT ECOLOGICAL STRATEGIES IN THE CONDITIONS OF
ANTHROPOGENIC TRANSFORMATION OF THE DONBASS
LANDSCAPES**

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抽象的。列出了靠近顿巴斯敌对行动地点（2014-2022 年）的植物物种清单：爆炸、通讯破坏、景观改造 – 环境的机械和化学污染。事实证明，战争因素会刺激植物出现特殊的结构特征，使个体和植物种群能够适应新的环境条件。物种清单及其特征分为高等开花指示植物和高等孢子植物物种 – 苔藓，在生态系统急剧变化的条件下，它们可以改变分枝的性质，外观的形成，分布方式 后代作为营养和繁殖机制。在敌对行动的压力下，指标物种出现了许多结构异常——畸形。这些事实的总和使得在高度城市化、工业发展和东欧活跃的军事行动的条件下对生境状态进行生态监测成为可能。

关键词：环境监测、顿巴斯、生态系统转型、植物指示、生态分析、植物生存策略。

Abstract. *Lists of plant species that are in close proximity to the places of hostilities in the Donbass (2014-2022) are presented: explosions, destruction of communications, landscape transformation - mechanical and chemical pollution of the environment. It has been proved that warfare factors are stimulating for the appearance in plants of special features of the structure, which allow individual individuals and plant populations to adapt to new environmental conditions. The lists of species and their characteristics are divided into higher flowering indicator plants and species of higher spore plants - mosses, which, under conditions of a sharp change in the ecosystem, can change the nature of branching, formation of appearance, ways of distributing their descendants as vegetative and generative mechanisms. Numerous anomalies in the structure appear in indicator species under the stress of hostilities - teratomorphs. The totality of these facts makes it possible to carry out ecological monitoring of the state of biotopes in conditions of high urbanization, industrial development and an additional factor - active military operations in Eastern Europe.*

Keywords: *environmental monitoring, Donbass, ecosystem transformation, phyto-indication, ecological analysis, plant survival strategies.*

The study of life strategy issues (environmental strategy, survival strategy) of species or individual groups of organisms is a fundamental task of biology and ecology [1–4]. This information is always based on the experience of experimenters and specially planned observations of wildlife [5–8]. For the territory of the most anthropogenically stressed region of Eastern Europe - the Donbass - the study of the indicator properties of plants is of particular interest: according to ecological scales [9], monitoring and environmental assessment [10–12], standardization [13] and assessment of natural environments according to the structural characteristics of plants [14, 15]. Actual developments are being carried out on the bibliographic accounting of environmental data about the Donbass [16], methodological issues of determining the indicator features of plants [17–19]. Such results are important for theoretical and practical science in solving topical problems at the regional level [20–23].

It is important to note that the formation of the Donbass (the territory of the Don River basin) as a populated area is directly dependent on the presence of coal deposits formed in the period of the same name 300–360 million years ago due to the dominance of broad-stemmed vegetation in a warm and humid climate. This paleontological prehistory decided the fate of the undeveloped steppe massif in Eastern Europe at that time (150–160 years ago). Against the background of the full-scale use of underground deposits, the construction of metallurgical plants and cities around them, there was also a total above-ground agricultural development of the area with the most fertile soils - chernozems. As a result, today Donbass is a completely anthropogenically transformed region with 4% of the territory of the natural reserve fund in places that are inconvenient for industry and the agricultural sector. Therefore, the current situation requires the presence of environmental specialists who solve the problems of balanced nature management and optimization of the technogenic environment for human life.

During the years of hostilities on the territory of Donbass - from 2014 to the present, the research activities of teachers and students of the Department of Botany and Ecology have been carried out within the framework of three initiative projects of Donetsk State University: 1) functional botany: environmental monitoring, resource technologies, phytodesign (2017–2021); 2) diagnostics of natural and transformed ecotopes according to the state of phytocomponents (2018–2019); 3) botany of anthropotechnogenesis: indication and optimization (since 2022).

The ideology of phytoindication introduced into practice is to establish a functional difference between the state of plant organisms in the ranked series of the anthropogenic component. For this, informative indices are subject to processing in accordance with the compiled ecological scales for the ranges of plant species hardiness and the range of their structural phenotypic plasticity. On the basis of scales and indices, paired and complex correlation analyzes were carried out,

levels of reliability and significance were established, cartographic material was created, which, by its technological application, is also a source of primary information in, for example, establishing geochemical provinces, pollution halos, and migration of a multispecies animal population. Based on the obtained planar models and established succession processes in the biogeochemical indices of well-being, materials have been prepared for management consideration of the issues of localization of zones of ecological disaster, risk, increased danger, a network of ecological corridors has been developed connecting the biogeocenotic cores of the region's reference ecosystems. Therefore, on the examples listed above, the system for the implementation of the indicator and information functions of the biosphere is considered. Most of these examples are associated with the results of ingredient monitoring - the concentration function of living matter is realized.

Accumulation of high levels of atypical polymorphism of indicator plants is typical for urbanized areas that are strategically functionally and historically associated with the location of industrial facilities in the Donbass. According to the areal patterns of the dynamics of values, the zone of stability remains the average indicators of the criterion of teratogenicity of territories - intervals 4, 5 and 6, which, according to the total capacity of the information network, form an array of 43% of all transitional indices. The total coefficient of atypical polymorphism of indicator plants was divided into two functional blocks for separate mapping: according to the vegetative and generative components of morphogenesis. Visualization cartographic materials for the territorial analysis of aspects of the anthropogenic transformation of open natural systems in the Donbass have been obtained.

In the aspect of the concentration function of living matter, accumulator plants are considered as an example: for cobalt: *Ageratum houstonianum* Mill., *Alyssum maritimum* Lam., *Amaranthus albus* L., *Ambrosia artemisiifolia* L., *Centaurea diffusa* Lam; марганца – *Berteroa incana* (L.) DC., *Calamagrostis epigeios* (L.) Roth., *Melilotus officinalis* (L.) Pall., *Plantago major* L., *Polygonum aviculare* L., *Reseda lutea* L., цинка – *Amaranthus retroflexus* L., *Capsella bursa-pastoris* (L.) Medik., *Chelidonium majus* L., *Deschampsia caespitosa* (L.) Beauv., *Sonchus arvensis* L., *Xanthium albinum* (Widd.) H. Scholz.; для ртуті: *Ambrosia artemisiifolia* L., *Capsella orientalis* Klokov, *Centaurea diffusa* Lam., *Cichorium intybus* L., *Cyclachaena xanthiifolia* (Nutt.) Fresen., *Dactylis glomerata* L., *Thlaspi arvense* L. Species for which an indication value was found for ectopic confinement to chemical contamination of the substrate: *Agrostis stolonifera* L., *Digitaria sanguinalis* (L.) Scop., *Gnaphalium uliginosum* L., *Sinapis arvensis* L. In terms of the environment-forming function in disturbed habitats, mosses make the greatest contribution to the development of local edaphosubstrates. *Tortula muralis* Hedw., *Plagiomnium cuspidatum* (Hedw.) T. Kop., *Bryum caespiticium* Hedw., *Aulacomnium palustre* (Hedw.) Schwägr., *Bryum capillare* Hedw., *Bryum*

argenteum Hedw., *Ceratodon purpureus* (Hedw.) Brid and *Grimmia pulvinata* (Hedw.) Sm.

Lists of plant species that change their life strategy as a result of military transformations of landscapes are presented in Table. 1 for flowering and tab. 2 for mosses.

Table 1
Options for changing the ecological strategy (survival strategy) of flowering plant species of the Donbass flora

Species name	Strategy changes			
	toxic environment, chemical pollution	%	mechanical transformation of landscapes	%
<i>Alsine media</i> L.	CSR → S-R	77	CRS → R	63
<i>Amaranthus retroflexus</i> L.	C-S	55	CSR → R-S	92
<i>Atriplex patula</i> L.	CSR → S-R	69		76
<i>Berteroa incana</i> (L.) DC.	S-R	86	C-R → R	68
<i>Capsella bursa-pastoris</i> Medik.	CSR → S-R	62	CSR → R-S	91
<i>Cichorium intybus</i> L.	CSR → C-S	69	CRS → R	58
<i>Dactylis glomerata</i> L.	CSR → S-R	58	CRS → R	83
<i>Dianthus campestris</i> M. Bieb		85		68
<i>Diplotaxis muralis</i> (L.) DC.	CSR → S	82	C-R → R	61
<i>Echium vulgare</i> L.	C-R → CSR	75	CSR → R-S	74
<i>Fumaria schleicheri</i> Soy.-Willem		92		93
<i>Gipsophila paniculata</i> L.	CSR → S	87	C-R → R	67
<i>Glaucium corniculatum</i> (L.)	CSR → S-R	81	CSR → R-S	91
<i>Moehringia trinervia</i> (L.) Clairv.		66	C-R → R	78
<i>Nigella arvensis</i> L.		94	CRS → R	73
<i>Plantago lanceolata</i> L.	CSR → S	81		56
<i>Plantago major</i> L.	C-R	87		90
<i>Polygonum aviculare</i> L.	C-R → CSR	67	C-R → R	70
<i>Portulaca oleracea</i> L.	CSR → S-R	80	CSR → R-S	86
<i>Reseda lutea</i> L.		89	CRS → R	79
<i>Sagina procumbens</i> L.	CSR → S	66	CSR → R-S	84
<i>Senecio vulgaris</i> L.	C-R → CSR	60	CRS → R	59
<i>Stellaria subulata</i> Boeberex	CSR → S-R	88		72
<i>Tanacetum vulgare</i> L.	CSR → C-S	65	C-R → R	88
<i>Tragopogon major</i> Jacq.	C-R → CSR	85	CSR → R-S	95
<i>Tripleurospermum inodorum</i> (L.)	C-S	71		64

Species strategies: C – competitors, S – stress tolerant, R – ruderals.

Table 2
*Options for changing the ecological strategy (survival strategy)
of bryophyte species of the Donbass flora*

Species name	Strategy changes			
	toxic environment, chemical pollution	%	mechanical transformation of landscapes	%
<i>Abietinella abietina</i> (Hedw.) M.Fleisch.	CSR → S-R	100	C-R → R	100
<i>Amblystegium serpens</i> (Hedw.) Bruch et al.	CRS → S	51	CRS → R	58
<i>Aulacomnium palustre</i> (Hedw.) Schwägr.	CSR → S	56	CSR → R-S	53
<i>Brachythecium campestre</i> (Müll. Hal.) Bruch et al.	CSR → R-S	71	CRS → R	40
<i>Brachythecium mildeanum</i> (Schimp.) Schimp.	CSR → S	43	CSR → R-S	50
<i>Bryum argenteum</i> Hedw.	CSR → R-S	50	CRS → R	66
<i>Bryum caespitium</i> Hedw.		60		49
<i>Bryum capillare</i> Hedw.		90	CSR → R-S	92
<i>Ceratodon purpureus</i> (Hedw.) Brid.	CRS → S	55	CRS → R	65
<i>Dicranum fulvum</i> Hook.	CSR → S-R	100	C-R → R	100
<i>Didymodon fallax</i> (Hedwig) R. H. Zander				
<i>Grimmia pulvinata</i> (Hedw.) Sm.	CSR → S		C-R → CSR	54
<i>Grimmia pulvinata</i> (Hedw.) Sm.	CSR → S-R	100	C-R → R	100
<i>Hamatocaulis vernicosus</i> (Mitt.) Hedenäs				
<i>Leskea polycarpa</i> Hedw	CSR → R-S	62	C-R → CSR	48
<i>Mnium lycopodioides</i> Schwägr.	CSR → S-R	100	C-R → R	100
<i>Orthotrichum diaphanum</i> Brid.				
<i>Orthotrichum pallens</i> Bruch ex Brid.	CSR → R-S	42	CRS → R	52
<i>Orthotrichum pumilum</i> Sw. ex anon.	CSR → R-S	75	CSR → R-S	57
<i>Orthotrichum speciosum</i> Nees	CSR → S	50	CRS → R	74
<i>Plagiomnium affine</i> (Blandow ex Funck) T.J.Kop.	CSR → S-R	100	C-R → R	100
<i>Plagiomnium cuspidatum</i> (Hedw.) T. Kop.	CSR → R-S	76	C-R → CSR	44
<i>Platygyrium repens</i> (Brid.) Bruch et al.	CRS → S	46	CRS → R	59
<i>Pleurozium schreberi</i> (Brid.) Mitt.	C-R → CSR	77	CSR → R-S	72
<i>Polytrichum juniperinum</i> Hedw.	CSR → S	73	CRS → R	61

<i>Syntrichia ruralis</i> (Hedw.) F. Weber & Mohr	CRS → S	45	CSR → R-S	63
<i>Tortula mucronifolia</i> Schwägr.	C-R → CSR	88	C-R → CSR	47
<i>Tortula muralis</i> Hedw.	CSR → S	60	CRS → R	78
<i>Weissia controversa</i> Hedw.	C-R → CSR	64	CSR → R-S	91

As a diagnostic characteristic of the explerent type of implementation of the bryophyte life strategy, the frequency of occurrence of atypical sporophthitization in the loci of the formation of sporophyte growth points for the species *Amblystegium subtile* (Hedw.) Schimp., *Brachythecium campestre* (Müll.Hal.) Bruch et al., *Bryum argenteum* Hedw., *Ceratodon purpureus* (Hedw.) Brid, *Brachythecium mildeanum* (Schimp.) Schimp., *Bryum caespiticium* Hedw., *Bryum capillare* Hedw., *Plagiomnium cuspidatum* (Hedw.) T. Kop., *Aulacomnium palustre* (Hedw.) Schwägr., *Platygyrium repens* (Brid.) Schimp. and *Amblystegium serpens* (Hedw.) Schimp was recorded.

