



# 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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欧盟碳边界调整机制：方法演变与争议  
**EU CARBON BORDER ADJUSTMENT MECHANISM: EVOLUTION  
OF APPROACHES AND CONTROVERSIES**

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注解。 该研究解决了与欧盟产品进口引入新的跨境碳税（称为欧盟碳边境调整机制）的影响相关的问题。 分析了这种税收方法的本质和演变。 针对通过碳税对贸易流动进行新监管的积极和消极影响，对各种专家的意见进行了比较分析，包括对俄罗斯出口商的影响。 确定了新的欧盟立法产生的重大矛盾以及解决这些矛盾的方法。

关键词： 欧盟、碳定价工具、欧盟碳边境调整机制（CBAM）、竞争力、绿色新政、温室气体排放机制、绿色新政、温室气体排放。

**Annotation.** *The study addresses issues related to the impact of the introduction of a new cross-border carbon tax on product imports in the European Union, called the EU Carbon Border Adjustment Mechanism. The essence and evolution of approaches to this tax is analyzed. A comparative analysis of various expert opinions is carried out regarding the positive and negative effects of the new regulation of trade flows through a carbon tax, including for Russian exporters. Significant contradictions generated by the new EU legislation and ways to resolve them are identified.*

**Keywords:** *European Union, carbon pricing instruments, EU Carbon Border Adjustment Mechanism (CBAM), competitiveness, Green Deal, greenhouse gas emissions mechanism, Green Deal, greenhouse gas emissions.*

*Introduction*

In 2019, the EU adopted a long-term economic development strategy aimed at achieving carbon neutrality by 2050 and building an environmentally sustainable economy that allows achieving higher rates of growth in prosperity without increasing resource consumption and negative impacts on the environment (de-coupling). The strategy was called the “European Green Deal”, or “Green Deal”.

As part of this strategy, various carbon pricing instruments, CPIs, that is, price incentives that are directly proportional to the greenhouse gas emissions created

by a given product or activity. They include all types of cash payments, the purpose of which is to reduce greenhouse gas emissions into the atmosphere through the imposition of a carbon tax on carbon-intensive industries and, as a consequence, their decarbonization. These payments are made through carbon taxes, emissions trading systems (ETS) and carbon credit mechanisms.

Let us clarify that the Carbon Tax is a monetary amount levied by the government on each unit of CO<sub>2</sub> equivalent emissions from a specified taxable source. Almost all the carbon contained in fossil fuels is eventually released as carbon dioxide. Therefore, a levy on the carbon contained in fossil fuels - carbon tax - is equivalent to a tax on the emissions generated by burning fossil fuels.

*Main part*

One of the mechanisms for decarbonizing industries is the transboundary carbon regulation (TCR), or Carbon Border Adjustment Mechanism, CBAM». The decision to introduce it was made as part of a comprehensive package of climate measures “Fit for 55” July 14, 2021<sup>1</sup>. The introduction of this mechanism involves levying a border carbon tax on imported products with a large carbon footprint, that is, on products the production of which is accompanied by CO<sub>2</sub> emissions in quantities exceeding the standards established in the EU. The stated goal of CBAM is to equalize carbon prices between domestic and foreign products, thereby limiting carbon leakage. According to the developers of the law, this measure could also encourage partner countries to introduce their own carbon pricing system and thus promote the production of zero-emission products<sup>2</sup>.

The tax will be levied by purchasing certificates from 2023. Prices for GHG emissions should be formed similarly to the prices of the quota trading system. The introduction of CBAM was hampered by a number of factors, including the low price of carbon emissions under the EU ETS in order to guarantee corrective measures at the border. However, since 2020, the EU has seen carbon prices rise rapidly, from €30 per tonne of CO<sub>2</sub> in December 2020 to €80 in December 2021 and €100 in February 2023. This has increased the need for corrective measures such as CBAM<sup>3</sup>.

The EU is a pioneer of carbon pricing, and its emissions trading system (*ETS*), which it created in 2005, is the world’s largest carbon market. Currently, only 45 national jurisdictions have carbon pricing initiatives. Russia will introduce such payments in 2023 as part of the Sakhalin project, first for large emitters.

Emissions trading systems and carbon boundary adjustments will be introduced in many countries in the coming years, but no country or territory has cur-

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<sup>1</sup> Erbach G. with Foukalova N. Review of the EU ETS: ‘Fit for 55’ package, EPRS, European Parliament. 2023.

<sup>2</sup> EU carbon border adjustment mechanism Implications for climate and competitiveness. EU Legislation in Progress. P. 2-3. URL: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698889/EPRS\\_BRI\(2022\)698889\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698889/EPRS_BRI(2022)698889_EN.pdf).

<sup>3</sup> Ibid P. 8.

rently implemented CBAM. A limited adjustment is made under California's cap-and-trade system for electricity imports.

SBAM will be introduced in stages. In 2023-2025 no financial adjustment payments will be made and importers will be responsible for calculating and reporting emissions whereas the European Commission will be responsible for collecting emissions data. From early 2026, importers will be required to purchase CBAM certificates that will be valid for 2 years and will be responsible for independently verifying emissions. In addition, importers will need to obtain possible exemptions for products from jurisdictions that impose EU ETS-equivalent emissions prices.

The CBAM will initially apply to imports in the five most carbon-intensive sectors: *cement, iron and steel, aluminum, fertilizers and electricity*. The fee will cover imports from all third countries other than those included in the ETS or a related mechanism and will thus equalize the position of EU producers and foreign producers whose country does not have a system similar to the European one. In 2026-2035 free allocations under the ETS will be abolished, which will ensure a level playing field for EU producers and importers from third countries.

As part of the package "Fit for 55" The European Commission has presented a legislative proposal to revise the Emissions Trading System to bring the EU ETS Directive into line with the EU objectives set out in the European Climate Law. To achieve this, the volume of emission quotas will be reduced, fewer quotas will be allocated free of charge, a separate new system for trading emission quotas for fuel for road transport and buildings, etc. will be created. The changes came into force on June 5, 2023<sup>4</sup>.

CBAM is a comprehensive measure and addresses many aspects: climate and environmental policy, trade, customs and taxation, as well as budgetary and economic issues. It was therefore accompanied by intensive negotiations about its legal basis and the conditions for its adoption. In order to take into account all the criticisms of this mechanism, the EU conducted an analysis of the opinions of three groups of stakeholders: European business, the academic community and third countries. The legal basis for the introduction of CBAM is Article 192(1) of the Treaty on the Functioning of the EU (*TFEU*), which allows the EU to take actions that contribute to the achievement of the environmental and climate goals specified in Article 191(1) *TFEU*. Therefore, EU experts believe that CBAM, which deals with regulating emissions through restrictions on the import of products, is consistent with environmental and climate goals and does not contradict the law.

Initially, the debate in the EU revolved around the choice of options for restrictive measures: the introduction of a border tax or customs duty, a consumer tax

<sup>4</sup> Review of the EU ETS: 'Fit for 55' package. Briefing 05/31/2023. URL: [https://www.europarl.europa.eu/thinktank/en/document/EPRS\\_BRI\(2022\)698890](https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2022)698890)

(like an excise tax or value added tax), obligations to purchase CBAM certificates or an extension of the EU ETS on imports. The studies addressed the impact of carbon regulation on achieving climate goals, the competitiveness of individual industries, the efficiency of administration of measures taken, etc. General criticisms of experts are presented in Table 1.

**Table 1.**  
*Criticisms of experts on the introduction of Carbon Border Adjustment Mechanism (CBAM)*

<b>group</b>	<b>Key Notes</b>
European business	<ul style="list-style-type: none"> <li>– maintaining free permits under the EU ETS would be preferable to CBAM;</li> <li>– free emissions permits and CBAMs can be combined with WTO rules;</li> <li>– phasing out free distribution will increase production costs and reduce resources for investing in decarbonization;</li> <li>– to avoid dissatisfaction of third countries with unilateral EU measures, it is necessary to create a climate club, etc.</li> </ul>
Academic community	<ul style="list-style-type: none"> <li>– direct GHG leakage can be reduced through energy markets more than through CBAM;</li> <li>– CBAM may reduce leakage rates more for the iron and steel industry than for the cement industry;</li> <li>– the tax has a moderate net climate impact;</li> <li>– all emissions policies may improve competitiveness but not reduce global emissions;</li> <li>– the economic and environmental impact of NEAM will remain small;</li> <li>– legal and administrative burdens may reduce the effectiveness of CBAM;</li> <li>– the validity of CBAM on environmental grounds needs to be examined in the context of WTO rules;</li> <li>– for WTO compatibility, the optimal carbon price should be approximately half the domestic carbon price, rather than equivalent;</li> <li>– Adjusting carbon borders will level the playing field, but will not help EU exports, etc.</li> </ul>
Third countries	<p>General criticism of the introduction of CBAM and compliance with WTO rules:</p> <ul style="list-style-type: none"> <li>– Ukraine – an exception must be made for the steel industry;</li> <li>– Türkiye – provide EU funding for Turkey’s accession to CBAM;</li> <li>– China - Wealthier countries should bear proportionately more responsibility for reducing emissions;</li> <li>– Russia - EU uses climate program to introduce new trade barriers;</li> </ul>

	<p>– Brazil, South Africa, India and China - the tax will have a negative impact on developing countries.</p>
<p>Representatives of the European Parliament</p>	<p>They support this regulation provided that it:                      1) comply with WTO requirements;                      2) contribute to the achievement of climate policy goals;                      3) will not be used as a protectionist measure.</p>

Source : compiled by the author by EU carbon border adjustment mechanism Implications for climate and competitiveness. EU Legislation in Progress. URL: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698889/EPRS\\_BRI\(2022\)698889\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698889/EPRS_BRI(2022)698889_EN.pdf)

As follows from the analysis of the statements presented in Table 1, experts identify quite a lot of factors that can reduce the effectiveness of CBAM for the global economy as a whole, including low economic and environmental positive impact, high legal and administrative burden associated with its administration and coordination of positions all interested parties, etc. The ability of this mechanism to ensure increased competitiveness of the European economy itself is also questioned. At the same time, a positive factor is the fact that representatives of the European Parliament are aware of the existing problems and are ready to discuss them constructively in a broad international format.

Research conducted by experts in 2021 proves that the introduction of CBAM will have the most negative impact on the states of Africa and South-Eastern Europe, so the final result will depend on their ability to adapt to this mechanism.

The medium-term consequences for China of the EU’s border carbon tax could be significant. China is the largest exporter to the EU, accounting for 20.4% of the Union’s imports in 2019<sup>5</sup>. The carbon tax will primarily affect Chinese steel exports; it is the largest producer and one of the largest suppliers of steel to the EU market. According to Eurostat data, before the pandemic, China accounted for about 7% of imports. At the same time, the carbon content of Chinese steel is the highest compared to other suppliers. The introduction of CBAM will also impact the chemical industry, which accounts for 5% of total EU imports from China.

<sup>5</sup> Razumnova, L.L. Long-term retrospective trends in the EU foreign trade development with the UK, USA and CHINA // International trade and trade policy. 2020. T. 6. No. 4 (24). pp. 23-43.

The tax will have an indirect impact on the import of machinery, equipment and vehicles (54% of the import structure)<sup>6</sup>.

The current situation in the energy market, which is characterized by an extreme degree of politicization and strengthening of anti-Russian sanctions, is forcing importing countries to temporarily change priorities, placing the primacy of energy security at the forefront. For the Russian fuel and energy complex, these disturbances became a trigger not only for the accelerated reorientation of trade flows in the eastern direction, but also for a larger-scale modernization of industrial sectors. This is not only about technological aspects, commodity and geographic diversification of production and foreign markets, but also the creation of new institutional structures that make it possible to generate and effectively use revenues from hydrocarbon exports, regardless of the countries of the collective West<sup>7</sup>.

Russian experts believe that our country needs to introduce its own effective national emissions regulation system, which must meet a number of requirements:

- contain elements of price regulation;
- be as simple and transparent as possible, which will avoid high corruption risks in the context of an imperfect regulatory framework;
- be flexible enough to respond to changes in economic conditions;
- carefully and gradually integrated into the existing fiscal system;
- a carbon tax cannot be a simple addition to the current tax system, but become part of a larger low-carbon development strategy<sup>8</sup>.

Russian expert M. Yulkin, from our point of view, most accurately identifies the possible consequences of the new carbon regulation for Russian exporters. He believes that after the introduction of CBAM, the European market will respond to all these measures by increasing product prices, which may also have a beneficial effect on Russian suppliers. At the same time, the obligation of importers to pay for their carbon footprint will result in additional costs for them, which they will try to shift to suppliers by demanding discounts and reducing purchases from those manufacturers whose GHG emissions are higher than European benchmarks. Some of the carbon costs of importers will be passed on to the price of products. Therefore, there will be those who benefit from the proposed measures and those who lose. The overall effect on the Russian economy will depend on Russian companies themselves, who have three years to adapt to the new European rules and learn to benefit from them. The Russian government also has time to think and propose its own system for regulating GHG emissions to ensure a low-carbon transformation

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<sup>6</sup> International approaches to carbon pricing. Department of Multilateral Economic Cooperation of the Ministry of Economic Development. January 2021.

<sup>7</sup> Artemkina L.R., Razumnova L.L. On the issue of balancing hydrocarbon markets from the perspective of the energy trilemma // Innovations and investments. 2023. No. 2. pp. 24-29.

<sup>8</sup> I. Makarov, I. Stepanov. Carbon regulation: options and challenges for Russia // Bulletin of Moscow University, ser. 6. Economics. 2017. No. 6, pp. 3-22.

of the economy and increase its competitiveness in the face of increasingly stringent climate restrictions<sup>9</sup>.

After examining the criticisms, the European Commission extended the transition period from 1 January 2023 until the end of 2026. In 2027 - 2032 a phased introduction of CBAM requirements will be carried out and, accordingly, a waiver of free distribution of quotas - 93% - in 2027, 84% - 2028, 69% - 2029, 50% - 2030, 25% - 2031 and reaching net zero in 2032. Free allocation of allowances will remain for exports outside the EU where carbon pricing mechanisms do not apply. By 2025, the Commission will provide an assessment of the impact of the EU ETS and CBAM on the production of exported goods and on the compatibility of the mechanism with WTO rules. To ensure continuous dialogue with trading partners, the EU proposes to create a “carbon club” as a new format of an open, non-exclusive international forum within the WTO, OECD or another organization. It is also proposed to create a “climate club” of countries that have emissions pricing or other similar instruments.

It has been decided that CBAM will also cover hydrogen and refined products made from cement, iron, steel and aluminum. By 2030, the scope of CBAM products should cover all sectors of the EU ETS, as well as indirect emissions from the production of electricity used to produce goods. The EU has also expanded the definition of direct emissions to include heating and cooling. Every two years from 2026, the Commission will assess the effectiveness of regulation for EU exports of goods to countries that do not apply the EU ETS or a similar pricing mechanism. Until 1 January 2028 and every two years thereafter, the EC will report on the implementation of the CBAM regulation. It must also prepare legislative proposals to eliminate the negative consequences for the economies of third countries that may arise from the introduction of CBAM.

It should be noted that CBAM not only aims to help EU regulators strengthen their environmental credentials, but is seen as part of a basket of so-called revenue-generating “own resources”, as it is capable of generating between €5 and €14 billion in profits annually and will help repay EU budget deficit of 750 billion euros<sup>10</sup>.

### *Conclusions*

As the study showed, the complex nature of the EU emissions regulation system, affecting various aspects of various areas - external and internal taxation, ecology and climate, budget, competition, law enforcement and administration,

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<sup>9</sup> Mikhail Yulkin. «Fit for 55». New EU climate initiatives and their consequences for Russia. URL: <https://cenef-xxi.ru/articles/fit-for-55.-novye-klimaticheskie-iniciativy-es-i-ih-posledstviya-dlya-rossii-obzor-mihaila-yulkina>

<sup>10</sup> Sam Morgan. Moscow cries foul over EU’s planned carbon border tax. URL: <https://www.euractiv.com/section/economy-jobs/news/moscow-cries-foul-over-eus-planned-carbon-border-tax/>

gives rise to a whole range of inter- and intra-country contradictions. In an effort to create common rules of the game in the market for European companies and foreign manufacturers, to build a “green economy” not only in the EU countries, but also beyond their borders, European regulators may jeopardize the competitiveness of the exporters of European products themselves and create new contradictions between WTO members. An instrument to combat climate dumping, as the Europeans call CBAM, must walk a fine line between contributing to the EU’s green policy and complying with WTO rules, and this is quite difficult to achieve. In addition, it is obvious that this tax is clearly protectionist in nature in conditions where other measures, such as the introduction of anti-dumping duties, have become frequently and unsuccessfully challenged by the Russian side in the WTO arbitration court<sup>11</sup>. Conducting a multilateral dialogue between the EU Parliament and trading partners through the work of the “carbon club” could become an effective format for reconciling the conflicting interests of all participants in international trade.

An analysis of academic research has shown that the potential effectiveness of introducing CBAM or similar measures is low, and the consequences of its use are very contradictory and uncertain. An emissions pricing system could have a significant but contradictory impact, primarily on the European economy, by stimulating industrial decarbonization or facilitating the relocation of production from EU territories abroad.

The European Environmental Policy Institute believes that the negative impacts of CBAM, especially on climate-vulnerable countries, could be addressed through a range of additional institutional and financial measures: closer multilateral dialogue; avoiding double compensation for EU industries; introducing exceptions and providing financial assistance, including through income from CBAM. Therefore, the problem of additional costs associated with the administration of this mechanism and the elimination of negative secondary effects of its spread to other countries requires a more in-depth comprehensive study.

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运输安全问题  
SAFETY ISSUES IN SHIPPING

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注解。 这篇文章探讨了航运中的安全问题。 提出了确保有记录的循环中水运安全的措施。 该文章的内容参考了律师教科书以及以船舶航行安全方面的国际关系为前提的规范。

关键词: 安全、 航运、 紧急情况、 条令、 航海规则。

**Annotation.** *The article examines safety problems in shipping. Measures are proposed to ensure safety in water transport in its documented circulation. The content of the article refers to textbooks for lawyers, as well as to norms that presuppose an international level of relations in the safety of the movement of ships.*

**Keywords:** *safety, shipping, emergency cases, doctrine, Navigation Code.*

The main safety issues in water transport are those issues that should not refute the traditional doctrine of the Navigation Code, but identify rules characterized by actions to identify emergency cases.

At the same time, non-compliance with safety rules on the part of the company's shipowners, as well as the captain and sea crew in water transport, leads to the necessary measures to take into account the general problems of states in introducing sustainable legal practices.

On the basis of norms and rules and bills taken into account in the Russian Federation, as well as other countries of the world, relations in merchant shipping are regulated, fixing a set of rules for the international safety of ships in the seas and oceans.

Taking into account modern opportunities and trends in shipping in trade relations, it must be borne in mind that the provisions of the Navigation Code Legis-

lation on the safety of navigation are implemented on the basis of circumstances and emergency cases that occurred in conditions of limited movement of ships.

The main conditions for the implementation of the assigned tasks at the legal level are considered to be provisions aimed at mathematical modeling of accidents that affect the statistics of these accidents and compensation for losses in those circumstances where their collection forms an economic balance in the sphere of influence and legality of the use of justice in the necessary work performed, discussed at the level of contractual relations.

One of the signs of trade relations in shipping is the need to identify at what level interactions are agreed upon that influence the criteria for economic agreement between the parties.

The guarantors of trade interactions between persons are, first of all, international conventions on safety in water transport, which regulate other relations formed by the basic concepts for creating the principles of safety in water transport. Some maritime safety bills adhere to the International Regulations for the Protection of the Movement of Ships.

Basically, textbooks and monographs, as well as articles by lawyers, take into account the laws of maritime practice, which regulate and form the legislative framework not only in the legal and business sphere of relations, but also in the economic indicator of strategic mutual influence in solving created security problems.

General problems in jurisprudence are distributed taking into account data on economic trade, which are characterized by safety standards in the movement of vessels in water transport, taking into account the identification of other emergency obstacles aimed at forming the basic requirements for the creation of regulatory legislative acts characterizing legal as well as economic relations.

It is also necessary to take into account the fact that the attempts made in terms of creating international safety in navigation are based on general rules for specific accidents, which are discussed on the basis of good maritime practice.

The main measures taken to resolve maritime security were taken into account over many years of practice. When disseminating transport safety standards in a maritime case, several facts are taken into account that determine not only the parties to the contractual relationship, but also the type of accident, since the actions of judicial practice form the final results of damages compensation.

Forensic analysis analyzes the facts of accidents in accordance with commercial safety standards. In court, the signs and types of accidents and compensation for damages are discussed in order to take into account what rules and regulations of the Russian Federation, as well as international countries, were not observed before departure from the shore and during the movement of the vessel.

In order to understand how judicial decisions are adopted and then modified in Russian legislation, it is necessary first of all to determine the essence of discre-

tionary measures to identify signs of emergency cases that characterize non-compliance with safety standards and regulations in water transport.

The reporting of many years of navigation in a commercial craft case reveals non-compliance with standards and deviations from maritime practice of safety rules in water transport, regardless of the type of accidents and compensation for losses.

Organized measures to prevent accidents in the case of maritime law are considered unsafe if the sea crew takes into account all the technical mutually influencing facts in the case of maritime transport, which presuppose the continuity of mastering lectures on safety precautions.

Today's modern measures to provide a vessel suitable for use by the sea crew guarantee not only the maneuvering of the vessel in its good condition for technical operation and service to citizens, but also the circumstances of the economic and legal relationship in maritime affairs, in which until recently the degree of competition in trade terms was extremely high and was determined by the legal content of norms and canons that ensure the functional ability of the vessel to perform tasks aimed at the global suitability of customer service.