The typical violent strategic form of most of the studied species of bryophytes is characterized by the appearance of signs of sporophyte oligomerization and fasciation during the formation of a shoot structure, which is reflected habitually and is widely used in express diagnostics of a field experiment for the following species: *Dicranum fulvum* Hook., *Leptodictyum riparium* (Hedw.) Warnst., *Leskea polycarpa* Hedw., *Brachythecium salebrosum* (F.Weber & D.Mohr) Bruch et al., *Orthotrichum obtusifolium* Brid., *Tortula muralis* Hedw., *Orthotrichum speciosum* Nees, *Grimmia pulvinata* (Hedw.) Sm., *Syntrichia ruralis* (Hedw.) F. Weber & Mohr, *Tortula mucronifolia* Schwaegr., *Orthotrichum pallens* Bruch ex Brid., *Pleurozium schreberi* (Willd. ex Brid.) Mitt, *Bryum turbinatum* (Hedw.) Turn., *Polytrichum commune* Hedw.

The ability of plants to show their heterogeneity in terms of recorded teratomorphs, associated with anthropogenic pressure on natural environments, reflects the specifics of the adverse impact on ecotopes, which makes it possible to implement a monitoring and quantification experiment to prove environmental tension in specific territorial positions.

Two leading causes of multidirectional background fluctuations in the occurrence and manifestation of deformities in indicator plants in the Donbass have been identified:

- 1) conducting military operations - fixing data along the line of confrontation;
- 2) stagnation of heavy industry in the region - the process is established along the vector of positive dynamics in reducing the teratogenicity of the territories.

Dominant secondary strategies of the species: C-R – competitive ruderals, S-R – stress-tolerant ruderals, C-S – stress-tolerant competitors and CSR-strategists.

Cartographic visualization methods based on the planar distribution of data and along the lines of ecological profiles make it possible to visualize and ad-

ditionally analyze the state of ecotopes in different years and in the dynamics of their main characteristics. It was with the help of the landscape method of data visualization that the process of divergence of extremes in the range of variation of the total sign of teratogenicity of territories was demonstrated: the previously recorded high levels of atypical plant morphogenesis became even higher; places with low characteristics of plant suppression for 5 years significantly reduced the indicators of teratogenic background in the studied local ecotopes.

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机会性细菌与免疫抑制个体对抗菌药物的多重耐药性相关
**OPPORTUNISTIC BACTERIA ASSOCIATED WITH MULTIPLE
RESISTANCE TO ANTIBACTERIAL DRUGS IN INDIVIDUALS
WITH IMMUNOSUPPRESSION**

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抽象的。近年来的统计数据显示出一个稳定的趋势：最危险的机会性病原体是具有抗生素抗药性迹象的菌株。它们是导致免疫功能低下患者病情严重和死亡率高的原因之一。如今，人们知道可以同时感染慢性免疫抑制患者身体的微生物物种谱的多样性，但实际上没有关于这批患者中这些微生物群落结构的信息。本研究旨在评估从免疫抑制个体分离的分离株样本中与抗菌药物多重耐药性相关的机会性细菌的流行情况。机会性微生物的物种多样性是根据莫斯科各类医院收治的慢性免疫抑制患者的 332 份临床样本（上呼吸道分泌物、痰和尿液）确定的。揭示了优势菌株的谱系，并确定了它们在患者继发感染过程结构中的病因学作用。已经研究了从细菌分离株中分离出的菌株的主要特征，包括它们对抗生素的耐药性。已确定这些微生物对现代抗生素的主要类别具有高水平的耐药性。已鉴定出多抗性临床分离株。

关键词：机会性感染，抗生素耐药性，免疫抑制，多重耐药性，抗生素敏感性。

Abstract. *Statistics of recent years show a steady trend: the most dangerous of opportunistic pathogens are strains with signs of resistance to antibiotics. They are one of the causes of the severe course of the disease and the high mortality of immunocompromised patients. Today, it is known about the diversity of the species spectrum of microorganisms that can simultaneously infect the body of patients*

with chronic immunosuppression, but there is practically no information about the structure of the community of these microbes in this contingent of patients. This study was conducted to assess the prevalence of opportunistic bacteria associated with multiple resistance to antibacterial drugs in a sample of isolates isolated from individuals with immunosuppression. The species diversity of opportunistic microorganisms was determined from 332 clinical samples (upper respiratory tract discharge, sputum and urine) in persons with chronic immunosuppression admitted to hospitals of various profiles in Moscow. The spectrum of dominant strains was revealed and their etiological role in the structure of secondary infectious processes in patients was established. The main characteristics of strains isolated from bacterial isolates, including their resistance to antibiotics, have been studied. A high level of resistance of these microorganisms to the main groups of modern antibiotics has been determined. Polyresistant clinical isolates have been identified.

Keywords: *Opportunistic infections, antibiotic resistance, immunosuppression, multi-resistance, antibiotic sensitivity.*

Uncontrolled use of antibiotics, an increase in the number of patients with viral immunodeficiency; persons receiving hormonal and cytostatic therapy, patients in intensive care units, etc., leads to the emergence of new clinically significant bacteria, reducing the relevance of known pathogens. So, for example, in the second half of the XX century there was an epidemic of nosocomial *Pseudomonas aeruginosa*. Now an equally dangerous opportunist is progressing — *Acinetobacter* sp. [3]. The strategic success of any bacterial pathogen depends on its ability to quickly adapt to the aggressive action of immune system effectors and antimicrobials. From these positions, 6 taxa of microorganisms are isolated, which are called ESKAPE pathogens [1]. It is the bacteria of this group, including *Enterococcus* sp., *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and *Enterobacter* sp., that are considered by international experts as a global threat to humanity [2,20]. The work of epidemiological services, treatment standards, hospital profile, use of antibiotics and other factors determine leadership within the ESKAPE group. The most important task of medicine at the present stage is the prediction and monitoring of such pathogens [22].

One of the reasons for hospitalization of patients in a state of chronic immunosuppression is respiratory damage [4,14,15]. The state of immune deficiency contributes to the colonization of such patients by the most aggressive microorganisms with pronounced resistance to antimicrobial/antifungal drugs, which requires correction of anti-microbial therapy [5]. Examples of such bacteria can be ESKAPE pathogens. It is also possible to include yeast fungi of the genus *Candida*, which pose a known danger to this category of patients due to the deep

suppression of the cellular link of immunity. Here, the concept of monitoring bacterial flora in a specific group of patients in a specific hospital, department justifies itself, the result of which is to obtain general patterns about the prevailing etiology of pneumonia of various origins. The main purpose of such monitoring is to assess the levels of resistance of pathogens to antimicrobial drugs and the empirical choice of starting antimicrobial therapy.

There is also a significant increase in the number of patients with cystitis, urethritis with a preponderance of opportunistic pathogens in the etiological structure, which is associated with the spread of antibiotic-resistant strains, as well as the presence of signs of immunodeficiency in sick patients [6,7,16]. The polyetiological nature of diseases caused by conditionally pathogenic microorganisms, the spread of antibiotic-resistant strains, the heterogeneity of their populations, the frequent change of the etiological agent, as well as the reduced ability to develop an immune response to conditionally pathogenic microorganisms create difficulties in the diagnosis, treatment and prevention of diseases of the urinary tract. Thus, opportunistic urinary tract infections constitute the largest reservoir of antibiotic-resistant microorganisms [8,9,19]. In this regard, the study of the etiological structure of diseases, the identification of anti-biotic-resistant strains, the selection of therapeutic drugs are significant and timely measures that can help in solving urgent problems.

Methods: A microbiological study of clinical material samples was carried out in persons with chronic immunosuppression with clinical signs of respiratory tract infection or urinary tract infection treated in various medical institutions in Moscow. In the first 48 hours after hospitalization, sputum, smears from the pharynx, and urine samples, depending on the disease, were collected for the detection of microflora. A total of 332 clinical samples were examined (250 upper respiratory tract cultures, 48 sputum samples and 34 urine samples). To assess the quality of taking the material, sputum was microscopized, then homogenized with beads of 1 ml of sputum and 9 ml of meat-peptone broth for 20 minutes, subsequent tenfold dilutions were prepared and 0.1 ml from the initial 1:10 dilution was sown on Colombian agar (HiMedia, India) with the addition of 5% blood, yolk-salt agar, Endo agar and Saburo agar (FBUN SSC PMB, Obolensk). Swabs from the pharynx were sown on nutrient and selective media by the method of sector sowing. To detect bacteria in urine samples, seeding was carried out according to the Gold method using a chromogenic non-selective medium "Uriselect agar" (Bio-Rad, France) [10]. The crops were incubated from 24 to 48 hours at t 37°C. All cases of isolation of microorganisms from sputum samples and smears from the pharynx at a concentration of 10⁶ CFU/ml or more were considered clinically significant. The clinical significance of pathogens isolated from urine was evaluated in accordance with the criteria presented in the Recommendations of the European Association

of Urologists for the Treatment of Urinary Tract infections and infections of the reproductive system in men [11]. The identification of the studied cultures was carried out on the basis of morphotinctorial, cultural and bio-chemical properties, using, in addition to routine methods, the Lachema test system (Czech Republic) for the identification of microorganisms with subsequent verification by MALDI-TOF mass spectrometry on the microbiological analyzer “BactoSCREN” (Litech, Russia) in automatic mode using software for the management, analysis and identification of microorganisms “BactoSCREN-ID”. Recommended values of Score ≥ 0.8 were used as a criterion for reliable species identification. The sensitivity of microorganisms to antibiotics was determined by the disco-diffusion method on Muller-Hinton agar using OXOID disks (UK) and Bioanalyse Limited (Turkey), in accordance with the recommendations of the European Committee on Antimicrobial Susceptibility Testing (EUCAST). The presence of certain resistance mechanisms in resistant strains due to the work of enzymes that ensure the resistance of bacteria to almost all beta-lactam antibiotics (extended-spectrum beta-lactamases (BLRS)) and carbapenems (metal-beta-lactamases – MBL) was determined phenotypically by the double disk method [12].

Statistical processing of the results was carried out using the statistical program “Microbiological monitoring system “Microb-2”. Nonparametric methods were used: Mann-Whitney and Pearson chi-squared. The criterion of statistical reliability of the obtained data was considered to be the generally accepted value $p < 0.05$ [13,17,18].

Results: When 48 sputum samples were seeded, microbial growth was obtained from 37 patients (77%). A total of 40 strains were isolated – monocultures were obtained from 34 patients (91.9% of cases), an association of microorganisms was isolated from 3 patients (8.1% of cases). Bacteria of the Enterobacteriaceae family (50%) dominated among monocultures, represented mainly by *Klebsiella pneumoniae* (82.3%) and non-fermenting gram-negative bacteria (NGOB) - *Acinetobacter* sp., *Pseudomonas aeruginosa*, *Stenotrophomonas maltophilia* (41.2%). Yeast-like fungi of the genus *Candida* accounted for 8.8%.

When sowing clinical material from the pharynx, growth was obtained in 100% of cases (250 samples out of 250), while associations of microorganisms were isolated in all samples. A significant proportion of microorganisms isolated from the pharynx were *Streptococcus* sp. of the viridans group and various types of *Neisseria* sp., which are part of the resident flora of the upper respiratory tract.

Conditionally pathogenic flora, sown in an amount of more than 10^6 , was represented by yeast fungi of the genus *Candida* – 32% of cases. In second place are representatives of the Enterobacteriaceae family (20%). Gram-positive *Staphylococcus* sp. accounted for 19.2%, followed by non-fermenting gram-negative bacteria (15.6%). 3.2% were *Enterococcus* sp. The frequency of *C. albicans* iso-

lation among all yeast fungi of the genus *Candida* was 72.5%, non-albicans species – 27.5%. *S. aureus* was mainly isolated from *Staphylococcus* sp. in patients (73.0%). For a fraction of *S. epidermidis*, *S. hominis* and *S. haemolyticus* accounted for approximately 27% of seeding cases. The Enterobacteriaceae family was represented by *Klebsiella pneumoniae* – 78% and *Enterobacter* sp. - 22%. *Pseudomonas aeruginosa* accounted for the majority of non-fermenting gram-negative bacteria. *Pseudomonas aeruginosa* represented 56.4% of all NGB isolated from the pharynx. *Acinetobacter* sp. also plays a significant role – 30.8%. *Stenotrophomonas maltophilia* is in third place in terms of the frequency of NGB isolation -12.8%. Bacteria of the genus *Enterococcus* sp. they were rarely sown from the throat (8 isolates from 250 samples of clinical material) and were represented by the species *Enterococcus faecalis*.

42 cultures of microorganisms were isolated from the examined patients with clinical signs of infection of the genitourinary tract, of which 26 (61.9%) were attributed to bacteria of the Enterobacteriaceae family with a predominance of *E. coli* — 63.6%, *Proteus mirabilis* – 15.2% and bacteria *Enterobacter cloacae* complete - 21.2%. The rest were identified and attributed to NGB - *P. aeruginosa*, *Acinetobacter* sp. (19%), as well as to *Staphylococcus* sp. (9.5%) and *Enterococcus* sp. (9.5%). From isolated coccoid bacteria, *Staphylococcus saprophyticus*, *Staphylococcus epidermidis* and *Enterococcus faecalis* were most often detected, which were more often isolated from urine in associations. *E. coli* and *Proteus mirabilis* were more often found in urine cultures of patients, both as a monoculture and as part of microbial associations.