So, measures to ensure safety on ships depend on the professional training of the marine crew for the activities and technical management of the ship. The current measures undertaken regarding the technical safety of the vessel are accompanied by its final results, which reveal the maintenance of the vessel in its technical condition and the ability of the sea crew to respond to situations involving dangerous actions in shipping.

For example, the publication "International Regulations for Preventing Collisions at Sea, 1972" [MORKNIGA 2013] interprets safety rules for ship collisions, but these regulations apply to both general accidents and private types of manifestation and compensation for damages.

It should be noted that the initiative taken to create common rules of practice in the Russian Federation, as well as in other countries of the world in relation to international security, is the joint path taken in the movement of vessels in water transport.

Since persons involved in common relations form a special culture and view of interfering economic relations, the interactions that characterize such relations are taken into account within the framework of international rules for regulating safety in water transport. Typically, such international rules, written in English in parallel with translations into Russian, are determined by the need to study new experience regarding the content of the texts of laws on maritime safety in connection with general rules taking into account accidents in water transport.

The application of rules and regulations for international safety modeling is carried out in accordance with practiced standards for identifying problems of

accidents and disasters, the resulting actions of which are recorded based on the performance of seaworthiness: what warning signals and signs contributed to the positive results of good practice and how other accidents led to overcoming obstacles in solving emergency problems.

Typically, international standards for ensuring security in its global manifestation are prescribed in International documents and in textbooks for lawyers. This attitude of affairs does not prevent the solution of problems in the international manifestation of the implementation of maneuverability in the law of the sea. International practice in designating safety signs has shown that signals in maritime practice operate regardless of the characteristics that cause signs of a general or particular accident.

So, even if a safety violation in all its manifestations is commented on in court, then the determination of the type of emergency is subject to analysis and study of signs indicating the clarification of problems in the Commercial Navigation Code.

First of all, in order to solve the relevance of problems related to accidents, it is necessary to take into account the main signs of non-compliance with the rules in water transport, as well as what characteristics were taken into account in court when identifying types of accidents in order to determine how general and private accidents are justified even when collection of payments in the form of compensable damage in the event of a collision between ships. It must be borne in mind that the legislator may not always take into account the rules that determine a fair result for compensation of losses, since at the legislative level of maritime law the legal content is sometimes distorted by changes and amendments to the law.

In order to make reliable decisions in court, you first need to justify the practices at the legislative level of relations, and in conclusion, establish what theoretical errors in practice led to conflict situations.

Lawyer Grechukha states that changes to some articles in the Russian Federation do not always coincide with the provisions regulated by other authorities. Grechukha's justifications regarding the lack of synchronicity in the enforcement of the merchant shipping law by other legislative bodies are taken into account in accordance with the applications of decisions in the court case on the collection of goods and damages.

At the same time, Grechukha comments on certain paragraphs of the articles of the Code of Inland Water Transport, which do not contradict judicial practice in terms of the Russian application of legislation, but are applied in accordance with the rules aimed at making decisions in favor of the plaintiff, which increases the possibility of identifying cases that generate the legal applicability of the law in its economic context. cooperation with the authorities serving this kind of relationship, which organizes the marketing basis in a trade craft that dates back centuries.

“The Newest Dictionary of Foreign Words and Expressions” comments on the concept of the word “marketing” in its international meaning. So, “marketing

*in English means market and presupposes a modern system for managing the production and household activities of enterprises, the main goal of which is to increase sales; includes the study and forecasting of demand, prices, organizing the release of new types of products, advertising, coordination of intra-company planning and financing” [The latest dictionary of foreign words and expressions 2002; 502].*

From the above definition to the concept of “marketing”, attention should be paid to the formative signs of forecasting in planning not only marketing relations, but also in terms of the rationale for regulating such relations. Using the example of Asian countries represented by Japan and China, where trade resources are determined by strategic forecasting in the financial sector, facts of economic content, regulated by legal means for making decisions on the safety of cargo transportation, are taken into account.

In Japan, for example, such economic development security measures have been strictly adhered to within the framework of the law and the general actions and norms taken to study the original and original origins of the Chinese people’s business culture.

If we take into account Russian legislation in terms of implementing security measures, then it is necessary to identify the fact that determines these norms, which fix a certain set of signs and signals. An attempt to comment on the set of signs and signals in the application of international maritime safety depends largely on the codification of legal signs. In Chinese culture, linguistic signs capture the model of Asian thinking on trade security.

Through the signs of merchant shipping, you can understand what the danger is in shipping.

For example, in the case of the sinking of the Canadian ship “Empress of Ireland” which collided with the Norwegian steamer “Storstad”, it was found that weather conditions in the form of settling fog led to other errors in navigation that were in contrast to the standards of safe maneuvering practice. a ship that is sailing towards another ship. It was revealed in court that the advancing fog had obstructed the visibility of the position of the two vessels, which were moving towards each other.

Later, when questioning the surviving witnesses, the following details were revealed, emphasized by the author-compiler M. Muromov: *“At the trial, before both captains gave their testimony, 59 witnesses were interrogated. Their testimony took up 612 pages of the transcript. During the investigation of the disaster, neither party could confirm their actions with entries in the logbooks, since these entries were not kept and were not made later. Neither side could prove that its ship made a turn in one direction or another and sounded so many beeps at the same time. And only after several meetings of the judicial commission, in the pro-*

cess of heated debates and mutual accusations, the following became clear. After the fog fell, Toftenes ordered Storstad's third co-driver, Jacob Sachs, to turn the steering wheel slightly to the left and signaled the car to stop. The Norwegian explained his actions by saying that he was trying to get away from the oncoming ship, which, as it seemed to him, would diverge on the port side. Then, fearing that Storstad would lose control and the current would turn him around, Toftenes gave "small forward", since the ship did not obey the rudder. (Moreover, he and the third navigator swore before the court that the ship did not obey the steering wheel.) As a result, Saxe admitted that he took the steering wheel from the helmsman and put the rudder on the left side. However, the third navigator categorically denied that this was what led to the collision. He added that only after this did Captain Anderson appear on the bridge and see the side of the Empress of Ireland brightly lit by portholes in front of the ship's bow. Anderson accused Kendall of stopping the liner in front of his steamer's bow and changing course to the south towards the shore, while there was more room to diverge from the north. The chairman of the court, Lord Mersey, announced that the chief mate of the Storstad, Toftenes, was guilty of not calling the captain to the bridge when visibility deteriorated and of changing the ship's course in the fog without any reason. Senior mate Storstad Toftenes was found guilty. He was deprived of ship ownership rights for two years. As for Storstad itself, the Canadians simply confiscated it. But a few months later, the owners of the ship, the A/S Maritim company, bought it for 175 thousand Canadian dollars and reappointed Anderson and Toftenes to their previous positions. Immediately after the disaster, literally the next day, searchers for sunken treasures flocked to the lost liner from all over America and Europe. They found it lying at a depth of 19 fathoms (40.5 meters) 4 miles from the village of Saint-Luce, 5 miles east of Cape Vater. However, attempts to extract silver bars and valuables belonging to passengers from the hull of the sunken liner led nowhere" [Muromov 2011; 174-175].

Lawyer Grechukha, in his textbook, in Chapter 8 "Legal Regulation of Navigation Safety," comments on the Federal Law of the Russian Federation. The author of the textbook emphasizes the legal fact of trade security at the legal level of relations. To paragraph 10 of Art. 1 of the Federal Law of the Russian Federation of February 9, 2007 No. 16-FZ Grechukha indicates the basic safety rules, among which the most fundamental and significant ones can be identified, the definition of which includes the tasks of ensuring in the field of transport security. One of the main ones, in our opinion, are those tasks that carry out model application to ensure safety in water transport. The main objectives, according to Grechukha, are: "1) legal regulation in the field of ensuring transport security; 2) assessment of the vulnerability of transport infrastructure and vehicles; 3) development and implementation of requirements to ensure transport security; 4) development and

*implementation of measures to ensure transport security; 5) training of specialists in the field of transport security” [Grechukha 2020; 86-87].*

V.N. Grechukha calls it legitimate to implement the information security of persons entering into such relationships, therefore the lawyer is not limited to the requirements for the security of the movement of goods, but considers it a necessary measure to regulate security *“in the creation of a unified state information system for ensuring transport security. It includes automated databases of personal data about passengers” [Grechukha 2020; 87].*

V.N. Grechukha comments on the norms related to the Code of Inland Water Transport, referring to Chapter 6 “Safety of Navigation”, *“which sets out the basic provisions on safety in inland water transport, including norms on the ship safety management system, port state control, supervision and control for ensuring economic security, pilotage of ships and some others” [Grechukha 2020; 87].*

Safety in inland water transport *“has been approved by the Federal executive body in the field of transport” [Grechukha 2020; 88].*

V.N. Grechukha comments on Article 34 of the Code of Inland Water Transport, which spells out the responsibilities assigned to the administration of swimming pools. The basic rules in the inland water basin, according to Grechukha, are the following: 1) certified training of the marine crew; 2) technical support for safety in water transport; 3) availability of a license that stipulates the training of the marine crew for professional activities in non-standard conditions to overcome obstacles in navigation; 4) regulation of communication and safe maneuvering actions with technical support for communication with dispatchers.

V.N. Grechukha directs his attention to the formation of *“dispatcher regulation of vessel traffic and control of vessel traffic in sections of inland waterways that have restrictions on navigation conditions and monitoring of vessel movement in the main sections of inland waterways” [Grechukha 2020; 88].*

V.N. Grechukha also considers the issue of maneuvering navigation on inland water transport under the flag of the Russian Federation, as well as under the flag of a foreign state, pointing to clause 8, Article 34 of the Code of Inland Water Transport.

In paragraph 8.2 of Chapter 8 “Legal regulation of the navigation safety management system,” legal scholar V.N. Grechukha. notes that the role of ensuring safety on ships sailing in inland water transport rests primarily with the shipowner. Measures that provide the necessary verification of documentation in terms of developing safe navigation support are applied in accordance with Article 34.1 of the Code of Inland Water Transport.

Despite the documented measures that partly provide a guarantee of maintaining the buoyancy of ships in water transport, it is necessary to take into account the fact that the regulations provided for maintaining the safety of the movement of ships do not always save from unforeseen incidents in inland water transport.



In a different order, circumstances requiring the execution of acts in a documented manner for the shipowner are determined by measures that make it possible to organize safe labor productivity in the maritime team, as well as to increase the long-term and safe buoyancy of ships in water transport. A modern technical check can prevent the shipowner from making mistakes in the operation of ships to ensure the safety of transportation of goods and passengers.