The isolated bacteria were tested for sensitivity to the following groups of antibacterial drugs: penicillins, cephalosporins, carbapenems, monobactams, fluoroquinolones, aminoglycosides, glycopeptides, as well as to other antimicrobial drugs, according to the expert rules and criteria for interpreting the sensitivity of EUCAST

Because of the analysis of the antibiotic sensitivity of the isolated strains, 36 polyresistant isolates of bacteria were selected. The identification of these isolates by MALDI-TOF mass spectrometry made it possible to attribute them to the family Enterobacteriaceae (*Klebsiella pneumoniae* and microorganisms of the genus *Enterobacter*), as well as non-fermenting gram-negative bacteria (*Acinetobacter* sp., *Pseudomonas aeruginosa*, *Stenotrophomonas maltophilia*), *Staphylococcus* sp. and *Enterococcus* sp. The frequency of occurrence of each species was determined: *Klebsiella pneumoniae* (n=8), *Enterobacter cloacae* complete (n=6), *Pseudomonas aeruginosa* (n=5), *Enterococcus faecalis* (n=5). *Stenotrophomonas maltophilia* (n=3), *Acinetobacter nosocomialis* (n=2), *Acinetobacter lwoffii* (n=2), *Acinetobacter baumannii* (n=1), *Staphylococcus epidermidis* (n=2), *Staphylococcus hominis* (n=1), *Staphylococcus haemolyticus* (n= 1).

All 5 isolates of *P. aeruginosa* were found to be multiresistant to penicillins – tikarcilline (100%), to antisynegnoide cephalosporins – ceftazidime and cefepime (100%), to carbapenems – imipenem and meropenem (100%), aminoglycoside – amikacin (100%). According to the new EUCAST criteria, 100% of the isolates were resistant to aztreonam. Resistance to fluoroquinolones - ciprofloxacin and levofloxacin – was also shown by 100% of isolates.

The majority of *Klebsiella pneumoniae* isolates showed high levels of resistance to monobactams - aztreonam (75%), penicillins – ampicillin and amoxiclav (50%) and cephalosporins – cefepime and cefixime (37.5%). Resistance to carbapenems (imipenem and meropenem), as well as to norfloxacin was detected in 62.5% of isolates. 100% of *Klebsiella pneumoniae* isolates showed resistance to co-trimoxazole.

All strains of the genus *Acinetobacter* were highly resistant to cephalosporins – ciprofloxacin and levofloxacin (100%), to carbapenems – imipenem and meropenem (100%), aminoglycosides – amikacin, gentamicin, tobramycin (in 100% of cases, respectively). The bacteria included in *Enterobacter cloacae* complete showed resistance to penicillin-ampicillin and amoxiclav (83.3%), 100% of isolates showed resistance to co-trimoxazole.

According to the EUCAST criteria, growth retardation zones for *Stenotrophomonas maltophilia* are defined only for co-trimoxazole. All 3 clinical isolates showed the absence of a growth suppression zone.

Studied strains of *Staphylococcus* sp. in 100% of cases they were resistant to penicillin, in 50% - to aminoglycosides (amikacin and tobramycin) and co-trimoxazole.

All strains of *Enterococcus faecalis* (VRE) showed multidrug resistance to penicillins, imipenem, gentamicin, norfloxacin, teicoplanin and vancomycin.

Conclusions: The results of this study indicate the leading role of gram-negative bacteria in the etiology of inflammatory diseases of the respiratory and urinary tract in patients with chronic immunosuppression. The most common pathogens in the analyzed period were representatives of the Enterobacteriaceae family, non-fermenting gram-negative bacteria, fungi of the genus *Candida*, staphylococci and enterococci. Most of these microorganisms belong to the group of the most problematic bacterial pathogens, which is called ESKAPE, because of the high frequency of occurrence and the ability to form secondary resistance to antibiotics of different classes.

The analysis of sensitivity to antibacterial drugs of the isolated strains revealed a high level of resistance to drugs of different groups.

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我们在中俄两国植物检疫和农业技术研究整合方面的经验以及新的合作建议
**OUR EXPERIENCE IN INTEGRATING PHYTOSANITARY AND
AGROTECHNOLOGICAL RESEARCH IN CHINA AND RUSSIA,
NEW PROPOSALS FOR COOPERATION**

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注解。 我们参与了全俄罗斯亚麻研究所的测试, 建议生产, 然后在超过500万公顷的俄罗斯亚麻作物总面积上, 用杀虫真菌和施肥成膜制剂镶嵌亚麻籽 实施 Tigam-C 后, 我们将其移交给中国黑龙江省农业科学院进行技术作物试验, 并在试验中证实了其有效性。 另一方面, 中国成功地在农业中使用稀土元素来改善植物生长、生产力和抗逆性, 并且显然没有对人类和动物消费产生负面影响, 这成为我们研究这一主题的基础。 它取得了积极的成果。 我们建议中方继续在这些议题和植物检疫监测方面开展合作。 使用大猪草来种植蜗牛是克服健康食品短缺的一个机会。 如果可能的话, 实施这种自然、有效和低成本的生态方法来限制其有害传播, 将有助于增加俄罗斯联邦地区人口的收入 (在为他们提供新的就业机会时) 并改善 该国的人口状况 (由于蜗牛及其鱼子酱的治疗特性)。

关键词。 杀虫真菌和施肥成膜药物、稀土元素、植物检疫监测、猪草、蜗牛、增效、增加公民收入、改善人口状况、继续合作。

Annotation. *With our participation in the All-Russian Flax Research Institute, it was tested, recommended for production, and then on the total area of Russian flax crops more than 5 million hectares, the inlaying of flax seeds with an insectofungicidal and fertilizing film-forming preparation Tigam-C was implemented, which we transferred for testing on technical crops to the Academy of Agricultural Sciences of Heilongjiang Province of China, where in experiments have confirmed its effectiveness. On the other hand, China's success in using rare earth elements in agriculture to improve plant growth, productivity and*

resistance to stress, apparently without negative consequences for human and animal consumption, became the basis for our study of this topic. It gave positive results. We offer the Chinese side to continue cooperation on these topics and phytosanitary monitoring. The use of hogweed for growing snails is an opportunity to overcome the shortage of healthy foods. The implementation of such nature-like, effective and low-cost ecologized ways to limit its harmful spread, if possible, can contribute to increasing the incomes of the population of the regions of the Russian Federation (when offering them new jobs) and improving the demographic situation in the country (due to the healing properties of snails and their caviar).

Keywords: *Insectofungicidal and fertilizing film-forming drug, rare earth elements, phytosanitary monitoring, hogweed, snail, efficiency, increase in income of citizens, improvement of the demographic situation, continuation of cooperation.*

The work is carried out with the financial support of the Ministry of Education and Science of the Russian Federation FGBNU FNC LC (GZ FGSS – 2019 – 0017).

In 1988-2003, with our participation in the All-Russian Flax Research Institute, it was tested, recommended for production, and then on the total area of Russian flax crops more than 5 million hectares, inlaying of flax seeds with an insectofungicidal and fertilizing film-forming preparation Tigam-C (TMTD + gamma isomer HCG, 400+120 g/kg / in addition the preparation contained zinc sulphate and Na CMC, 120+100 g/kg) [1]. The named drug was produced in significant quantities (as it turned out, hundreds of tons), but was not used on many crops for which it was originally intended. It was possible for us to develop a technology for inlaying flax seeds with it, and then to implement an unprecedentedly effective and large-scale production application of the drug Tigam-C, which allowed avoiding the previously traditional spraying of flax fields with insecticides.

We transferred Tigam-C for testing on technical crops to the Academy of Agricultural Sciences of Heilongjiang Province of China, where its SC50 for common phytopathogens were determined in experiments on artificial nutrient media, significantly lower than the standard fungicidal seed protectant - TMTD: 1) *Fusarium oxysporum* - Tigam-C (PSP, 520 g/kg) – 18 mg/l; - standard - TMTD (SP, 800 g/kg) – 42 mg/l. 2) *Rhizoctonia solani* – Tigam-C – 15 mg/l; - standard - TMTD – 33 mg/l.

In field experiments conducted in the People's Republic of China, seed encrustation with Tigam-C in the norm of application of 3.0 kg / t - provided greater, compared with the TMTD and Phenoram Super variants, efficiency indicators against diseases of soybean seedlings and the yield of its seeds. In addition, it was noted that Tigam-C did not have a negative effect on the development of nodule bacteria, positively affected the content of oil and protein in seeds [2].

On the other hand, China's success in using rare earth elements in agriculture to improve plant growth, productivity and resistance to stress, apparently without negative consequences for human and animal consumption, became the basis for our study of this topic.

Rare earth elements are used in agriculture with the help of agrochemicals enriched with them. In our experiments, rare earth elements significantly increased the resistance of plants (in particular, flax) to diseases, and the yield of products.

Of course, although no harmful effects have been observed at the current low concentrations of rare earth elements, the effects in the long term and with accumulation over time are unknown, which causes some calls for additional studies of their possible effects. We offer the Chinese side our further scientific and technical cooperation on this topic.

In 2004, one of the authors of this article (N.A. Kudryavtsev) was on a business trip to China and signed from the Russian side an "Agreement of Intent on Flax cooperation for 2004-2009 between the Center for the Development and Research of Technical Crops of the Academy of Agricultural Sciences of Jilin Province of China and the All-Russian Flax Research Institute" [3]. A special point in this document is noted "cooperation in the field of cultivation and protection of flax plants". We continue to continue research on phytosanitary monitoring, the study of biological characteristics of diseases, pests and weeds associated with flax, in a wide geographical plan. The difficulty of the work is the lack of Russian funding for this work.

In addition, we invite representatives of China working in Russia to pay attention to the fact that our hogweed "occupied" huge territories. We are studying the possibilities of income and population growth when using giant hogweed for feeding delicatessen, medicinal snails and implementing other nature-like ways to limit the harmful spread of this aggressive plant.

Further special research and, accordingly, adequate funding are needed to consistently address these issues. We pay special attention to the fact that the implementation of such nature-like ways to limit the harmful spread and the study of the possibilities of using giant hogweed contributes to increasing the incomes of the population of some regions with: - offering them new jobs; - developing effective and low-cost environmentally friendly measures to limit the harmful spread; - exploring further possibilities of using hogweed for growing snails and overcoming food shortages.

October 12, 2021 The President of the Russian Federation, Vladimir Putin, speaking to the deputies of the State Duma of the VIII convocation, said that the main problem for the country is the low income level of many of its citizens. According to Rosstat, in the first quarter of 2021, 14.4% (21.1 million) lived below the poverty line Russians. The amount of the subsistence minimum that year was 11,653 rubles. per month.

The second very important modern problem identified by the President is the deterioration of the demographic situation in Russia. By the end of 2020, the total population of the Russian Federation decreased by 577,600 people. In 2021 - another 535,500 people.

According to Vladimir Putin, the Russian authorities are not going to solve these problems by “populist methods.” The main social tasks of the country, including increasing the incomes of the majority of its citizens and improving the demographic situation in many regions of Russia, should be solved on the basis of qualitative growth of the country’s economy [4].

In our opinion, our work contributes to the solution of these and some other economic, organizational, social and environmental problems of our time. The topic of the presented work is connected with the dangerous spread of giant hogweed in Russia (threatening an ecological catastrophe, harming the national economy, causing injuries to people /up to fatal outcomes/). On the other hand, people all over the Earth are insufficiently provided with livestock products and natural healing food when using holistic plant organisms with healing natural properties. The relevance of this research is sharpened by its compliance with the priority direction of the “Strategy of Scientific and Technological Development of the Russian Federation until 2035” - No. 4 (g) [5].

The scientific novelty of the research is associated with the lack of knowledge of the objects under study, with the originality of the proposed methods of their use and restriction of harmful spread, and, in addition, with a versatile (organizational, economic, social, environmental and technological) consideration of the interrelated issues raised.

The applied purpose of the work is to achieve a high level of economic, organizational, ecological and agrobiotechnological efficiency of the nature-like methods being developed to limit the harmful spread and use of giant hogweed with the assistance of solving important problems for the country (increasing the incomes of its citizens, improving the demographic and environmental situation in the Russian Federation).

We interpreted the general methodological aspects of the work in accordance with our methodological works [6; 7]. Ecological-economic and bioenergetic assessment of the studied nature-like ways to limit the harmful spread with the possibility of using giant hogweed - started according to the published methodological recommendations on these work profiles [8; 9].

We contribute to increasing the incomes of the population of the regions of the Russian Federation by offering them new jobs, together with them we provide a kind of analytical monitoring of giant hogweed, we study the possibilities of its use as raw materials for obtaining motor fuel and other valuable materials. To limit its harmful spread, we are developing effective and low-cost environmentally

friendly measures. We contribute to overcoming the shortage of food products of animal origin when feeding “grape snails” with borscht, which have high dietary value and healing properties (in particular, as an aphrodisiac that can positively affect the demographic situation in the country). In addition, it is a nature-like measure to limit the harmful spread of hogweed.

The implementation of nature-like ways to limit the harmful spread and the study of the possibilities of using giant hogweed contributes to increasing the incomes of the population of the regions of the Russian Federation by: offering them new jobs; developing effective and low-cost ecologized measures to limit the harmful spread; exploring the possibilities of using hogweed for growing snails and overcoming food shortages. When feeding grape snails with borscht (we have an even more productive one – the European land snail) and obtaining their caviar, which have high healing properties (in particular, as an aphrodisiac, capable of positively affecting the demographic situation in the country), the problem of the food base for snail breeding is solved. At the same time, it is a nature-like ecologized measure to limit the harmful spread of hogweed.

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秋水仙碱对两种小米基因型光合色素的诱变作用

MUTAGENIC EFFECT OF COLCHICINE ON PHOTOSYNTHETIC PIGMENTS OF TWO PROSO MILLET GENOTYPES

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注解。 本文介绍了使用秋水仙碱对小米 (*Panicum miliaceum* L.) 进行化学诱导诱变的实验。 为了研究秋水仙碱对光合色素特性的影响,包括叶绿素a (Chl a) 和b (Chl b) 以及类胡萝卜素 (car) 的含量,在2 m²的小区进行了田间试验, 地块的位置是系统地重复的。 根据实验数据,三个品种之间没有发现显着差异。 尽管诱变物质减少了光合色素的量和产量,但鉴定出浓度和处理时间以及0.0%及更高的变体,这表明使用秋水仙碱作为获得新形式和小米样品的来源的可能性。

关键词: 黍、诱变、秋水仙碱、光合作用、色素; 叶绿素a和b; 类胡萝卜素。

Annotation. *The article presents experiments with the use of colchicine for chemically induced mutagenesis of proso millet (*Panicum miliaceum* L.). To study the effect of colchicine on the characteristics of the photosynthetic pigment, including the content of chlorophylls a (Chl a) and b (Chl b) and carotenoids (car), a field experiment was set up using a plot area of 2 m², the location of the plots was systematic in duplicate. According to experimental data, no significant differences were found between the three varieties. Despite the fact that the mutagenic substance reduces the amount of photosynthetic pigments and the yield, concentrations and processing times along with variants of 0.0% and higher were identified, which indicates the possibility of using colchicine as a source for obtaining new forms and samples of millet.*

Keywords: *Panicum miliaceum, mutagenesis, colchicine, photosynthesis, pigments; chlorophyll a and b; carotenoids.*

Introduction

Proso millet (*Panicum miliaceum* L.), commonly known as yellow rice, is one of the oldest crops in the world. It was domesticated in China for the first time about 10,000 years ago [1] and is currently an important food crop of northwest China [2], in some parts of Africa and Asia [3], also suitable for cultivation in several geographic locations including Europe [4]. It is still widely cultivated due to high resistance to stress, such as poor soil and drought. The proso millet grains contain several nutrients, including starch, protein, dietary fiber, vitamins, and mineral elements, and starch (58.5–73.5%) is the main carbohydrate [5]. Due to the nutritional value, proso millet is favored by people as a diet food, functional food, etc.

Proso millet refers to plants of type C_4 [6]. C_4 plants occur in hot and dry climatic conditions with usually high light intensity. Generally, C_4 and CAM plants are the best adapted to arid environments, because they have higher water-use efficiency (WUE) than that of C_3 plants. C_4 plants have higher photosynthetic efficiency than C_3 plants, namely in arid, hot, and under high-light conditions, because they possess an additional carbon fixation pathway and characteristic anatomy to limit photorespiration. Furthermore, CAM plants can effectively save metabolic energy and water during harsh environmental conditions by closing their stomata during the day [7]. Various studies on elevated CO_2 concentrations have shown a close relationship between improvements to photosynthesis and increases in yield and total biomass of maize [8] and in 14 perennial grassland species from four functional groups [9].

Photosynthesis during the reproductive stages is positively correlated with crop yield, and improving the photosynthetic capacity of leaves has been suggested as a way to increase crop yields [10–11]. Chlorophylls *a* and *b* (Chl *a*, Chl *b*) represent the majority of the antenna complex pigments and thus are of great importance for light absorption, oxygen evolution, and conversion of light energy to chemical energy. In fact, the amount of solar radiation that is absorbed by a leaf is closely related to its chlorophyll concentration [12–14], which generally is positively related with photosynthetic rate [15–17].

A number of works have shown a positive effect of mutagens on an increase in the content of chlorophyll, in *Macrotyloma uniflorum* (Lam) Verdcourt, samples have been isolated - sources of signs that improve photosynthesis rates [18].

Purpose: study of the mutagenic effect of colchicine on the content of chlorophyll *a*, *b* and carotenoids in two proso millet genotypes.

Materials and methods: two genotypes of proso millet (*Panicum miliaceum* L.) were used as a research material: Quartet (RF) and PI 289324 (Hungary). Laboratory studies were carried out at the Scientific Research Platform of Agricultural Biotechnology (RPAB) at the Saken Seifullin Kazakh Agrotechnical Research

University, Astana, Republic of Kazakhstan. Field experiments were carried out from May to September in growing season in the breeding nursery of the Scientific Production Center of Grain Farming named A.I. Baraev in the dry steppe zone of the Akmola region.

Seed treatment with colchicine: The seeds treatment with $C_{22}H_{25}NO_6$ was performed under laboratory conditions, according to the procedure reported by Swathi et al. [19]. Seeds in the amount of 500 pieces were first immersed in a 12% hydrogen peroxide solution for 15 minutes to destroy harmful microflora on the grains, after which they were washed three times with distilled water. For seeds treatment 20 ml of 0.0%, 0.04%, 0.06%, 0.08%, and 0.1% colchicine aqueous solutions were put in Petri dishes for 6, 12 and 24 h at room temperature, on which two sheets of filter paper were placed and 500 grains of seeds were soaked in them.

Method for determining the content of photosynthetic pigments: Pigments were extracted by dissolving 100 mg of leaves of proso millet in 100 ml of absolute ethanol. Leaves of proso millet in the tillering phase were cut into small pieces and placed in 50 ml flasks containing up to 30 ml of ethanol and kept in the dark for a day. There after, the extraction was repeated more than three times in order to completely extract chlorophyll (Chl *a*). The final volume was reached up to 90 ml and the total volume was 100 ml. The pigment concentrations were determined by spectrophotometer PE-5400UV (Erkos, Moscow, Russia) at wavelengths: chlorophyll (Chl *a*) - 665 nm; chlorophyll *b* (Chl *b*) - 649 nm; carotenoids (*car*) - 470 nm. Pigment measurement was performed according to Lichtenthaler [20].

Results: in terms of total chlorophyll content, almost all genotypes were varied. The results of assessing the effect of colchicine on photosynthetic activity showed that in treated variants, the content of pigments in the photosynthetic apparatus in most samples decreased at higher concentrations of the mutagen relative to the 0.0%. The dynamics of Chl *a* accumulation at low 0.04-0.06% mutagen concentrations for all studied exposures was shown in Table 1.

Table 1.
*Effect of different concentrations and treatment times colchicine on Chl a and b, Chl a to Chl b and car in leaf of millet (*Data are the mean ± SD; n=3)*

Treat ment time, hours	Colchicine concentrations, %																			
	0.0				0.04				0.06				0.08				0.1			
	Chl <i>a</i>	Chl <i>b</i>	Chl <i>a</i> to Chl <i>b</i>	<i>car</i>	Chl <i>a</i>	Chl <i>b</i>	Chl <i>a</i> to Chl <i>b</i>	<i>car</i>	Chl <i>a</i>	Chl <i>b</i>	Chl <i>a</i> to Chl <i>b</i>	<i>car</i>	Chl <i>a</i>	Chl <i>b</i>	Chl <i>a</i> to Chl <i>b</i>	<i>car</i>	Chl <i>a</i>	Chl <i>b</i>	Chl <i>a</i> to Chl <i>b</i>	<i>car</i>
Quartet																				
6	3.7	2.3	1.6	1.1	8.9	2.0	4.4	2.4	5.0	2.4	2.1	1.4	9.5	3.9	2.9	2.7	8.3	1.8	4.7	2.3

12	3.9	2.1	1.4	1.0	9.2	1.2	8.7	2.0	9.5	0.9	9.8	1.9	8.5	0.8	9.9	3.0	7.2	0.9	8.4	2.1
24	4.3	2.6	1.9	1.5	7.5	2.7	2.8	0.4	5.3	1.7	3.1	1.4	7.9	2.3	3.4	1.4	6.4	2.5	2.6	1.2
PI289324																				
6	8.9	3.5	2.6	1.8	9.3	2.4	3.9	2.7	9.7	2.3	4.2	2.6	9.2	2.8	3.3	2.5	9.7	2.3	4.3	2.9
12	8.6	3.8	2.9	1.5	7.3	0.6	11.4	2.4	8.8	1.7	13.2	2.6	6.0	1.8	3.3	1.5	7.3	0.8	9.4	2.0
24	5.4	2.9	1.9	1.2	5.9	2.0	2.9	1.3	6.0	2.9	2.1	1.4	7.6	2.3	3.4	1.8	9.7	3.6	2.7	2.3

After a 6-hour exposure in the Kvartet variety in the control of 0.0%, the content of Chl *a* was 3.7 mg/g, and at 0.04 and 0.06%, the content increased by 0.23 and 0.31 mg/g, in the PI289324 genotype - by 0.36 and 1.0 mg/g, respectively. An increase in the content of Chl *a* pigment at mutagen concentrations of 0.04 and 0.06% was also observed at 12- and 24-hour exposures. According to the content of Chl *b*, there was a noticeable decrease in the amount of pigment compared to 0.0% in both two genotypes at exposures of 6 and 12 hours. With a 24-hour exposure, the content of Chl *b* in the samples Quartet and PI289324 slightly increased compared to 0.0%.

The characteristics of chlorophylls in terms of the Chl *a*/Chl *b* ratio (mg/g) in millet genotypes at different concentrations and times of exposure to colchicine differed markedly. The Russian variety Quartet showed a significant increase in the ratio of pigments in all concentrations and exposures of the mutagen time compared to the 0.0%, especially in the variants with 12-hour treatment at 0.08-0.1%. It should be noted that in the PI289324 genotype, the Chl *a*/Chl *b* ratio at 0.1% concentration for 12 hours of exposure was two times higher than the 0.0%. In general, the obtained results indicated a negative effect of the mutagen on the accumulation of the main photosynthetic pigments in the leaves of millet at high concentrations of the mutagen in the tillering phase in the field, with the exception of carotenoids. Concentrations (0.04-0.08%) of the mutagen significantly increased the content of carotenoids by 2-2.5 times relative to the 0.0%. The amount of photosynthetic pigments *car* in terms of dry leaf weight increased in the PI289324 genotype at all exposures at all four concentrations from 0.18 to 1.71 mg/g compared with the 0.0%.

Discussion: in a study by Kang et al. in wheat varieties with low salinity tolerance, the content of chlorophyll *a*, chlorophyll *b*, and *car* was at the level with untreated varieties or at the level, but a decrease was observed at a concentration of 250 mM NaCl [21]. Salinity reduced the chlorophyll index and the content of total pigments in salt-sensitive soybeans [22]. Our results showed that colchicine had a positive effect on the total content of photosynthetic pigments, since the minimum was observed at 0.0%, and the maximum was observed on pre-treated seeds in most samples. It can be seen that the highest content of total chlorophyll was observed in the variety Quartet 0.08% after 6 hours and PI289324 0.1% after 6 and 24 hours of treatment. This also indicates that the soak time may have an effect on the overall pigment content.

Conclusion

The amount of pigments in plants is mainly determined by genotypic characteristics and, within the normal range of the genotype reaction, by the conditions of its growth. Significant differences between the untreated and colchicine treated variants were observed in the total content of photosynthetic pigments.

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元素自然衰变导致矿物中天然金属纳米颗粒的积累 (以铂族元素为例)
**ACCUMULATION OF NATIVE METAL NANOPARTICLES IN
MINERALS AS A RESULT OF NATURAL DECAY OF ELEMENTS
(BY THE EXAMPLE OF PLATINUM GROUP ELEMENTS)**

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抽象的。在矿物中形成铂族元素纳米粒子和金的可能方法被认为是自然放射性衰变系列放射性同位素链的结果，其结果是形成放射性转变稳定元素同位素。

关键词：铂族元素纳米颗粒、金、放射性衰变、同位素。

Abstract. *The possible method of forming platinum group elements nanoparticles and gold in minerals is considered as a result of natural radioactive decay series radioactive isotope chains, as a result of which radioactive transformations stable elements isotopes are formed.*

Keywords: *Platinum group elements nanoparticles, gold, radioactive decay, isotopes.*

At present, in connection with the use of probe and transmission electron microscopes, it has become possible to «consider» the state of matter, with a dimension of one or less nanometers. On this basis, new sciences are being formed, including nanomineralogy and nanogeochemistry, the object of study of which is the zone of transition from an element atom, through clusters, nanoparticles to crystals, and the behavior of mineral nanoparticles in natural processes and experiments [Koneev, 2006; Moiseenko, 2006].

In gold ore, complex gold-platinoid, gold-platinoid-rare metal and other types of deposits, along with free visible gold and platinum group elements (PGE), there are native noble metals in the form of nanoparticles 1–30 nm in size, which was shown for Sukholozhskoye and others. gold deposits [Distler et al., 1996; Korobeinikov, 2004 and others]. At the same time, the content of PGE reaches industrially significant values. Gold and PGE are concentrated mainly in pyrite, arsenopyrite and carbonaceous matter. Precious metals in these ores are difficult to extract during enrichment, and the ores of these deposits are referred to as the so-called «refractory ores».

It is traditionally believed that the deposition of gold and PGE in pyrite and arsenopyrite and other minerals occurred as a result of hydrothermal activity under certain thermodynamic conditions of the system.

However, in nature there is another mechanism for the formation of nanoparticles of noble (and other) metals: the formation of elements (isotopes) due to radioactive transformations of elementary particles (isotopes), which is very widely carried out in nature [Gusev, Dmitriev, 1988].

Currently, 273 stable isotopes and about 1700 radioactive isotopes are known [Kulikov, 1990]. Although «stability» for stable isotopes seems to be a relative term, since a stable isotope $^{204}_{82}\text{Pb}$ has a half-life of about 10^{50} years.

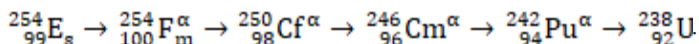
In nature, in addition to natural unstable (radioactive) elements (uranium, thorium), almost all elements of the periodic system of Mendeleev have stable and radioactive (unstable) isotopes, the number of which in elements is from 1 to 10.

Radioactive transformations of isotopes are carried out by α - and β -decay, electron capture and spontaneous nuclear fission.

Spontaneous transformation of atomic nuclei occurs according to the law of radioactive decay, according to which the decay rate (ie the number of nuclei decaying per unit time) is proportional to the number of non-decayed nuclei at a given time. The decay rate of a radionuclide can be characterized in terms of the half-life T-time, during which half of the available number of radionuclide atoms decays.