Lawyer V.N. Grechukha lists the main ways to document safety in shipping. We include among them measures that are fundamentally regulated by basic concepts in their legal manifestation. So, the provision of acts responsible for the buoyancy and safety of ships in the Russian Federation zone is identified by the specifics of determining the safety of the movement of ships, as well as the regulatory requirements prescribed in Art. 34.1 Code of Inland Water Transport of the Russian Federation.

The main regulatory requirements include the obligations of the parties (represented by the shipowner, captain, pilot, as well as crew members, represented by those responsible for the safety of ships, who are not service personnel) to follow instructions for ensuring the technical operation of ships in the “prevention of environmental pollution” [ *Grechukha 2020; 89*].

Other factors that mutually influence each other should also be taken into account. The designation of measures to maintain safety in inland water transport in the Russian Federation maintains the stability of document flow in the matter of maneuvering vessels. Subsequent identification of reckless errors in the operation of vessels can introduce more sustainable relations in terms of the safety of vessels when maneuvering in movement on water transport.

We consider it necessary to list other measures. Their maintenance will ensure the documented safety of relations, and will also relieve the shipowner and sea crew from additional measures to maintain the stability of ships and the safety of their movement on water transport.

So, in accordance with the standards for the operation of ships, measures that ensure the safety of the movement of ships are contained in their “documented” order in accordance with the standards emphasized by V.N. Buckwheat. In accordance with them, V.N. Grechukha, the author of the textbook “Inland Water Transport Law,” gives as an example the following rules in relation to safety standards: “1) documents establishing the powers and relationships of the shipowner’s employees who manage the operation of ships, in terms of ensuring the safe operation of ships and preventing environmental pollution ; 2) methods of communication between the shipowner’s employees and the ship’s crew; 3) the procedure for transmitting by the ship’s crew reports of accidents, facts of non-compliance with legal requirements and (or) requirements established by the shipowner; 4) the procedure for the actions of ship crew members and other shipowner employees in

*the event of emergency situations; 5) timely transmission of messages to the ship-owner about deficiencies in the safety management system; 6) the procedure for planning a vessel's voyage and ensuring the safety of its navigation; 7) measures to ensure the reliability of mechanisms, devices, equipment that are not constantly used; 8) the procedure for checking the effectiveness of the security system and, if necessary, revising it" [Grechukha 2020; 90-91].*

According to the formed and listed acts ensuring the safety of ships, the ship-owner is responsible for appointing workers who must ensure the operation and maneuverability of ships in accordance with the recommendations for managing seaworthiness in water transport. Such recommendations, according to V.N. Buckwheat are considered essential in shipping safety planning.

Egiazarov V.A. also considers the characteristics that contribute to safety and "improved quality" [Egiazarov 2018; 172] when moving vessels within the framework of the law.

When operating ships, the rules that determine "the safety of the product to be harmless to the life and health of consumers, as well as to the environment during its use and disposal are taken into account. Safety criteria are established in legislation" [Knyazkin, Yurlov 2020; 21].

Safety in shipping not only responds to the issues of preserving the lives of the parties to the relationship, but also to the basic requirements for compensation for losses.

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航运中的私人事故类型  
**TYPE OF PRIVATE ACCIDENTS IN SHIPPING**

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注解。 该文章探讨了私人事故的迹象以及在什么条件下对参与合同关系的人员进行损害赔偿。

关键词：私人事故、损失、法律关系、新闻事件、司法问题、纠纷。

**Annotation.** *The article examines the signs of a private accident and under what conditions damages are compensated to persons participating in contractual relations.*

**Keywords:** *private accidents, losses, legal relations, news events, judicial issues, disputes.*

Particular accidents are characterized by the definition of their consequences, actions that are not included in the category of general accidents.

The definition of private accidents is ambiguous and is regulated by legal relations in court in accordance with the application of rules for deciding and taking measures in the case of damages.

Unfortunately, judging by the description and commentary on the articles prescribed in the Merchant Shipping Code of the Russian Federation, resolving judicial issues in private accident cases takes up a small part in their application at the legislative level of relations. Articles on general averages are given more time in terms of enforcement relations. On a legal basis, both general and private accidents are discussed and applied in accordance with the rules regulated by this law.

The dual classification of a particular accident (since some emergency actions coincide with general accidents) is considered in accordance with the solution of problems that are taken into account by issues of establishing the type of accidents and the measures that were taken to streamline relations in rescue cases.

If in the listed paragraphs of the articles of the Merchant Shipping Code the classification of general average was used in a fairly broad and justified manner, then the legislator does not devote time and space to private accidents to explain and comment on maritime legislation. Perhaps such an act is associated with circumstances that arise from a general accident, since the general and the particular entail actions that are linked to each other.

The fact of accidents indicates general or private cases of cargo compensation, but such enterprises must contribute to the correct determination of the type of accidents and the solution of problems in accordance with the filing of claims in court for consideration of cases for compensation of losses.

All accidents that are not included in the accounting of general emergency cases are considered private. The issue of private accidents is still controversial and attracts attention in the field of jurisprudence, where it seemed that with the definition of types of accidents everything should be transparent and not contradict other rules of application of the legislation of the Russian Federation.

In particular, as judicial practice has shown, decisions that were agreed upon in accordance with standards excluding general average remained stable. And yet it is not a fact that such decisions were considered in order of the stability of contractual relations to determine the types of accidents.

The fundamentally insufficiently studied issue of private accidents due to the almost identical specificity in determining the types of accidents in the Merchant Shipping Code of the Russian Federation is characterized by ambiguity in the explanation and decision-making that facilitates a timely response to ensure measures in the case of compensation for losses.

So, the definition of “private accidents” in its legal classification is determined taking into account the requirements prescribed in the Merchant Shipping Code of the Russian Federation, as well as comments from lawyers. The definition of private accidents is interpreted by the need to objectify the dissemination of the definition in its practical meaning and application in the form that constitutes the need of a citizen, legal entity, as well as the captain to compensate for the lost loss.

Attempts to limit the definition of private accidents in the field of enforcement of legal legislation are considered unlawful and spasmodic.

Insufficient information on the principle of a private accident in the legislative sources is limited to a discussion of the rules established on the territory of the Russian Federation. As legal practice has shown, it is necessary to correlate all the initial data to the interpreted norms accompanying the concept of accidents in order to determine a mass accident involving the public, called for one reason or another a general one, and a private accident, which, like the first, involves a detailed consideration of its characteristics in the analyzed causes of accidents and the application of standards involved in the case of collecting losses. Losses

in the event of a private accident do not apply to the masses of the parties if the investigation does not reveal general accident actions. To determine what type of damage to transported cargo belongs to, it is necessary to identify statistical and social patterns studied in its legal phenomenon. Lawyer V.F. Sidorchenko notes: *“The causes of maritime disasters and their consequences are usually considered in three aspects: technical, social and legal. The essence of the technical analysis of shipwrecks is to carefully identify all the details of the incident, deficiencies in the design of the vessel, its systems, mechanisms and equipment, omissions in the process of technical operation, violations of navigation rules, and good maritime practice. The purpose of such an analysis is to develop recommendations for technical improvement of the vessel design and for the development of navigation safety rules. The social manifestation of maritime disasters is a consequence of the loss of ships and cargo. The legal act of investigating maritime disasters can be conditionally reduced to answering three questions: what rules were violated, who violated them and under what conditions, who will compensate for losses”* [Sidorchenko 2006 ; 411-412].

Often in its social phenomenon, the permitted publicity when identifying general or private accidents is based on the facts of accounting in emergency cases. In cases of widespread detection of accidents, legal discretion is exercised in its general volume and economic turnover, but cases of private accidents sometimes acquire the criminal nature of an incident, the consequences of which are not limited to just one accusation against a private individual. Therefore, in the case of private research on compensation for accidental losses, the maritime law and the act identifying judicial obstacles in resolving disputes in court must be justified in accordance with the incoming modern challenges to detect accidental problems. The advantage of private turnover in a civil and social direction is determined by actions taken within the framework cultivated by maritime legislation, therefore legal norms do not exclude the fact of litigation in the application of a call for damages at the private level of trade relations.

Signs of a private accident and compensation for baggage losses are examined based on the general provisions on accidents. It is the conditions in the articles on private accidents that are fixed by the legislator in accordance with the norms prescribed in the law on maritime affairs.

The dictionary of “Marine Terms” defines the following definition for accidents, which corresponds to the article of the Merchant Shipping Code of the Russian Federation: *“Private average is a term of maritime law that means losses caused by a maritime accident, which are not subject to distribution among the owners of the vessel, freight and cargo, as in a general average, - their bears only the victim. A private accident includes damage caused to a ship without cargo, and if it is present, accidental damage, when the cause occurs instantly and is*

*completely unforeseen and unpreventable, for example, a meteorite falling on the ship. Private accidents can be caused by force majeure, and also be a consequence of improper actions of the crew of the victim or another vessel, leading to grounding, collision, or damage to berth structures. Private accidents include the cost of damage caused to parts of the ship and cargo damaged by fire, as well as spontaneously combustible cargo thrown overboard or cargo transported not in accordance with the rules accepted in merchant shipping. Losses may also be caused by an unjustified increase in the duration of the voyage, downtime due to the crew of the ship performing repair and restoration work after a storm, boosting the engines, machinery and boilers of the ship afloat in the event of any danger” [ KORABEL . RU ].*

Wikipedia pays attention not only to the signs confirming the difference between general and private accidents, but also to the parties to the relationships involved in the emergency case. In the “General and private accident” section, Wikipedia refers to the scientific works of V.V. Tulinov, V.S. Gorin. and Efimova S.L., emphasizing the following idea: *“A private accident is understood as unintentional damage caused to a ship or cargo. The legal consequences of a general and private accident are different. Losses constituting a private accident are attributed to the one who incurred them (shipowner, carrier or cargo owner), or to the one who is responsible for causing them” [Wikipedia].*

Article 2 97 Merchant Shipping Code considers in which emergency cases there may be disputes of a private nature [Merchant Shipping Code of the Russian Federation [https // www . consultant \\_ ru . document \]](https://www.consultant.ru). Basically, this is a fire of the ship, which occurred due to the fault of the sea crew. Failure to comply with the rules and regulations for the operation of the safety of the vessel on the part of the captain, as well as crew members, becomes a target for achieving the goal in terms of private accidents, which can quickly turn into a large-scale disaster.

The types of private accidents include a category that characterizes the following sign of accidents: *“the cost of spontaneously combustible cargo thrown overboard and cargo transported on the ship not in accordance with the rules and customs of merchant shipping” [article of the Merchant Shipping Code of the Russian Federation law].*

The above-mentioned category of private accident does not correspond to the only case in the case of clarification of the proceedings in court. From the above paragraph of the article, indicating the category of particular, you need to start from the *“cost of the discarded cargo.”* The second rule, which must be considered in court, assumes what factor caused the “spontaneous combustion” and what led to the loss of the cargo. Usually, if an object spontaneously combusts, then you need to find the cause that led to the consequences of this fire. The cause of spontaneous combustion is variable and, as a rule, is transferred to the fire object

through instruments and flammable devices, which, in contact with coal or fuel, react to a process that causes pressure on the flammable object.