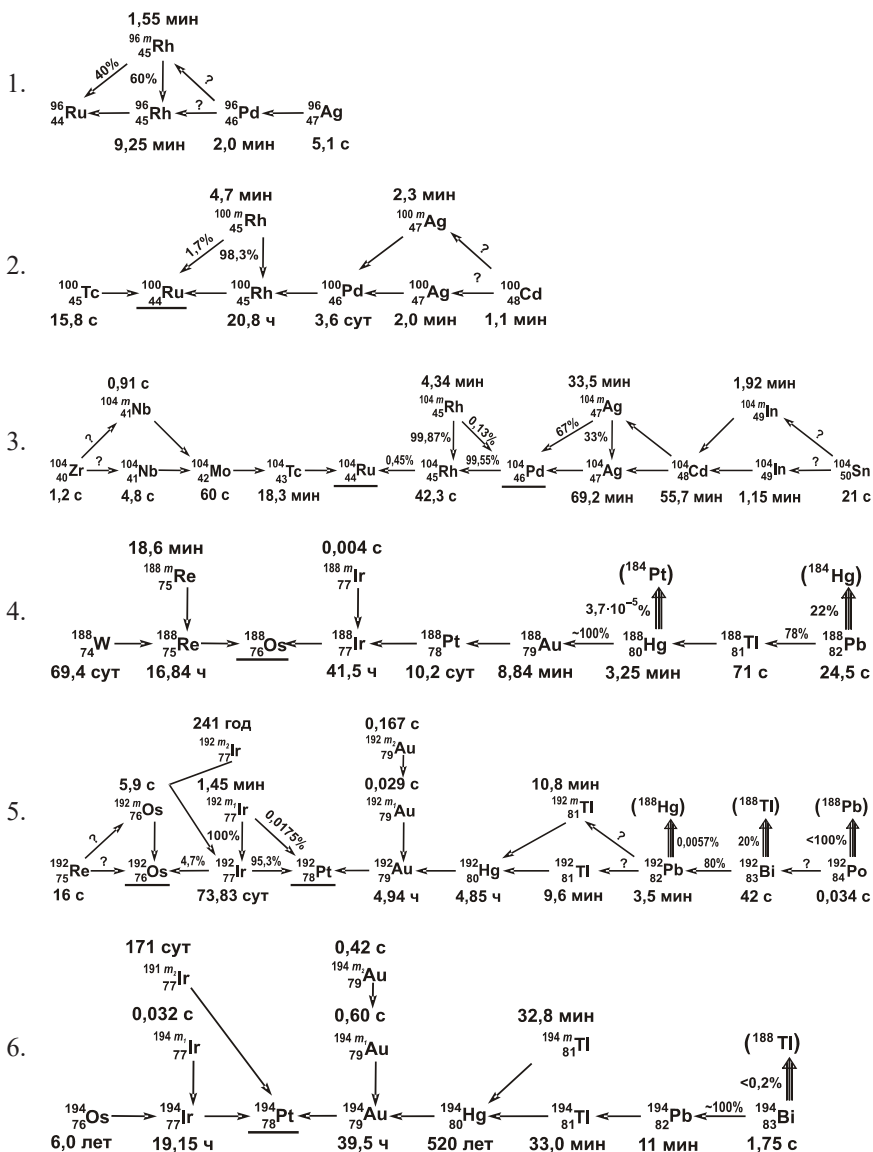
Among the heavy natural radioactive elements of the end of the periodic table of Mendeleev, 3 radioactive families are known: $^{238}_{92}\text{U}$, $^{235}_{92}\text{U}$ и $^{232}_{90}\text{Th}$, which through the alternation of a series of α - β -decays turn into stable isotopes $^{206}_{82}\text{Pb}$, $^{207}_{82}\text{Pb}$, $^{208}_{82}\text{Pb}$ respectively. In addition, the neptunium series existed in the early stages of the Earth's development. $^{237}_{93}\text{Np}$. Members of this series are obtained as a result of artificial nuclear reactions.

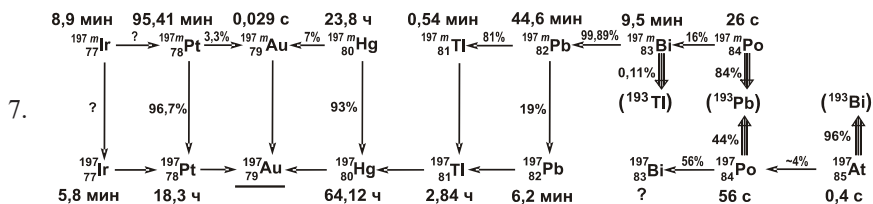
The study of isotopes of artificial transuranium elements and neutron nuclear reactions has significantly expanded our understanding of radioactive series. It turned out that the natural radioactive series represent only a part of the radioactive families, which are much more extensive and contain a large set of radioisotopes. For example, it was found that eisteinium-254 undergoes β -decay and four subsequent α -decays, turns into uranium-238:



Unstable radioactive isotopes of elements, decaying, pass into new radionuclides and, ultimately, radioactive transformations end with a stable nuclide (isotope), forming the so-called radioactive chains. Depending on the scheme of decay of more radioactive nuclei, the chains can be simple (linear) and complex (with branches). The proportion of the transformation of the parent radionuclide into daughter ones is characterized by the branching factor and is expressed as a percentage in relation to all types of transformations of the given nucleus.

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Note. The following signs are used in radioactive chains: – formation of a nuclide of a given isobaric chain; \Rightarrow – is the formation of a nuclide belonging to another isobaric chain as a result of α -decay or spontaneous fission; stable nuclides in chains are underlined.

In addition, stable isotopes of noble metals are formed in other radioactive chains [Gusev, Dmitriev, 1988]. Here, for brevity, only the extreme members of the isobaric chains (left and right) and the stable isotope are shown.

$^{98}_{44}\text{Ru}$ from $^{98}_{43}\text{Tc}$ and $^{98}_{48}\text{Cd}$; $^{99}_{44}\text{Ru}$ from $^{99}_{37}\text{Rb}$ and $^{99}_{48}\text{Cd}$; $^{101}_{44}\text{Ru}$ from $^{101}_{39}\text{Y}$ and $^{101}_{48}\text{Cd}$; $^{102}_{44}\text{Ru}$ и $^{102}_{46}\text{Pd}$ and $^{102}_{37}\text{Rb}$ from $^{102}_{49}\text{In}$; $^{103}_{45}\text{Rh}$ from $^{103}_{40}\text{Zr}$ and $^{103}_{50}\text{Sn}$; $^{105}_{46}\text{Pd}$ from $^{105}_{41}\text{Nb}$ and $^{105}_{50}\text{Sn}$; $^{106}_{46}\text{Pd}$ from $^{106}_{41}\text{Nb}$ and $^{106}_{47}\text{Ag}$; $^{108}_{46}\text{Pd}$ and $^{108}_{48}\text{Cd}$ from $^{108}_{42}\text{Mo}$ and $^{108}_{52}\text{Te}$; $^{110}_{46}\text{Pd}$ from $^{110}_{43}\text{Tc}$ and $^{110}_{53}\text{I}$; $^{184}_{76}\text{Os}$ from $^{184}_{82}\text{Rb}$; $^{186}_{76}\text{Os}$ from $^{186}_{43}\text{Ta}$ and $^{186}_{81}\text{Ti}$; $^{187}_{76}\text{Os}$ from $^{187}_{74}\text{W}$ and $^{187}_{82}\text{Pb}$; $^{189}_{76}\text{Os}$ from $^{189}_{74}\text{W}$ and $^{189}_{83}\text{Bi}$; $^{190}_{76}\text{Os}$ from $^{190}_{74}\text{W}$ and $^{190}_{83}\text{Bi}$; $^{191}_{77}\text{Ir}$ from $^{191}_{75}\text{Re}$ and $^{191}_{83}\text{Bi}$; $^{193}_{77}\text{Ir}$ from $^{193}_{76}\text{Os}$ and $^{193}_{84}\text{Po}$; $^{195}_{78}\text{Pt}$ from $^{195}_{76}\text{Os}$ and $^{195}_{83}\text{Bi}$; $^{196}_{78}\text{Pt}$ и $^{196}_{80}\text{Hg}$ from $^{196}_{76}\text{Os}$ and $^{196}_{85}\text{At}$; $^{198}_{78}\text{Pt}$ from $^{198}_{77}\text{Ir}$.

Thus, as a result of radioactive transformations of radionuclides, stable isotopes of noble metals are formed, which can accumulate in minerals in the form of nanoparticles and make a certain contribution to the content of one or another element in a mineral or rock.

The process of formation of significant accumulations of ore components, up to industrially significant ones, due to the radioactive decay of radionuclides, is not discussed here. Although this issue was repeatedly raised by the Soviet scientist P.A. Korolkov in the mid-1950s and was discussed at the sessions of the Academic Council (and other meetings) of the Mining and Geological Institute of the Ural Federal Academy of Sciences of the USSR.

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体积疏水化对真菌微生物对水泥石混凝土损伤程度的影响

**THE EFFECT OF VOLUMETRIC HYDROPHOBIZATION ON THE
DEGREE OF DAMAGE TO CEMENT STONE CONCRETE BY
FUNGAL MICROORGANISMS**

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抽象的。防止混凝土在持续湿润的真菌微生物影响下腐蚀的方法之一是对水泥石进行体积疏水化。可以通过在搅拌水泥砂浆阶段引入硬脂酸钙疏水添加剂来提供体积疏水化。硬脂酸钙粉末的足量为水泥重量的0.5–0.7%。在疏水性水泥石中，真菌废物造成的破坏比不含添加剂的样品少几乎 2.5 倍。对于不含硬脂酸钙的水泥石，真菌腐蚀 10 年，大约 1 厘米厚的一层将被破坏，而在疏旋样品中，该层大约为 0.3 厘米厚。在持续湿润的条件下，经过 50 年真菌微生物的侵袭，普通水泥石的腐蚀层将达到 2 厘米，而对于含有疏水添加剂的样品，腐蚀层将达到 0.6 厘米。

关键词：混凝土生物腐蚀，真菌腐蚀，疏水添加剂，体积疏水化，疏水混凝土。

Abstract. *One of the ways to prevent concrete corrosion under the influence of fungal microorganisms at constant moistening can be volumetric hydrophobization of cement stone. Volumetric hydrophobization can be provided by the introduction of a hydrophobic additive of calcium stearate at the stage of mixing cement mortar. A sufficient amount of calcium stearate powder is 0,5-0,7 % by weight of cement. In hydrophobic cement stone, fungal waste products cause almost 2,5 times less destruction than in a sample without an additive. For 10 years of fungal corrosion in cement stone without calcium stearate a layer about 1 cm thick will be destroyed, and in a gyrophobic sample it will be a layer of about 0,3 cm. After 50 years of the attack of fungal microorganisms in conditions of constant*

moistening the corroded layer of ordinary cement stone will be 2 cm, for a sample with a hydrophobic additive it will be 0,6 cm.

Keywords: *biocorrosion of concrete, fungal corrosion, hydrophobic additive, volumetric hydrophobization, hydrophobic concrete.*

Concrete products and structures are subject to various destruction processes resulting from the ingress and presence of water due to their porous structure. The impact of aqueous media causes undesirable changes in the properties of the material, aggravated by the processes of chemical and physical destruction as a result of the activity of microorganisms [1-3].

Since microorganisms are present in almost any environment and have a surprisingly diverse metabolism, their presence on building materials is quite normal. They often cause deterioration of the properties of the material, for example, loss of alkalinity, erosion, detachment of the concrete shell, corrosion of reinforcement, loss of water or air tightness [4-7]. Microorganisms, mainly bacteria and fungi, affect the cement stone of concrete through the release of aggressive substances (acids, CO₂, sulfur compounds, etc.) [8-10], as well as through biofilm, which physically and chemically interacts with the surface [11, 12].

To prevent damage to the structural components of concrete, it is necessary to use water-resistant and high-quality concrete containing new special materials [13-15].

In the construction industry, there is a growing trend in the use of water-resistant and water-repellent additives in concrete [14, 16, 17], which implies the hardening of concrete in a waterproof state and the absence of the need to apply a membrane to a concrete product.

Hydrophobic compounds are added to cement during concrete production, they prevent seepage, leakage and dampness caused by capillary absorption of moisture in cement, mortar and concrete. The amount of additives introduced is very small and does not exceed 5 % of the cement weight [18]. Hydrophobizers can also correct poorly distributed concrete mix, promote concrete curing and improve its performance [19, 20].

In the manufacture of cement stone samples, the calcium stearate hydrophobizer was added to the cement mortar in an amount of 0,5 and 0,7 % by weight of cement. The samples are made of Portland cement CEM I 42.5 N with a water-cement ratio of 0,3. After curing in air for 28 days, the surface of the cement stone was infected with a suspension of fungal microorganisms *Aspergillus niger*.

The degree of damage of the cement stone was determined according to the procedure set out in GOST 31383-2008 «Protection against corrosion of concrete and reinforced concrete constructions. Test methods».

The amount of cement stone (in terms of CaO) that has entered into chemical interaction with a solution of organic acids released by fungi is calculated by the formula:

$$P_{CaO} = \frac{q_1 \cdot M \cdot f_{\text{зкв}}(CaO) \cdot 0,05608 \cdot Q}{S \cdot q_2}, \text{ g/cm}^2, \quad (1)$$

here: q_1 is the volume of a standard solution with a known concentration spent on titration of the solution after interaction with concrete, ml; M is the solution concentration, mol/l; $f_{\text{зкв}}(CaO) = 1/2$; 0,05608 is the molar mass of CaO corresponding to 1 ml of an acid solution of a concentration of 1 mol/l; Q is the volume of the acid solution involved in the interaction with concrete in each time period between individual tests, ml; S is the area of the working surface of the samples that interacted with acid, cm²; q_2 is the volume of the solution taken for titration, ml.

Calculation of the depth of concrete destruction is carried out according to the formula:

$$D = \frac{P_{CaO}}{C \cdot \beta}, \text{ cm}, \quad (1)$$

here: C is the amount of cement in 1 cm³ of the test sample, calculated from the actual composition of concrete, g/cm³; β is the content of CaO in cement, determined by the results of chemical analysis of cement before testing, %.

It was found [9] that as a result of the vital activity of *Aspergillus niger* fungi, organic acids acting on the cement stone of concrete are released: citric (22.5 wt. %), oxalic (17 wt. %), gluconic (10 wt. %), fumaric (3 wt. %), malic (2 wt. %), succinic (0.5 wt. %).

The aggressiveness of organic acids for concrete is determined by the solubility of their calcium salts according to SP 28.13330.2017 «Protection against corrosion of construction». Gluconic, fumaric, malic and succinic acids are highly aggressive towards concrete; citric and oxalic acids are moderately aggressive.

It should be assumed that since the content of highly aggressive organic acids in the waste products of *Aspergillus niger* fungi is small, the corrosion rate of concrete cement stone is due to the dissolution of calcium under the influence of gluconic, citric and oxalic acids with the formation of corresponding calcium salts. With this in mind, the calculation of the characteristics of the degree of damage to the cement stone as a result of exposure to fungi *Aspergillus niger* was carried out (table 1).

Table 1
*The degree of damage to the cement stone as a result of exposure to fungi *Aspergillus niger**

Parameter	Sample without additives	Sample with 0,5 % addition of calcium stearat	Sample with 0,7 % addition of calcium stearat
The amount of cement stone (in terms of CaO), g/cm ² , entered into chemical interaction with acid solutions	0,644	0,289	0,265
Depth of concrete destruction, cm			
- after 6 months	0,0155	0,0048	0,0044
- after 10 years	0,938	0,279	0,256
- after 50 years	2,0974	0,6234	0,5714

After 10 years, irreversible corrosion damage in cement concrete without hydrophobic additives, which is exposed to fungal microorganisms and constant moisture, will spread to a depth of about 1 cm. The forecast for the 50-year service life of non-hydrophobized cement concrete under conditions of fungal corrosion shows that a significant thickness of the concrete coating layer will be subject to cracking and collapse.

With volumetric hydrophobization of cement stone, corrosion mass transfer processes slow down [21, 22], which affects the reduction of the degree of damage to concrete as a result of the action of fungal microorganisms. In 10 years, a layer of concrete with a thickness of 2,5-3 mm will corrode, and in 50 years 6-6,5 mm of concrete will be damaged.

By providing volumetric hydrophobization, it is possible to increase the corrosion resistance of concrete operated under the influence of microorganisms by 2.5 times and to ensure an increase in its service life.

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2007–2020年航空发动机故障损坏研究
**RESEARCH OF FAILURES AND DAMAGES OF AERO ENGINES
FROM 2007 TO 2020**

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注解。根据已发表的材料,该工作揭示了运行中发生故障的主要根源。结论评估并解释了特定的故障组。

工作结果可应用于分析一组故障中的特定故障、开发新产品以及创建可靠性保证程序。

关键词:飞机发动机(AE)、燃气轮机发动机(GT)、可靠性、GT故障、AE故障源、空难、强度。

Annotation. *On the base of published materials the work disclosed the main sources of failure occurred in operation. The conclusions evaluate and explain specific groups of failures.*

The work results may be applied to analysis of specific failures within a set of malfunctions, development of new products and creation of the reliability ensuring programs.

Keywords: *Aircraft engine (AE), Gas Turbine engine (GT), reliability, GT failure, AE failure source, air accident, strength.*

The reliability of the power plant largely determines the performance of the aircraft. The purpose of this article is to analyze the main causes of aircraft engine (AE) failures that led to an aircraft accident (AA) or catastrophe. Identify the most common malfunctions and their causes, analyze the data obtained.

It should be noted that manufacturers often do not publish data on failures, especially those related to design and technological imperfections. Therefore, the analysis presented in the article, based on published data, should not be considered exhaustive. In addition, there is often a chain of interrelated failures and damages, so when analyzing them, it is important to separate the root cause and effect of this failure.

Distribution by causes of failures and damages identified during the operation of aircraft for the period 2007 - 2020. shown in diagram 1.



Diagram 1. Distribution by causes of failures and damages identified during the operation of aircraft for the period 2007 - 2020

Consider and compare the causes of engine failures according to the Interstate Aviation Committee (IAC) and the National Transportation Safety Board (NTSB).

Analyzing the main groups of causes of aviation accidents that occurred due to an engine malfunction, it can be seen that according to the IAC reports, the predominant cause of accidents due to engine failure or damage is the human factor - 39%. At the same time, strength and functional failures and damage account for 40%. In terms of accidents analyzed by the NTSB, human error accounted for 17% of accidents, and system failures and damage accounted for 59%. These data are visualized in Figure 2.

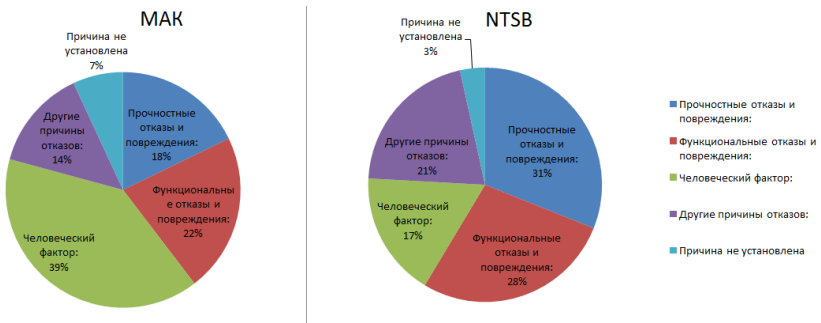


Diagram 2. Distribution by main groups of failures and damages according to IAC (left diagram) and NTSB (right diagram).

Let us consider in more detail each group and the causes included in them. For clarity, for each group, the reasons and their number are summarized in tables. Diagrams are built according to the tables.

Strength failures and damage



Diagram 3. Strength failures and damage

Table 1.
Strength failures and damages

No.	Name	Quantity	
		IAC	NTSB
1	Fatigue cracks and fractures on compressor blades (LPC, HPC), locks and disks, leading to blade or disk breakage.	1	3
2	Fatigue cracks and fractures on turbine blades, turbine disks (blade breakage, destruction of HPT disk, LPT, free turbine).	1	1
3	Burnout of the flame tube (due to stress corrosion under heating conditions of the material, fatigue cracks on the elements of the combustion chamber)	4	-
4	Propeller blade damage	1	-
5	Complete or partial destruction of the air filter	1	-
6	Gearbox damage (first stage planetary bearings)	1	-
7	Engine cylinder failure (fatigue cracks, poor fixing) or stuck cylinder valves	4	1
8	Destruction of one of the parts of the piston-rod group (fatigue cracks and destruction)	5	1
9	Destruction of the screw (its attachment, one of its parts)	-	1

One of the main causes of strength failures are: fatigue cracks on various parts of the engine, leading to the destruction of this part.

Cracks and breaks in compressor and turbine blades are found on almost all types of gas turbine engines. The vast majority of compressor blade failures and a great many turbine blade failures are of a fatigue nature. Breaks of a significant part of the blade are detected immediately during operation, lead to increased engine vibrations, can lead to compressor surges and serious secondary damage. Cracks and breaks in the blades lead to the need for early removal of the engine from operation if it is impossible to replace the damaged blade under operating conditions.

Cracks and destruction of turbine and compressor disks are among the most dangerous types of failures, since in many cases, when a part of the disk breaks, the destruction is usually not localized within the engine casing. Often, during the development of a crack in the disk, an increase in the level of general engine vibrations occurs, which can serve as a diagnostic sign of this failure and, if the engine is turned off in a timely manner, can prevent disk destruction. If a crack is found in the disc, the engine should normally be taken out of service.

Cracks and burnouts in the flame tubes of combustion chambers are most often found when examining an engine with endoscopes. Flame tube failures usually result from thermal stresses caused by high temperature gradients, as well as sudden temperature changes during starts, accelerations, shutdowns. [3]

Functional failures and damage



Diagram 4. Functional failures and damage

Table 2.
Functional failures and damage

No.	Name	Quantity	
		IAC	NTSB
1	Loss of gas-dynamic stability and flameout (extinguishment) in the combustion chambers when flying in icing conditions (including carburetor icing due to improper heat management).	2	-
2	Damage to the fuel system (over-enrichment of the air-fuel mixture when the carburetor enrichers are on, destruction of the fuel line when the engine is separated from the aircraft airframe, vehicle leaks, fuel tank intake is exposed, fuel supply is cut off at negative g-forces, filters are clogged, pipeline damage)	15	4
3	Damage to the oil system (bloated oil tank, oil starvation due to leakage, loss of oil pressure, contamination of the oil supply system with debris, failure of the oil pump).	1	-
4	Reduced engine thrust during takeoff.	1	-
5	Decrease in engine power (discrepancy between the power on the engine shaft required for level flight)	2	-
6	Inconsistent operation of the engine, propeller, constant speed controller and oil.	1	-
7	Cooling system failure	1	-
8	Break of kinematic connection: main gearbox - motors	1	-
9	Damage to the electronics (damage to the insulation of the connecting wire of the magneto contact group, abnormal operation of the electronic engine control unit, malfunction of the electronic engine controller)	3	3
10	Combustion chamber damage	-	1

Systems (oil, fuel, cooling) that ensure the stable operation of the engine are very important in the operation of the power plant. Also, the operation of the engine directly depends on the operation of electronic systems that control and regulate the parameters along the engine path.

In many cases, failures of the control system are eliminated in operation by replacing units or overshooting. But there are cases when the engine has to be removed ahead of schedule due to failures of the control system, for example, with a large overshoot of the gas temperature.

Human factor



Diagram 5. Human factor

Table 3.
Human factor

No.	Name	Quantity	
		IAC	NTSB
1	Improper engine maintenance, repair or improper installation of equipment that led to the failure of engine components	6	1
2	Violation of the rules of operation	1	-
3	Assembly and maintenance of the aircraft by non-certified specialists	6	-
4	Violation of technology and quality control in the manufacture of the engine and its elements	2	-
5	Exceeding the service life (including beyond the established overhaul period).	1	1
6	Incorrect actions of the aircraft and engine operation service	4	
7	Incorrect fuel supply to the engine (use of poor quality fuel)	7	1
8	Incorrect actions of the pilot, instructor or crew	13	2

To ensure flight safety, the ground engineering and technical service and crews must operate the equipment in accordance with the prescribed documentation (instructions, regulations, RMP (flight operations manual)).

Other reasons for failures



Diagram 6. Other reasons for failures

Table 4.
Other reasons for failures

No.	Name	Quantity	
		IAC	NTSB
1	Foreign object entering the air intake, including birds.	4	2
2	Manufacturing defect	1	1
3	Throttling of the engine due to failure of the control system (CS)	1	-
4	Inconsistent operation of engines	1	-
5	Engine surge	1	-
6	Shutdown of engines by the free turbine protection system	1	-
7	The reason could not be determined (the reason cannot be determined or not specified)	7	1

Foreign object damage to compressor blades is a common cause of early removal of engines. With a powerful jet of air sucked in by a gas turbine engine, various solid particles can enter the compressor inlet and, meeting with blades with circumferential speeds up to 400 500 m/s and higher, cause serious damage to them; these damages (nicks) are most dangerous on the edges in the root sections. The nicks on the shoulder blades, when they are detected, are carefully removed. If this is not possible without a noticeable reduction in the fatigue strength of the blade, the engine is removed to replace the damaged blades. Foreign objects entering the engine can damage not only the first stages of the compressor, but also pass through the entire path, up to the last stages.

Based on the presented data, a number of main or most frequently recurring causes of failures can be identified. These include: fatigue cracks and fractures of disks and blades of compressors and turbines, cracks and burnouts of flame tubes of combustion chambers, damage and failures of fuel system elements, damage to electrical systems, damage to compressor blades by foreign objects.

Since during the operation of aircraft engines in a significant number of cases cyclic unsteady loading takes place, the presence of both static and cyclic elastic and elastoplastic deformations becomes characteristic for their most loaded zones. Under such deformation modes, the analysis of the conditions for the formation of limit states in the material by the appearance of cracks or by the final destruction in the design process is a necessary step in the procedures for substantiating the safe parameters of subsequent operation.

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压电体电物理参数获取方法比较

COMPARISON OF METHODS FOR OBTAINING
ELECTROPHYSICAL PARAMETERS OF PIEZOELECTRICS

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抽象的。在本文中,考虑了压电材料的使用。采用泛音法和共振-反共振法获得了基于锆酸铅-钛酸铅固溶体的圆盘状样品的电学参数。建立了样品的幅频特性。获得了样品的电物理参数并进行了对比分析。

关键词: 压电体电物理参数、泛音法、共振-反共振法。

Abstract. *In this paper, the use of piezoelectric materials was considered. The overtone method and the resonance-antiresonance method were used to obtain the electrical parameters of a disc-shaped sample based on solid solutions of lead zirconate - lead titanate. The amplitude-frequency characteristic of the sample was built. The electrophysical parameters of the sample were obtained and a comparative analysis was carried out.*

Keywords: *Electrophysical parameters of piezoelectrics, overtone method, resonance-antiresonance method.*

A large number of piezoelectrics have found wide application in measuring technology, as piezoelectric transducers and sensors, they are used to control dynamic processes as primary information transducers of measuring and control systems [1]. One recent study has shown that ultrasonic irradiation of soft biological tissues produces a signal that is well explained by voltage-induced polarization, which responds linearly to applied acoustic stress. Induced polarization is clearly observed in the Achilles tendon, aortic wall, and aortic valve specimens, indicating that fibrous tissues exhibit electromechanical coupling [2]. Piezoelectric materials are used in medical implants, they can be used as sensors and can imitate biological tissues (bones and blood vessels) [3, 4].