Particular accidents include damage to or, conversely, movement of the engine at the speed limit in situations where weather conditions or ice hazards do not allow a response under the influence of rules that are contrary to maritime safety. So, legal enforcement regarding compensation for losses in private circulation or in general is again considered a controversial issue in the paragraph of the article, which specifies “operation of engines and their boosting”: “*losses caused by forcing or other operation of engines, other machines or boilers of a ship, which was afloat*” [Article 297 Merchant Shipping Code of the Russian Federation [https // www . consultant \\_ ru . document](https://www.consultant.ru/document/) ] . The type of engine operation involves consideration of the formation of work with the engine and its operation during the sailing process, during sailing or after. This vision of affairs provides for phenomena that characterize not only the act of accidents and compensation for losses, but also a legitimate assessment of ongoing events that provide for the generality or particularity of compensation for losses. As a rule, the lever is a means of maneuvering the steering wheel on water transport. A lever, according to the dictionary of antonyms and synonyms, is “*a driving force, an engine, a spring*” [ *Shilnova 2017; c .530*]. To maneuver the lever, imperative commands of sea navigation are assumed: enter back, enter forward, left and right. Therefore, in legal proceedings, it is necessary to consider what circumstances led to engine speeds or maneuvering operations that did not comply with the standards that preserve the ship’s suitability for service. Such a manifestation of cases in maritime practice will save the ship, eyewitnesses of the relationship, and including the insurance company from the rash classification of accidents and the problems of mass persuasion of a nature that implies private coverage of expenses by insurers.

In 2013, on May 8, information appeared in the media that the vessel “Jolly Nero” engines stopped working and the ship got into an emergency in the port of Genoa [ [www 1. Tv . Ru](http://www.1tv.ru) ] .

The formation and forcing of engines, which involve an increase in the buoyancy of the ship in its rapid movement, can lead to consequences that reveal not a breakdown of the engines themselves, but a catastrophic phenomenon that could have been prevented, for example, in the Titanic case. In pursuit of the title of best ship, the Titanic let its guard down as it sailed across the Atlantic Ocean. Forcing events on the part of the captain of the ship, indicating to his subordinates the imperativeness of actions and the command “full speed ahead,” contributed to an increase in the power of the ship through the speed of the engines. Several factors played a cruel joke on the Titanic: there were not enough lifeboats for passengers and crew, and the white fireworks suggested a festive fireworks display, and not the disaster in which the liner found itself. The captain should

have thought about safety rules, but he didn't. Surely there were individuals on board with binoculars. The dispatchers received and sent telegrams and did not hear from other ship dispatchers that behind the cold and settling fog that hung over the Atlantic Ocean, ice thickness in the form of an iceberg could chop off part of the ship's hull. Well-known historical facts have proven that in the case of accidents, insurance safety played, firstly, into the hands of the White Star Line company, even if it lost influential majors who were on the list of victims, and secondly, the Lloyd insurance company compensated the shipping company all losses to the company. The accidental lapses of the captain of the Titanic, as well as the crew, were triumphantly broken when the White Star Line companies were compensated for the losses. As is known, the insurance company Lloyd also compensated itself for part of the losses from the cargo of the injured persons. The fact remains obvious that the Lloyd company almost always remained the winner in the business of maritime transportation, which was lost in the depths of the ocean or sea. White Star Line companies were compensated for losses. But at what cost? Could erroneous facts save the shipowner's reputation? The final process of discussing the general disaster became a private trial in the case of compensation for damages to the shipowner of the Titanic. The shipowner had to observe the high-quality implementation of maritime safety instructions and, before sailing to the ocean, identify deficiencies in the ship's hull, as well as check the availability of boats and binoculars. Individuals became hostages of the liner disaster, unaware that the mistakes of the Titanic's sea crew and shipowner acquired the status of a large-scale disaster. By possible measures that do not interfere with the reasonable planning of the strategy in terms of trading relations with many foreign investors, the White Star Line company has hedged its bets in terms of compensation for losses in its "private" manifestation, crossing the waters of the Atlantic ice ocean. In judicial practice, there are cases of encumbrance of taxes on the payment of an insurance company by a company that owns ships.

As Article 297 of the Merchant Shipping Code of the Russian Federation indicates, "*grounding of a vessel*" refers to a private accident. In the existing article 297 of the Merchant Shipping Code of the Russian Federation, the conditions that separate accidents are indicative: "*particular ones include the grounding of a vessel, and the general one includes the refloating of a vessel*" [Article 297 of the Merchant Shipping Code of the Russian Federation].

Lawyer V.N. Grechukha notes: "*if losses are caused by a vessel's delay during a voyage, its downtime, price changes, or other indirect losses, they are not recognized as a general average*" [Grechukha 2020; 202].

Accident characteristics for damages must be considered in light of who the accidents are aimed at and how such accidents are considered to be characteristics of private accidents. Not every sign of emergency is considered an accident and



not every engine boost is a case for trial, indicated in the claim procedure. For this reason, the essence of accidents is sometimes equated to proceedings where organizational actions in navigation become conditions for creating emergency situations. Sometimes even the signs and types of accidents cannot be considered justified if the actions occurred in general or privately. Sometimes a grounding becomes necessary. And such a characteristic cannot be called general if the accident took place in private, and vice versa. Cases of grounding do occur and can be an obstacle to achieving the goal if, in fact, water has penetrated the ship and the shore is still very far away.

Using the example of the “Black Sea fishing seiner No. 192 May 21, 1982.” V.F. Sidorchenko describes the non-compliance of the maritime crew with the rules of maritime practice.

Seiner, according to the evidence presented by lawyer V.F. Sidorchenko, according to the facts, “*made the transition from the port of Batumi to the port of Ilyichevsk, following along the coast of Crimea*” [ Sidorchenko 2006; p.108] . The captain of the ship did not have information about the depth of the seabed in relation to the shore, which led to rash actions and did not warn him against navigational errors. V.F. Sidorchenko comments that even if some of the signs indicating good practice in the field of navigation took a different turn in this accident, they should still be taken properly in judicial practice. All emergency cases are examined closely in terms of observing cases of a statistical nature and what facts led to accidents in private or general proceedings in court. The fact is that during legal proceedings, the assigned type of accident may distort the principle of compensation for damages. Even if you seriously raise such an issue as a legal fact in judicial decision-making, then you need to start from the conditions that led to the accidental destruction of an object or to actions that are expressed in articles classifying the type of private accident and the consequences of compensation for damages. The complexity of any legal process lies in its type of phenomenon and the changing roles of “defendant-plaintiff” in the manifestation of legislation in a dispute over judicial relations. Lawyer Sidorchenko and other lawyers comment that even if the signs of good maritime practice are not always discussed by the rules specified in the MLC, they are nevertheless used by “*judicial and arbitration bodies when investigating the causes of maritime accidents and disasters*” [ Sidorchenko 2006;109].

In connection with the “Resolution of the Plenum of the Supreme Arbitration Court” in a transport law case, lawyer V.A. Egiazarov . emphasizes that *detail and specificity* are important in judicial decision-making. Egiazarov emphasizes : “*It should be noted that the practice of arbitration courts and transport legislation, being inextricably linked, have a constant impact on each other*” [ Egiazarov 2018; thirty].

Some legal norms of maritime navigation, which represent at the legislative level the management and use of sign signals in the matter of solving problems in its technical manifestation, are burdened and apply to the work of maneuvering and operating the vessel by the marine crew in the same order and understanding of the variety of accidents.

The procedure and presentation of acts on the part of the shipowner of the company can partially eliminate legal disputes in the case of the work of the sea crew. Therefore, the trial in the case of restoring the reporting of accidents on the part of the sea crew is burdened with accounting data and indicators that require the provision of facts from the reporting log.

The above example in the case of a fishing seiner, in which the captain did not indicate the impending obstacles in advance, since he “*did not reduce the speed of the vessel*” with the help of the engine , led to the fact that “*the vessel ran aground*” [ Sidorchenko 2006; p.109].

Sidorchenko notes that the refloating was carried out by a tugboat. Judicial practice has shown that “*grounding was qualified as an emergency with all losses attributed to the shipowner*” [ Sidorchenko 2006; 109].

of Lex apply to the settlement of disputes in private litigation Fori. S.I. Knyazkin and I.A. Yurlov defines the international principle Lex Fori, emphasizing the extension of local justice to the problems of studying disputes that extend to individuals.

So, the definition of the international principle Lex Fiori , according to the reference dictionary of Yurlov and Knyazkin, contains the following statement, scientifically substantiated by the authors: “*The international principle of Lex Fori is an international rule, meaning the need for a court to apply the procedural law of its own country, while it is permissible to apply the procedural law of foreign states in the case of certain procedural actions only under the circumstances specified in the legal acts of the relevant state*” [Knyazkin, Yurlov 2020 ; 187].

According to the specified practice circumstances, in the spread of litigation for compensation of losses, private proceedings may, due to circumstances, acquire international publicity. As judicial practice has shown, proceedings on issues of compensation for losses involve notification of announcements in the form of news facts about incidents and emergencies. Also, not all cases involving small detailed work were informed at the international level of relations.

Indicating facts in the media on emergency cases (using the example of the vessel “ Jolly” Nero ”) show a practicing lawyer how to work with the consequences of disasters, what decisions are considered justified in favor of the person who suffered in an accident case. Of course, the issue of emergency circumstances is not limited to information from the media, and some informed data that gives international publicity may reveal certain facts that would be missed in court under

controversial circumstances. Such judicial circumstances are exhausted if there are reliable facts confirming the actions taken on a legal basis.

The nature of justice can be interpreted in the manner of questioning in judicial proceedings: whose ship, under what flag is registered and where the consequences of accidents in water transport have taken on the nature of judicial disputes in the study of cases to clarify the circumstances with the shipowner and crew.

Sometimes such legal proceedings are delayed due to technical investigations to identify deficiencies in the vessel for operational work. The shipowner can pay attention to the shortcomings of technical operation and take risks in the matter of compensation for losses. There are cases of intentional sinking of a ship by the sea crew in order not to miss the payment of funds from insurers. As is known, scrapping a ship does not cover the shipowner's expenses.

Errors in the operation of a vessel can lead to losses involving monetary losses for the ship owner. Therefore, if necessary, the captain protects the pilot, and the shipowner protects the captain and pilot. Such violations in maritime practice are conditional, but not always justified in a case in which the shipowner may miss the opportunity to lose funds to continue its activities in the trade circulation of the movement of its goods by water transport. Most often, the defendant is the captain of the ship, and the shipowner is the plaintiff. Therefore, such a fact may acquire a criminal character, which is interpreted as the need for the shipowner to take significant measures to eliminate negligence in the management of the sea crew by the captain.