To measure the amplitude-frequency characteristics, a piezoelectric sample was taken in the form of a tablet based on solid solutions of lead zirconate with a piezomodulus equal to $d_{33} = 567 \frac{\text{пКл}}{\text{м}}$, the amplitude-frequency characteristics are shown in Figure 1.

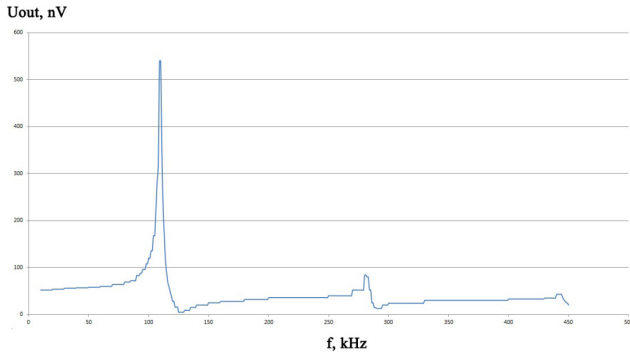


Figure 1. Frequency response of a piezoelectric sample in the form of a tablet based on solid solutions of zirconate - lead titanate.

Figure 1 shows a smooth rise from 30 kHz to 90 kHz and a sharp fall from 90 kHz to 110 kHz. There is one large and two peaks several times smaller than the first one.

To calculate the piezoelectric constants of a sample in the form of a disk, the complex conductivity for high-frequency piezo-soft modes is taken as a basis. Determination of the electromechanical coupling coefficients of the piezoceramic material and piezoelectric constants are determined by measuring the frequencies f_s и f_p , the piezomodulus can be found by the formula [5]:

$$d_{33} = k2f_p \sqrt{\frac{m}{c^s}} \quad (1)$$

Where C^S -capacitance of a sample measured at high frequency.

Elastic constants are calculated by the formulas:

$$C_{33}^D = 4\rho f_p^2 t^2 \quad (2)$$

$$C_{33}^E = C_{33}^D (1 - k_t^2) \quad (3)$$

The constants determined using the resonance-antiresonance method are presented in Table 1.

Table 1.
Constants of a piezoelectric sample obtained by the resonance-antiresonance method

Constant	Method P-A	True value
$C_{33}^D, 10^{10}\text{N/m}^2$	0.5	11.1

$d_{33}, \frac{\text{пКл}}{\text{Н}}$	607	567
k	0.73	0.75
k_t	0.515	0.52
$C_{33}^E, 10^{10}\text{N/m}^2$	0.37	-

The main advantages of the method are the ease of implementation, the availability of mathematical and hardware. However, the impossibility of determining the dielectric and piezoelectric losses at operating frequencies reduces the accuracy of determining the parameters. The main disadvantage of the method is the difficulty of applying it to medium and high frequency modes.

The mathematical model of the overtone method is the exact solution of the electromechanical problem for the radial oscillations of the disk in a one-dimensional approximation. The method is based on measuring the fundamental resonant frequency and the resonant frequency of the first harmonic (overtone) of the radial disk mode, followed by solving a system of two transcendental equations for elastic constants.

The resonance condition leads to a system of transcendental equations, general form [5]:

$$j_1(\varphi_n) = 1 - \sigma^E \quad (4)$$

where j_1 -the Bessel function, σ^E - the Poisson's ratio, and n -is the ordinal number of the harmonic.

Expression (20) is considered a system of equations of the form:

$$j_1\left(\frac{f_{sn}}{f_R}\right) = 1 - \sigma^E \quad (5)$$

where $f_R = \frac{1}{2\pi R} \sqrt{\frac{1}{\rho S_{11}^E (1 - \sigma^E \epsilon_2^E)}}$; f_{sn} - the value of resonant frequencies ($n=1,2$).

These equations are based on the Bessel function, for resonant frequencies corresponding to the sample, the function is shown in Figure 2.

Then the equation $j_1\left(\frac{f_{s1}}{f_R}\right) = j_1\left(\frac{f_{s2}}{f_R}\right)$ is solved relatively f_R and then Poisson's ratio is determined, this is the main task of this method. After, according to the known, σ^E other electrophysical constants of the piezoelectric are determined (table 2).

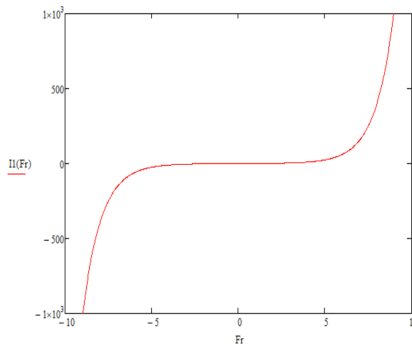


Figure 2. Bessel function, for resonant frequencies corresponding to the sample

$$j_1\left(\frac{f_{s1}}{f_R}\right) = j_1\left(\frac{f_{s2}}{f_R}\right).$$

Table 2.
 Constants of a piezoelectric sample obtained by the
 resonance - antiresonance method

Constant	Method P-A	True value
$C_{33}^D, 10^{10}\text{N/m}^2$	9.471	11.1
$d_{33}, \frac{\text{nK}\cdot\text{m}}{\text{H}}$	569	567
k	0.74	0.75
k_r	0.53	0.52
σ	0.32	0.31
$C_{33}^E, 10^{10}\text{N/m}^2$	6.81	-

Conclusion: The overtone method and the resonance-antiresonance method were used to obtain the electrical parameters of a disk-shaped sample based on solid solutions of zirconate - lead titanate. The amplitude-frequency characteristic of the sample was built.

Having obtained a set of parameters using the resonance-antiresonance method, we can draw the following conclusions:

The main advantages of the method are the ease of implementation, the availability of mathematical and hardware. However, the impossibility of determining the dielectric and piezoelectric losses at operating frequencies reduces the accuracy of determining the parameters. The main disadvantage of the method is the difficulty of applying it to medium and high frequency modes. Since the exist-

ing sample based on lead zirconate-titanate solid solutions had a high-frequency mode, some parameters obtained by this method differed greatly from the real parameters of the sample, for example, the elastic constant C_{33}^D .

Overtone methods allow you to expand the capabilities of the resonance-antiresonance method, since the method is also based on the measurement of resonant frequencies and differs from R-A in its mathematical apparatus. However, this method has no difficulties when applied to medium and high frequency modes. Due to this, it is possible to more accurately determine the electrical parameters of the sample. In addition, the overtone method allows you to determine the Poisson's ratio. But there are also disadvantages of the method, because of the more complex mathematical apparatus, it is better to use automatic computer calculation.

Both the overtone and the R-A method are common methods for obtaining the electrophysical parameters of piezoelectrics, but they have a number of disadvantages:

- the overtone method has a complex mathematical apparatus;
- P-A difficulty of application on mid- and high-frequency modes;

In addition, the results obtained by both methods strongly depend on the geometric parameters of the sample. Therefore, it is important to continue research in this direction in order to improve the available methods for determining electrophysical parameters or to propose completely new methods.

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主成分法分析多元数据的可能性研究
**STUDY OF THE POSSIBILITIES OF THE PRINCIPAL
COMPONENT METHOD FOR ANALYZING MULTIVARIATE
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抽象的。使用主成分法（PCA）分析气象数据集。选择三个实体来评估 PCA 分析：主成分贡献、主成分负载和主成分估计的散点图。该研究揭示了数据集的内部结构以及变量之间的关系。这些结果为进一步的数据分析和建模提供了基础，有助于更好地解释数据，为预测和决策提供更准确的依据。

关键词：气象序列、主成分分析、特征向量、特征值、奇异值分解。

Abstract. *Meteorological datasets were analyzed using the principal component method (PCA). Three entities were selected to evaluate the PCA analysis: principal component contributions, principal component loads and scatter plots of principal component estimates. The study reveals the internal structure of the dataset and the relationships between the variables. These results provide a basis for further data analysis and modelling, which can help to better interpret the data and provide a more accurate basis for forecasting and decision-making.*

Keywords: *meteorological series, principal component analysis, eigenvector, eigenvalue, singular value decomposition.*

Nowadays, the use of diverse, high-speed data, which is constantly growing in volume, has become the norm in both the commercial sector and public administration. In addition to social media, the internal information environment of enterprises and organizations is also a source of big data. Continuous data from

measuring devices, events from radio frequency identifiers, meteorological data, remote sensing data, data on the location of cellular subscribers, data streams from audio and video recording devices, and many other data literally overwhelm the means of storing and processing them. Such large data sets are often difficult to handle.

To interpret such datasets, methods are required to reduce the dimensionality of the data dramatically in an interpretable way. In doing so, much of the information in the data must be preserved. Many methods have been developed for this purpose, but Principal Component Analysis (PCA) is one of the oldest and most widely used [1-3]. The idea behind PCA is simple - to reduce the dimensionality of the data set while retaining as much 'variability' (statistical information) as possible. This means finding new uncorrelated variables that are linear functions of the original data sets and maximize variance. Finding such new variables (principal components) reduces to solving the eigenvector problem. Moreover, the new variables are determined by the dataset and not a priori, which makes PCA an adaptive method of data analysis.

Data for the study (air temperature) were obtained from meteorological station 29434 (Tomsk, Russia). The present location of the meteorological station is 56.50° N and 84.92° E, altitude 139 m above sea level. Air temperature values are taken for the meteorological day, which begins in Tomsk at 12 o'clock worldwide time (19 o'clock local time). The temperature records for each day are determined as the lowest and highest values according to a number of daily resolution data. Thus, for weather monitoring in Tomsk, daily data were taken for the period from 1881 to 2023. The data are presented as a set of lines, some of which are shown in Figure 1.

```
29430 1950 1 1 0 -38.9 -35.4 -32.4 0.0
29430 1950 1 2 0 -35.9 -28.2 -23.2 0.8
29430 1950 1 3 0 -25.1 -18.7 -9.5 1.6
29430 1950 1 4 0 -9.7 -6.9 -5.4 1.0
29430 1950 1 5 0 -24.8 -17.8 -7.1 2.5
29430 1950 1 6 0 -24.8 -20.0 -15.5 0.0
29430 1950 1 7 0 -22.6 -19.6 -17.5 0.0
29430 1950 1 8 0 -22.6 -6.4 0.5 0.3
29430 1950 1 9 0 -12.6 -7.5 -0.8 0.0
29430 1950 1 10 0 -20.2 -12.8 -4.9 0.6
29430 1950 1 11 0 -33.8 -30.9 -20.0 0.0
29430 1950 1 12 0 -38.8 -27.7 -18.5 0.8
29430 1950 1 13 0 -20.7 -17.7 -11.6 1.2
29430 1950 1 14 0 -32.1 -29.2 -16.5 0.2
29430 1950 1 15 0 -29.7 -25.0 -21.0 0.0
29430 1950 1 16 0 -21.9 -20.9 -20.0 0.4
29430 1950 1 17 0 -27.6 -21.9 -17.4 0.3
```


29430	1950	1	18	0	-23.8	-21.2	-17.5	0.1
29430	1950	1	19	0	-26.8	-23.0	-18.9	0.0
29430	1950	1	20	0	-25.0	-21.0	-17.6	0.0
29430	1950	1	21	0	-21.1	-17.4	-15.4	0.0
29430	1950	1	22	0	-19.0	-14.6	-13.0	0.8
29430	1950	1	23	0	-20.1	-16.0	-11.4	2.2
29430	1950	1	24	0	-30.6	-25.1	-15.6	0.1
29430	1950	1	25	0	-35.7	-33.8	-30.6	0.0
29430	1950	1	26	0	-33.0	-26.3	-19.2	0.4
29430	1950	1	27	0	-20.6	-18.2	-16.3	0.7
29430	1950	1	28	0	-25.1	-19.8	-15.6	0.2
29430	1950	1	29	0	-20.6	-17.9	-13.6	0.0
29430	1950	1	30	0	-23.6	-18.9	-16.6	0.2
29430	1950	1	31	0	-19.3	-16.4	-13.7	0.3
29430	1950	2	1	0	-18.2	-14.2	-10.4	0.0
29430	1950	2	2	0	-14.7	-11.5	-8.0	1.5
29430	1950	2	3	0	-23.2	-20.1	-10.4	0.2
29430	1950	2	4	0	-28.7	-24.8	-21.8	0.4
29430	1950	2	5	0	-31.9	-27.5	-23.4	0.1
29430	1950	2	6	0	-35.3	-30.0	-27.4	0.0
29430	1950	2	7	0	-28.1	-26.8	-23.6	0.3
29430	1950	2	8	0	-41.4	-33.6	-24.0	0.0
29430	1950	2	9	0	-31.3	-26.9	-22.0	0.0
29430	1950	2	10	0	-26.2	-22.4	-19.1	0.0
29430	1950	2	11	0	-21.2	-17.8	-15.3	0.1

Figure 1. Data sets

There are nine columns of parameters in the original data set. The experiments used «minimum air temperature» (column 6), «average air temperature» (column 7) and «maximum air temperature» (column 8) with a sample of data calculated from 1950-01-01 to 1960-12-31. Plots of the raw data are shown in Figure 2. V6 is minimum air temperature, V7 is average air temperature and V8 is maximum air temperature. воздуха.

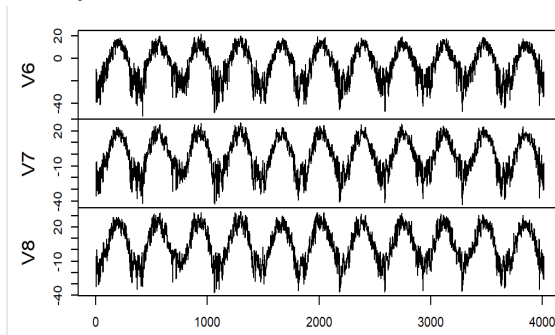


Figure 2. Original data graphs

The following flowchart was used for the PCA analysis:

- selection of the time series of interest from the original data set;
- data preparation (removal of missing values or standardization);
- conducting PCA analysis on selected time series;
- interpretation the results of PCA analysis to understand the main components and their contribution to explaining the variance of the data;
- visualization of results (graphs of components and their contribution);
- using the results for further analysis and forecasting.

The software experiments were carried out in an integrated open source environment for the R programming language (RStudio Desktop), in which the program is run on the local machine as a normal application.

Below are some excerpts from the experimental work with the data. The extent to which each principal component (PC1, PC2 and PC3) influences the explanation of variation in the raw data is presented in Figure 3.

	PC1	PC2	PC3
Standard deviation	1.718992	0.2036857	0.05983306
Proportion of Variance	0.984980	0.0138300	0.00119000
Cumulative Proportion	0.984980	0.9988100	1.00000000

Figure 3. Contribution of main components

Scatter plots of the principal component estimates are shown in Figures 4, 5 and 6. Scatter plots are extremely useful for identifying any trend between two quantitative variables.

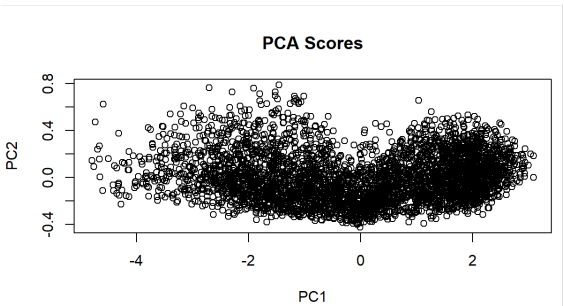


Figure 4. Scatter diagram for PC1 and PC2

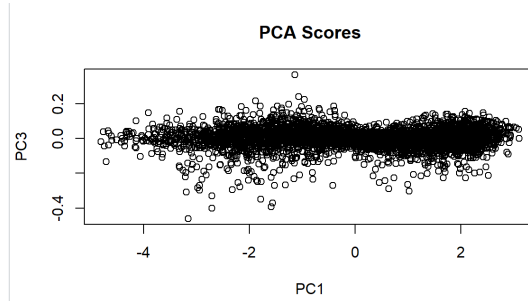


Figure 5. Scatter diagram for PC1 and PC3

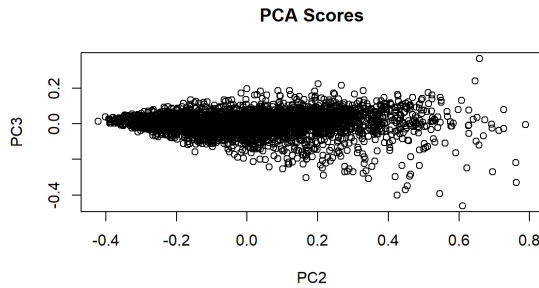


Figure 6. Scatter diagram for PC2 and PC3

A three-dimensional scatter plot showing the distribution of principal component estimates (the first three principal components) over the measurement coordinates PC1, PC2 and PC3 is shown in Figure 7.

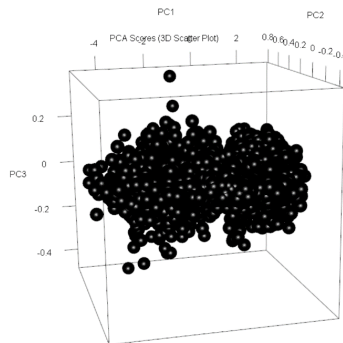


Figure 7. Three-dimensional scatter diagram

Figure 8 shows the cumulative contribution of each principal component to the total variance.

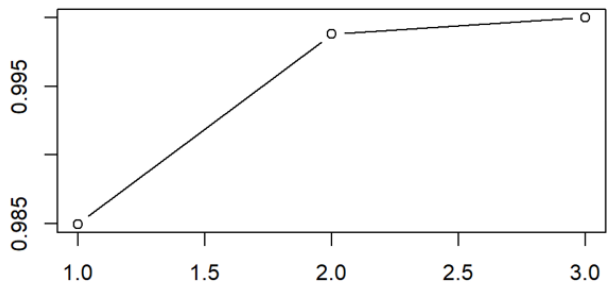


Figure 8. Cumulative contribution

The first principal component explains over 98% of the variability. The higher the explained variance of the model, the more the model is able to explain the variation in the data. The proportion of variance explained by the second and third principal components is insignificant. The specific percentage contribution of each principal component to the explanation of variance is plotted as a histogram (Figure 9).

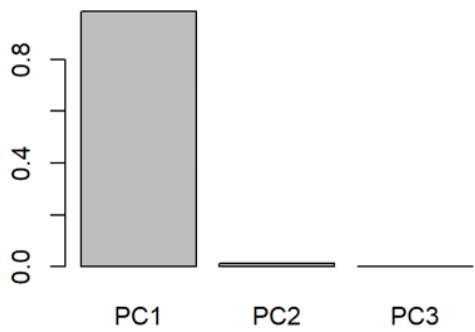


Figure 9. Specific percent contribution

The plots constructed to illustrate the contribution of the principal components in explaining the variance help to determine how many principal components should be chosen to represent the data. However, PCA does not always reduce a large number of source variables to a smaller number of transformed variables that account for most of the variance of the original set. If the original variables are not correlated, then PCA analysis will not help.

In conclusion, while PCA in its standard form is a widely used and adaptive tool for quantitative data analysis, it also has many proprietary adaptations that make it useful for a wide variety of situations and data types in numerous studies. In the present study, PCA analysis was carried out for correlated data sets. Three entities were chosen to evaluate the PCA analysis: principal component contributions, principal component loadings and scatter plots of principal component estimates. The internal structure of the data set and the relationships between the variables were identified. These results provide a basis for further data analysis and modelling, which can help to better interpret the data and provide a more accurate rationale for decision-making and forecasting.

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论学生创业的特点

ON THE FEATURES OF STUDENT ENTREPRENEURSHIP

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抽象的。青年政策的重点是培养年轻人积极的创业心态、他们的技能和小企业发展的动力。明确高等学校学生创新创业发展方向。学生创业被认为是大学青年人力资本发展的一种教育外实践,同时也是强化和提高教育过程质量的工具。

关键词: 青年政策、青年创业、青年创业发展、学生创业、青年企业家问题。

Abstract. *The focus of youth policy on the formation of active entrepreneurial mindset of young people, their skills and motivation in small business development is substantiated. The directions of development of student innovative entrepreneurship in higher education institutions are defined. Student entrepreneurship is considered as an extra-educational practice of human capital development of university youth and, at the same time, as a tool to intensify and improve the quality of the educational process.*

Keywords: *youth policy, youth business, youth entrepreneurship development, student entrepreneurship, problems of young entrepreneurs.*

Small business is now an indispensable element of the Russian economy. Small business is accessible to a wide range of people, including the young under 30. Small businesses generally do not require large financial, material and labor resources. According to the New Business portal, the number of young entrepreneurs under 35 years of age increased by 42% in the first quarter of 2023 compared to the same period last year [1]. Although its share in the national economy is generally small, it is small and medium-sized enterprises, which are sensitive and dynamic to changes in the economic situation, are associated with the saturation of the market with necessary goods and services to improve the standard of living of the population. Therefore, in the national project «Small and medium entrepreneurship and support of individual entrepreneurial initiative», almost all of its four federal components are focused on youth entrepreneurship [2].

Modernization of all areas of society requires new leaders and new ideas. Young people are characterized by innovation, mobility to explore new markets with effective business models, the ability to dynamically update their knowledge and skills, and much more. This includes the health that allows them to withstand the increased work and stress of entrepreneurial activities. Therefore, the youth environment is seen as a strategically important labor resource for society, as a new formation of entrepreneurs capable of proposing and implementing competitive ideas in the new realities of today's global «knowledge economy». That is why youth entrepreneurship is an important factor contributing to the modernization of the Russian economy and is highlighted as an independent direction of domestic state policy.

Of course, the participation of young people (including students) in business is not a new phenomenon for the Russian economy. In the state budget of both the Federal Agency for Youth Affairs and the Ministry of Science and Higher Education of the Russian Federation, separate lines of funding for the development of student entrepreneurship appear. But the uniqueness of the precedent is that these programs only partially claim to be integrated into the internal work of educational organizations and fit into the framework of extracurricular work, in which student entrepreneurship existed before in the format of competitive platforms and accelerators..

Young entrepreneurs and enterprising young people should be given the opportunity not only to earn money, but also to create comfortable conditions at the state level for mutually beneficial work with large organizations and enterprises. It is worth noting that the promotion of entrepreneurial activity of young people, more precisely, youth policy, has been introduced in the Constitution of the Russian Federation since July 4, 2020 (article 72, part 1, item f) [3]. It is noted that the issues of youth policy, along with the general issues of upbringing, education, science, culture, physical culture and sports, are under the joint jurisdiction of the Russian Federation and the subjects of the Russian Federation. Especially noteworthy is the Federal Law “About youth policy in the Russian Federation” (No. 489-FZ), which entered into force on January 10, 2021. The law defines the goals, principles, main directions and forms of realization of youth policy, and also regulates the relations arising between the subjects, carrying out the activity at formation and realization of youth policy in the Russian Federation [4]. Moreover, the message of the President of the Russian Federation Vladimir Putin to the Federal Assembly of the Russian Federation from 21 April 2021, which explicitly states the need for each national project to provide a special section aimed at supporting youth [5].

Valery Falkov, Minister of Science and Higher Education of the Russian Federation, noted: «Involving young people in entrepreneurial activities is one of the

drivers of the country's economic growth. It is especially important to develop entrepreneurial competencies among students. According to statistics, a quarter of the world's startups and business ideas are born on the university bench. In our country, this figure is lower. To support students and help them start their own business, the Russian Ministry of Education and Science has developed a project to create a «Platform of university technological entrepreneurship», which was included in the list of 42 initiatives for socio-economic development of the country, approved by the Russian Government» [6].

It should be added that graduate qualification works (GQW): Bachelor's thesis, diploma thesis (project), Master's thesis as qualification works are losing their practical relevance among employers and students alike. Students' own projects - start-ups as GQWs - are gaining popularity. It is GQW in the form of a startup that makes it possible to identify the degree of immersion of students in the ecosystem of technological entrepreneurship and to support promising projects and their development in the future already at an early stage.

Thus, it is the entrepreneurial activity of students, or rather the experience of entrepreneurship, business culture and management gained in the process of educational activities, that enables students to successfully adapt to the business community. At the same time, the analysis of youth policies of universities shows that student entrepreneurship is not a task with the highest priority in the list of their activities. In [7] the prerequisites that determine the increased interest in student entrepreneurship are noted:

- high interest in entrepreneurship among the students themselves;
- the need to develop emotional verbal and social communication skills free from negative emotions, due to the transfer of business operations into the «virtual sphere».

The authors of the study [8] based on empirical material identified two groups of factors influencing the development of student entrepreneurship: personal (subjective) attitudes of students and the impact of external environment (primarily, various support measures for student entrepreneurs). There are three blocks in student entrepreneurship support:

- support that is state-based;
- private support (by commercial and public organizations);
- intra-university support (university support).

Let us add that support of student entrepreneurship is necessary at all levels of government, as well as within the boundaries of specific territories and municipalities. And also - it is necessary to teach students knowledge of the legal and regulatory framework for competent business activities (economic and legal culture), especially in the field of economic activities, as it is in this area where illegal entrepreneurship is the most common crime among young people.

Thus, the relevance of studying the problems of student entrepreneurship development in higher education institutions is obvious. But before starting to deploy and implement student entrepreneurship, it is necessary to study the following, primarily educational issues [9]:

- Synchronization of the learning process at HEI with the existing business infrastructure in the region (roles, conditions, cycles).
- Entrepreneurship education (practical use of entrepreneurial opportunities).
- Involvement in entrepreneurial activities already in their junior year (graduate qualification work in a start-up format, micro-financing of student entrepreneurship during undergraduate studies, grants from regional industry for entrepreneurial projects (entrepreneurship, R&D), etc.).
- Practical extracurricular (extracurricular) activities (pre-accelerators, accelerators, hackathons, etc.).

Interesting options for entrepreneurship models are offered by the Foundation for the Support of Innovation and Youth Initiatives of St. Petersburg [9].

* The involvement model. The main objective is to get involved in the topic of entrepreneurship. Tools: Educational courses, hackathons, idea competitions, workshops and meetings with entrepreneurs, maker activities (small inventions), analytics.

* Approbation model. The main objective is to provide an opportunity to take part in projects and be acquainted with real businesses. Tools: pre-accelerators, business clubs, mentoring, competitions (project schools), microfinance, prototyping, industry events.

* The Development Model. The main objective is to enable the creation of a business. Tools: startup as a degree, master's program, inclusion in technology teams, mentoring, funding.

* Scaling up model. The main objective is to reach a sustainable growth, scalable, high-growth company (gazelle-enterprise). Tools: industry accelerators, working with external Funds, international collaborations.

In conclusion, despite the fact that entrepreneurship is becoming an increasingly attractive field for education, according to surveys, only 9% of students are ready to start their own business from scratch after university. Moreover, here it is not only the student's own desire to become an entrepreneur, but also the initial help from the university and business that is very important. Student projects require not only an academic supervisor, but also competent business representatives who can provide assistance at all stages of the project – from prototype development to grant financing and company creation.

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