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父母与子女抚养义务的若干问题  
**SOME PROBLEMS OF CHILD SUPPORT OBLIGATIONS OF  
PARENTS AND CHILDREN**

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注解。本研究课题的相关性在于，在当今的俄罗斯联邦，父母和子女的赡养义务纠纷在司法和法律实践中占有很大份额。每年，特别大规模拖欠赡养费的执行程序数量都在增加。因此，赡养费支付人向执行官隐瞒其收入和财产，或少报所收到的收入，或以第三方的名义获取和登记财产。

关键词：赡养义务、父母、子女、需要、物质支持、收入、额外费用、法院、未成年子女的利益、法院命令、执行令。

**Annotation.** *The relevance of the research topic lies in the fact that today in the Russian Federation, disputes over alimony obligations of parents and children occupy a significant share in judicial and legal practice. Every year the number of enforcement proceedings in which there is arrears of non-payment of alimony on a particularly large scale increases. It follows that the alimony payer hides his income and property from the bailiff, or understates the income received, or acquires and registers property in the name of third parties.*

**Keywords:** *alimony obligations, parents, children, need, material support, income, additional expenses, court, interests of minor children, court order, writ of execution.*

The obligation to provide financial support for the child applies equally to both the father and mother of the child, regardless of whether they are married or not. In this case, only the fact of consanguinity in the manner prescribed by law or the establishment of adoption is important.

It should be noted that if paternity of a child born in an unregistered marriage of parents is recognized administratively, alimony is collected in the same manner as for children born from married parents. If a claim for alimony is filed simulta-

neously with a claim to establish paternity, then it is necessary to take into account the fact that when a claim for paternity is satisfied, alimony is awarded from the date the claim is filed.

In modern life realities, persons connected by alimony legal relations and who are often blood relatives of each other neglect their responsibility to financially support persons who need their help.

In this regard, the number of malicious alimony defaulters is increasing every year. This phenomenon, in our opinion, negatively affects not only the social component of our state, but also the stability of the Russian economy as a whole.

Legally established penalties are an effective tool in the fight against offenders. Russian legislation contains provisions on liability for failure to fulfill or improper fulfillment of alimony obligations in various branches of law through regulations. Fulfillment of obligations, as a rule, is a writ proceeding, and in some cases alimony is collected through a claim proceeding.

It seems that in family law there are no provisions on the institution of compensation for moral damage for failure to comply with the deadlines for the provision of alimony. Therefore, some authors propose to amend Art. 115 of the Family Code of the Russian Federation [1], which would establish compensation for moral damage as one of the measures of family legal responsibility.

So, M.A. Danilyan believes that failure to pay alimony may result in the inability to satisfy a person's primary needs, which may subsequently lead to illness, hunger, moral suffering, because alimony in some cases is the only source of livelihood [2, p. 15].

In turn, E.A. Usacheva is convinced that excessive guarantees from the recipient of alimony may lead to excessive powers at a weak subject [3].

Alimony obligations of parents and children occupy a central position among other types of legal relations and are obligations of the first priority. The presence of other relatives does not affect the provision of child support by parents and vice versa [4, P. 80].

Alimony obligations mean that parents must provide for the child's needs for clothing, food, education, treatment, rest, etc. Ideally, disputes about the fulfillment of the obligation to support a child in the family do not arise and this issue is resolved by agreement between the parents on a voluntary basis. If the parents have not entered into an agreement on the payment of alimony and cannot voluntarily decide to support the child, then the issue of financial support for the minor is considered in court.

Undoubtedly, the advantage of concluding an agreement on the payment of alimony is that the parents, even if they end the marriage, maintain friendly relations with each other for the sake of the child.

At the same time, the law establishes a mandatory written form of the agreement on the payment of alimony and its certification by a notary [5]. It stipulates

the method and procedure for paying alimony, which can be established either in a fixed sum of money or provided at a time, including with property for the entire period of provision of alimony, no less than the amount established by law.

An agreement on the payment of alimony implies a complete agreement of the parties on all the nuances of fulfilling the alimony obligation. The subject of receiving alimony of this type of obligation is a minor child. If he has not reached fourteen years of age, then his legal representative (parent or guardian) acts on his behalf. After reaching the age of fourteen, a child can independently enter into an agreement, but with the consent of a legal representative [6, p. 133].

In legal relations related to alimony obligations for minor children, the parent acts not as a recipient, but as a legal representative of the interests of a minor child.

At the same time, since a child cannot independently protect his property rights, the legislator has expanded the competence of the courts. Guided solely by the interests of a minor child, the court independently decides the issue of collecting alimony, regardless of whether the claim was brought by the parents or not; such powers are vested in the guardianship and trusteeship authorities.

When making a decision on the collection of alimony, the court most often determines its amount in shares, which is for one child - 1/4, for two - 1/3 and for three or more children - 1/2 of all types of wages or other income of the alimony payer .

It must be said that the Decree of the Government of the Russian Federation dated November 2, 2021 No. 1908 [7] defines a list of types of wages and other income from which alimony for minor children is withheld, as well as income that cannot be recovered.

In practice, the alimony payer may have more than one wife, and, consequently, children, but he is obliged to support them all in equal conditions. Particular attention should be paid to the legislative experience of the Republic of Armenia. Yes, Art. 69 of the Family Code of Armenia [8] provides that alimony payments for each child cannot be less than the minimum wage, which, in our opinion, fully protects the material interests of the minor.

In modern Russia, there is such an institution as a court order for the collection of alimony, which is issued by a magistrate's court without a court hearing; the parties are not heard and do not present their arguments. In this case, the judge collects alimony from the alimony payer, as well as a state fee. Moreover, if the alimony payer has received a court order and has objections, he submits an independent application to cancel the previously issued court order, and the court will be obliged to hear the arguments of the parties and subsequently may issue a writ of execution or refuse, since the children live with the alimony payer and the other party has no right to demand such content.

The collection of alimony by filing a statement of claim is more consistent, in our opinion, with the legal nature of family relations, and in particular, alimony

obligations. This is due, first of all, to the fact that most of the norms of the RF IC are situational in nature. This suggests that they contain rules that cannot be clearly applied in practice, but require the study of all the circumstances of each specific case. This is only possible if both parties to the alimony obligation are present and their arguments are heard.

Let us outline the features of proving in court cases related to the collection of alimony for minor children.

1. Subject of proof:

- the presence of a family relationship between the alimony payer and the minor child;
- the financial condition of the parties, the presence of other obligations of the payer, as well as other circumstances that may affect the amount of alimony obligations;
- the fulfillment or failure by the payer of its obligations to support a minor child;
- the presence or absence of an agreement on the payment of alimony;
- the compliance with the law of the amount of alimony actually paid;
- the need for additional payments in the event of a child’s illness, disability or other compelling reasons.

2. Documents serving as evidence:

- a copy of the child’s birth certificate;
- a certificate from the child’s place of residence stating that he is supported by the plaintiff;
- a certificate of the defendant’s salary. If alimony is already being withheld from the alimony payer in favor of another child (children), or any other deductions, for example, in favor of disabled parents, this should be reflected in it;
- a certificate of the plaintiff’s salary or other document confirming his income.

There are a number of types of income from which alimony obligations are not collected. These include:

- severance pay;
- allowances established for caring for a disabled family member;
- childbirth benefits and others.

In situations where, after the parents’ divorce, children remain with each of the parents, alimony is collected from the more financially secure party so that the children are in equal material conditions.

Thus, the court establishes a fixed amount of money as alimony, which is collected monthly from the alimony payer. In some cases, recovery in a fixed amount of money is more preferable than as a share of wages or other income. Such situations include:

- the payer has irregular, inconsistent earnings (one month a child may receive a significant amount of alimony, but the next month he may receive nothing);

– the receipt by the alimony payer of income in kind or in foreign currency (determining alimony in proportion is difficult due to the fact that the cost of products in kind and the exchange rate are constantly changing);

– the other cases when shared recovery is impossible or significantly violates the interests of one of the parties.

It should be noted that if the alimony payer does not have income that can be foreclosed on, then the bailiff applies the foreclosure on property owned by the debtor as a personal or joint property. The alimony payer, as a rule, often hides his official income or significantly understates it in order to avoid providing financial support in favor of a minor child. At the same time, the alimony payer may own quite a significant amount of expensive property; in this case, the court determines the amount of alimony in a fixed amount based on the value of the property owned by the debtor.

It should be noted that alimony obligations for the maintenance of minor children cease at the moment when the child reaches full legal capacity (coming of age, emancipation, marriage).

However, it is not always at this point that children's right to receive child support from their parents ceases. According to family law, parents are obliged to support adult disabled children if they need financial assistance from their parents.

It must be said that in the cases listed in the law, an agreement on the provision of maintenance can be concluded by the children themselves (if they are legally capable) or their guardians (if the children are incompetent and recognized as such in court). If there is no agreement, the interested party files a claim in court to collect alimony.

It should be noted that the current legislation of the Russian Federation does not disclose the concept of need. In our opinion, this is a lack of funds to meet the needs of a person's normal life. The court determines based on the size of the subsistence level of both the payer and the alimony established at the moment.

When determining and assigning the amount of alimony, the court takes into account all the circumstances of a particular case. For example, even disabled people of the same group may have different family and financial status. In this regard, some recipients of alimony need it more, others, on the contrary, less.

The Family Code of the Russian Federation establishes the procedure for incurring additional expenses for a minor or disabled recipient of alimony.

Thus, having studied the institution of alimony obligations, we came to the conclusion that certain difficulties in collecting alimony from the alimony payer are usually difficult in the process of forced collection by a bailiff, who today is not interested in the proper protection of the rights of the alimony recipient, especially that the legislator provided for administrative liability in the form of a fine, and only then criminal liability under art. 157 of the Criminal Code of the Russian



Federation [9], which, in our opinion, does not fully correspond to the protection of the rights of the child.

In our opinion, it seems necessary to improve the current legislation in the field of child support obligations of parents and children, proposing the construction of Part 1 of Article 157 of the Criminal Code of the Russian Federation with the following content:

“1. Failure by a parent to pay child support without valid reasons, in violation of a court decision or notarized agreement, for the maintenance of underage children or disabled children who have reached the age of eighteen, if this offense is repeated, is punishable by imprisonment for up to two years, or compulsory labor for the same period, or arrest for up to six months.”

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执达主任强制收取赡养费

## FORCED COLLECTION OF ALIMONY BY A BAILIFF

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注解。对强制收取赡养费义务的研究主题的相关性在于，如今大量的执行文件已提交给俄罗斯联邦法警局执行。一般来说，赡养费义务是长期的，因此，强制向未成年子女收取赡养费的期限会被推迟。

关键词：赡养费、执行令、强制执行、法警、未成年子女、父母、法院、对法警的行为（不作为）提出上诉。

**Annotation.** *The relevance of the topic of research into the forced collection of alimony obligations lies in the fact that today a huge number of enforcement documents are submitted for execution to the Federal Bailiff Service of Russia. Alimony obligations are, as a rule, long-term in nature, and therefore the duration of forced collection of alimony in favor of minor children is delayed.*

**Keywords:** *alimony, writ of execution, forced execution, bailiff, minor child, parents, court, appealing the actions (inaction) of the bailiff.*

Interest in the study of alimony obligations is due to the theoretical and practical needs of the study of this institution, the family crisis, the increase in the number of children, low-income elderly people and the increasingly frequent occurrence of cases where family members, under certain circumstances, are not able to financially support each other. In the Russian Federation, the collection of alimony is relevant since many cases remain unfulfilled due to the imperfection of the law and the lack of legal consciousness among citizens, therefore, in our opinion, it is necessary to improve the legal mechanism for the collection of alimony by introducing changes and additions to the current legislation, paying attention to special attention to the rights and obligations of bailiffs, taking into account foreign experience on the issues under consideration.

Problems of collecting and paying alimony exist and will continue to exist for a long time. These categories of cases cause certain difficulties, in our opinion, in enforcement. Problematic issues remain not simply in the unwillingness to pay, but in the amount of material resources assigned as alimony support. Courts take into account the financial situation of the alimony payer, but very often they take into account official income, but they are not real income, since most often the alimony payer has a lower salary than established by a court decision.

The plaintiff is the party that presents evidence of the financial situation of the alimony payer, and at the same time faces the problem of proving the understatement of income received.

At the same time, the legislator allows the collection of alimony in marriage, which is used for mercenary purposes and to save money from the alimony payer, at the same time, no one checks whether the level of child support is fairly determined when the parents enter into an agreement on the payment of alimony; it is not the responsibility of the court to initiate consideration of issues regarding the division of property and the amount of alimony, and also does not take into account the relationship of the obligation to pay alimony with the regime of communication with the child, there are difficulties in collecting alimony from a person located outside the Russian Federation and in the execution of decisions of foreign states, and the judicial process itself requires material costs, which is difficult for most citizens.

Departmental statistical reporting from enforcement agencies confirms the fact that the number of cases of alimony collection remains consistently high. There are always some difficulties in enforcing maintenance cases. In Russia, the total alimony debt is growing, and not only for child support (in 2020 its volume amounted to 156 billion rubles) [1], and therefore, when conducting the study, we came to the conclusion that it is necessary to create a state alimony fund, from which benefits will be paid to citizens if alimony payers do not fulfill their obligation established by a court decision or an agreement on the payment of alimony.

Recently, there have been socio-economic problems in the state that need to be addressed at a higher level. Alimony obligations exist because, firstly, the family faces financial difficulties, and secondly, the family loses its authority and the end of a marriage is not uncommon, therefore the institution of alimony obligations aims to protect the rights of the alimony recipient.

In the modern world, it should not be the case that vulnerable sections of our society, such as minor children and disabled family members, independently provide themselves with the necessary living conditions. Parents must respect their immediate responsibilities, educate and financially support their child. Adverse consequences in the form of physical and moral influence can occur if parents do not perform their natural functions [2, P. 271].

Sometimes even a capable person cannot provide the necessary living conditions on his own (a pregnant woman or has given birth to a child and is on leave to care for him) or due to health reasons the person is not able to work.

The state, to some extent, provides financial support to needy family members, providing them with benefits and pensions.

The obligation to provide financial support to needy family members lies in the fact that some family members have the right to demand material support, while others are obliged to provide such maintenance.

Enforcement proceedings are a special stage of the process where the forced execution of judicial acts, acts of other bodies and officials is carried out, who, in the exercise of powers established by federal law, are given the right to impose obligations on the subjects of legal relations to transfer funds and other property.

It should be noted that without the forced execution of a court decision, there is no need to talk about any purpose of the court process, since the alimony payer can maliciously evade paying alimony, without executing the court decision, hide his property, and, as a result, properly protect the rights, freedoms and legitimate interests are not possible.

Currently, the state of enforcement proceedings in the Russian Federation is characterized by low efficiency in terms of activities for the execution of judicial acts, therefore there is a need to conduct a legal analysis of the activities of enforcement authorities and identify problems in their activities using the example of cases of alimony collection [3, P. 112].

So, N.A. Rassakhatskaya believes that every year more and more people are sent for the forced execution of writs of execution for the collection of alimony, and this is one of the most important problems, which in turn entails a large burden on one bailiff, thus the effectiveness of forced execution is reduced to the lowest limits [4, P. 149].

Currently, there are no effective enforcement tools that could encourage the debtor to pay alimony.

In our opinion, it is necessary to look for an individual approach to each alimony payer, but the bailiff does not have time, since other court decisions are being enforced.

The individuals who are obligated to pay alimony can be divided into three categories:

- 1) individuals who have the actual income to pay alimony but, for various reasons, hide their income;
- 2) individuals who do not have actual income and lead an antisocial lifestyle;
- 3) individuals who consistently pay alimony.

The first and second categories are the most problematic for enforcement agencies, since, as a rule, they lack property, income, or are generally deprived of parental rights and lead an asocial lifestyle.

It seems necessary to give enforcement authorities the authority to employ unemployed alimony payers and refer the latter to employment authorities for registration.

Also, bailiffs should have the right to force such alimony payers into employment so that alimony arrears do not accumulate, and alimony, in turn, is paid on time.

At the same time, the alimony payer cannot refuse the proposed job vacancy, because this refusal will be considered as malicious evasion of alimony payment, which will entail criminal liability under Article 157 of the Criminal Code of the Russian Federation [5].

In connection with the above, in our opinion, there is a need to improve Article 68 of the Federal Law of October 2, 2007 No. 229-FZ “On Enforcement Proceedings” [6], adding Part 3 of this article with paragraph 10.3) with the following content:

“10.3) forced referral by a bailiff of a citizen to employment authorities to find a suitable job within no more than 10 working days from the date of the decision by the bailiff;”

In accordance with this, changes must be made to the legislation regarding an unemployed debtor, such as forced employment. This measure, in our opinion, will solve the problem of collecting alimony from an unemployed debtor.

If enforcement authorities begin to employ debtors, this will stimulate alimony payers to fulfill their alimony obligations properly.

Referring to the statistical data of the Federal Bailiff Service of the Russian Federation, it should be noted that within the framework of implementing measures to improve the enforcement of court orders and notarial agreements on child support payments and protect the rights of recipients of alimony, there has been a positive trend in reducing the number of pending enforcement proceedings for the collection of alimony. In 2019, it decreased from 825.5 thousand rubles to 806.4 thousand rubles, and in 2020, it further decreased to 791.7 thousand rubles. Additionally, for the benefit of children, 15.2 billion rubles were collected in 2018, 17.4 billion rubles in 2019, and 19 billion rubles in 2020. The share of enforcement proceedings that involve the enforcement of rights to receive alimony amounts to 80.2% [7; 8].

The FSSP of the Russian Federation, as part of the enforcement investigation, in 2019 alone, the location of 53.1 thousand alimony defaulters was established - according to executive documents on the collection of alimony and 37.5 thousand in 2020. Officials of the territorial bodies of the FSSP of Russia initiated 118 in 2019 thousand and in 2020, 103 thousand cases of administrative offenses against debtors evading payment of alimony, and as a result of criminal law measures taken in the interests of the parties to enforcement proceedings, more than 178

million rubles were recovered for 2019 and 98.3 million rubles for 2020 alimony payments, including in favor of educational institutions for the maintenance of orphans and children left without parental care.

In turn, Russian courts convicted 45,787 people in 2018, 46,884 people in 2019, and 37,751 people in 2020 to criminal liability for failure to pay funds for the maintenance of children or disabled parents [9; 10; 11].

These numbers are not reassuring. But the direct collection of alimony payments is the most difficult stage of obtaining financial support, and despite the decrease in the number of such enforcement proceedings, their number is quite significant [12, p. 42].

This state of affairs indicates, firstly, that the courts are constantly considering the relevant categories of cases, which leads to the conclusion that the issues of preventing family conflicts in substantive law have been insufficiently addressed. Secondly, as noted by E.N. Kuznetsov, these categories of cases cause certain difficulties in enforcement [13, p. 53], especially since the statistics today are disappointing and indicate big problems in family relationships.

Thus, in conclusion, it should be noted that the activities of enforcement authorities require the creation of new legal regulations that will allow the jurisdictional act on the collection of alimony to be properly enforced.

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苏联刑事立法中理想犯罪和客观真理的制度化问题 (1926-1957): 问题陈述和后果

**ISSUES OF INSTITUTIONALIZATION OF THE IDEAL SET OF CRIMES AND OBJECTIVE TRUTH IN THE CRIMINAL LEGISLATION OF THE USSR (1926-1957): PROBLEM STATEMENT AND CONSEQUENCES**

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注解。该书考察了 1920 至 1950 年代苏联法律史上理想和真实犯罪集合以及客观真理的刑事法律制度的形成和演变过程。作者一贯地展示了在刑事和刑事诉立法法的编纂过程中,立法者制定规范这些机构的法律规范结构的方法的变化。特别关注对普通犯罪和反革命性质的犯罪组合进行镇压,这解释了大规模刑事起诉和随后平反的形象的形成。最后,指出了所考虑的制度在新的历史条件下的相关性以及法学界正在就其在现行立法中的巩固问题进行的讨论。

关键词: 惩罚政策、刑事和刑事诉讼法、镇压、全面性、完整性、客观性、犯罪总体性。

***Annotation.** The work examines the process of formation and evolution of criminal legal institutions of the ideal and real set of crimes and objective truth in the history of Soviet law of the 1920-1950s. The author consistently shows the change in the legislator's approach to the formulation of the structures of legal norms regulating these institutions in the process of codification of criminal and criminal procedural legislation. Particular attention is paid to the use of repression for a combination of crimes of an ordinary and counter-revolutionary nature, which explains the creation of an image of mass criminal prosecution and subsequent rehabilitation. In conclusion, the relevance of the considered institutions in the new historical conditions and the ongoing discussions among legal scholars on the issues of their consolidation in the current legislation are pointed out.*

***Keywords:** punitive policy, criminal and criminal procedural law, repression, comprehensiveness, completeness, objectivity, totality of crimes.*



The recent changes in the field of domestic justice, which are ambiguously assessed, nevertheless pursue, first of all, the goals of ensuring not only recognition, but also respect and protection of citizens' rights at all stages of the process of law enforcement of substantive norms of protective branches of law. An objective and comprehensive investigation, aggressive and professional defense, an independent, fair and impartial court, as well as unconditional execution of court decisions and the inevitability of punishment represent the only possible formula for a civilized legal system of the state. The latter circumstance allows us to reasonably assert that the institutions of achieving "objective truth" and "ideal and real totality of crimes" are among the most problematic and controversial topics in the field of criminal legal protection of public order. What has been said is of particular relevance today, in the context of new challenges and the need to strengthen the punitive component of criminal policy, corresponding to the dynamics of crime in the country.

A significant place in the research and creative study of the questions posed is given in the works of famous criminologists and, above all, A.S. Bakhta, R.S. Belkina, I.F. Demidova, V.I. Elesina, L.A. Zakhozhy, P.A. Lupinskaya, E.A. Matvienko, N.I. Nikolaichika, G.A. Pechnikova, N.I. Revenko, V.M. Savitsky, A.D., Solovyov, M.S. Strogovich, S.A. Shafera, N.A. Yakubovich and others.

Previously, in our works, we have repeatedly emphasized that the content of punitive policy cannot be limited only to punishment and the conditions for serving it; such an approach is too narrow<sup>1</sup>. Without a doubt, the establishment of types, hierarchy of punishments, saturation of them with various kinds of restrictions (both purely punitive and compulsory-preventive properties), as well as the procedure and conditions for their execution and serving are the determining elements in characterizing the punitive policy, but are far from the only ones. In criminal law, important determinants are such legal categories and institutions as the expansion of criminalization of certain acts that were previously not considered criminal (e.g. the introduction of Article 581a - treason to the Motherland - in the Criminal Code of the RSFSR in 1926 and 1934); establishment of various categories of crimes (directed against the foundations of the Soviet system and all other crimes as they were divided in Article 46 of the Criminal Code of the RSFSR in 1926). Moreover, here it is worth paying attention to an important detail that is deliberately overlooked by modern critics of Soviet justice: the code divided all crimes into two categories, while "For crimes of the first category, the Code defines a limit below which the court does not have the right to prescribe a measure of social protection for the judicial-corrective character. For all

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<sup>1</sup> See: Zharkoy M.E. The theory of Soviet punitive policy: historical issues and comments (1917-1940). St. Petersburg, St. Petersburg University of NPS EMERCOM of Russia. 2023. 231 p.

other crimes, the Code defines only the highest limit permissible for the court.”<sup>2</sup>; the presence or absence of the institution of analogy (Article 10 of the Criminal Code 1922., Article 16 CC 1926.); relapse of crimes (repetition of property crimes - introduced by Decrees of the Presidium of the Supreme Soviet of the USSR dated June 4 1947.); age, criminal imputation (12 years – Article 12 as amended on November 25 1935.<sup>3</sup>); necessary defense (Article 13 of the Criminal Code); ideal and real set of crimes (Article 29,30 of the Criminal Code of 1922, Article 49 of the Criminal Code, according to which, determining the appropriate measure of social protection (punishment) for each crime separately, the court finally determined the latter according to the Article providing for the most serious of the crimes committed and the most severe measure of social protection (punishment); the procedure and conditions for imposing punishment and exemption from it (sections four, five and six of the Criminal Code); amnesty, pardon (Article 52 of the Criminal Code), criminal record (Article 55 of the Criminal Code) and some others. All of the above-mentioned legal institutions, as we see, were accumulated in Soviet criminal legislation.

The first edition of the Criminal Code of the RSFSR in 1922<sup>4</sup> Articles 29 and 30 constructs and consolidates the first Soviet model of aggregation of crimes. In accordance with the concept of the code, it is formed under two circumstances. In the first case, when the committed act contains signs of crimes provided for in various Articles of the Criminal Code, the court determines the punishment under the Article that establishes the greatest punishability. In the second - when the defendant before upon sentencing, commits two or more criminal acts, the court, having determined the punishment for each crime separately, sentences the offender to the heaviest of all the punishments assigned to him, and the latter can be increased to the highest limit of the sanction of the norm enshrined in the Article under which the punishment was determined.

In the Criminal Procedure Code of the RSFSR in its first edition of 1922<sup>5</sup> an attempt was made to institutionalize “objective truth.” Thus, Article 114 chapter IX of the Code makes it the duty of the investigator to direct the preliminary investigation, guided by the circumstances of the case, towards the most complete and comprehensive consideration of the case. In essence, the code acted the first codified source of Soviet criminal procedural law, which predetermined the vector of further development of the national system of criminal justice bodies, the mechanism of pre-trial and judicial proceedings in a criminal case, which became the

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<sup>2</sup> SU RSFSR. 1926. No. 80. Art. 600.

<sup>3</sup> SU RSFSR. 1936. No. 1. Art. 1.

<sup>4</sup> SU RSFSR. 1922. No. 15. Art. 153.

<sup>5</sup> SU RSFSR. 1922. No. 20-21. Art. 230.

forerunner of subsequent codified acts in this segment of legal regulation and thus marked the beginning of the modern history of Russian criminal proceedings<sup>6</sup>.

The formation of these institutions could not but bring to life the need to ensure the rights of persons who find themselves in the sphere of punitive influence of the state and who have been subjected to criminal prosecution. Of course, today the problem of human rights and, in general, the mechanism of human rights activities lies in the plane of natural law and the modern philosophical libertarian-legal theory of law, which sees the highest value of law - formal justice - as its difference with the law. However, it was not typical for the Soviet type of legal understanding, and was not acceptable. At that time, a pronounced legalist or positivist approach dominated. Moreover, when it comes to combating crime, the interests of the state are at the forefront, and as A.I. Zubkov correctly expressed, "it is presumed that in this struggle costs in the form of violation of human rights and freedoms are inevitable"<sup>7</sup>.

The study of the dynamics of the international situation, external and internal political events of the second half of the 1920s - early 1930s allowed to identify three leading reasons for the tightening of the punitive policy of the Soviet state by the middle of the last pre-war decade. Firstly, the activity of international reaction, the mouthpiece of which was initially, in the second half of the 1920s, England, and as militarization increased, fascist Germany; secondly, this is the activity of White Guard, nationalist and other emigrant organizations located in the territories of other powers and led by foreign intelligence services, and thirdly, the oppositional activities of currents opposing the Stalinist group in the CPSU (b) and criminal elements within the USSR. All of these factors led to changes in the nature of repression, the concentrated expression of which was partially reflected in the Resolution of the All-Russian Central Executive Committee and the Council of People's Commissars of the RSFSR of March 26, 1928 "On punitive policy and the state of places of detention"<sup>8</sup> and led to the use, in modern language, of unpopular measures in the fight against a potential "fifth column" in anticipation of the impending military danger.

As a result, the decisive factor became the survival of the state, and through it the entire society. It was the dominance of state goals in social development that was a priority. In the RSFSR alone, according to incomplete data from 1922 to 1935, from 60 to 560 thousand people were convicted annually for murders, inju-

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<sup>6</sup> See: Code of Criminal Procedure of the RSFSR of 1922 - the first Soviet procedural Code (on the 100th anniversary of its adoption): monograph / ed. A. I. Chuchaeva. - Electron. Dan. (2.5 MB). - M.: Institute of State and Law of the Russian Academy of Sciences, 2023. P. 5.

<sup>7</sup> Zubkov A.I., Zubkova V.I. Problems of reforming criminal (punitive) policy at the present stage. // Journal of Russian Law, 2002, No. 5.

<sup>8</sup> See: Weekly of Soviet Justice. 1928. April 16. No. 14. pp. 417-419.

ries, bandit raids, robberies, robberies and qualified thefts.<sup>9</sup> In addition to those known since the 19th century, gangs of robbers, counterfeiters, swindlers, smugglers, etc. were active in the thieves' communities in the USSR. In fact, until the mid-1930s there was not a single region on the territory of the RSFSR where criminal gangs were not declared<sup>10</sup>.

The conviction rate was quite high in the 1930s. According to V.V. Luneev for the period from 1930 to 1934, according to incomplete data, the judicial authorities of the RSFSR convicted 6,238,071 people, and in the USSR from 1935 to 1941 - 6,884,521 people.<sup>11</sup> Even despite massive operations to remove socially harmful elements carried out in the 1930s, crime continued to significantly threaten the security of society and the state. It is also worth paying attention to the fact that the wave of economic crime has given rise to the emergence of specialized units to combat it. So on March 16, 1937, the BKhSS Department was organized as part of the NKVD police of the USSR. The date of formation of the BHSS seems to us not to be accidental. It is unlikely that there is a coincidence in time. The fact is that, in our opinion, the social sanitation of society that unfolded in the country after the February-March (1937) Plenum of the Central Committee of the All-Union Communist Party of Bolsheviks presupposed an uncompromising fight against any encroachments on the Soviet system or the legal order established by the Workers' and Peasants' Power (Article 6 of the Criminal Code of the RSFSR 1926<sup>12</sup>). And any economic crimes could automatically be considered counter-revolutionary or other crimes against the order of government that were particularly dangerous for the USSR. If you believe O. Shilov, then A.Y. adhered to precisely these views. Vyshinsky, who believed that in modern conditions of aggravation of class struggle, ordinary crimes turn into political ones<sup>13</sup>. According to the not indisputable opinion of M.S. Grinberg, "criminal law" of the 20s - 50s was a unique experience of the invasion of criminal legal coercion into all spheres of life of Soviet society - an open invasion when it came to non-economic coercion to work, and a hidden one when, under the signs of counter-revolutionary crimes... it could be let down and everything was let down..."<sup>14</sup>.

This, in our opinion, lies the phenomenon of "massiveness" of political repressions of the 1930s and the reverse process of rehabilitation in the 1950s and 1980s-

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<sup>9</sup> Judicial statistics. Crime and criminal record. M., 1995.

<sup>10</sup> See: Ministry of Internal Affairs of Russia. 1802-2002. Historical essay in 2 volumes. T.2. St. Petersburg, 2002. P. 191.

<sup>11</sup> Calculated by the author. Ref. data: Luneev V.V. Crime of the twentieth century. World, regional and Russian trends. M., 1997. P. 57.

<sup>12</sup> SU. 1926. No. 80. Art. 600.

<sup>13</sup> See: O. Shishov. Leader of the "legal front" // Inquisitor: Stalin's prosecutor Vyshinsky. M., 1992. P. 255.

<sup>14</sup> Grinberg M.S. Repressions of the 20s - 50s and the principles of criminal law // Jurisprudence. 1993. No. 5. P. 79.

1990s. Art. 49 of the Criminal Code of the RSFSR, as we have already indicated above, provided for the institutions of an “ideal and real” set of crimes; when they were identified, the court, having determined the appropriate measure of social protection for each crime separately, finally determined the latter under the article providing for the most serious of the crimes committed and the most serious measure of social protection. In other words, subsequently only the charges brought against the perpetrator under articles were subject to rehabilitation. 58-59 of the Criminal Code of the RSFSR, and the rest remained in force. Recently, attention has been drawn to this in the literature. For example, E.A. Prudnikov based on the analysis of the content of Art. 5814 of the Criminal Code of the RSFSR (counter-revolutionary sabotage, i.e. deliberate failure by someone to fulfill certain duties or deliberately negligent performance of them) rightly assumes that any crimes provided for in Ch. 3 of the same Code “Official (official) crimes”<sup>15</sup>. D.Y. Lyskov notes that “numerous economic, business and corruption crimes of that period were often interpreted as counter-revolutionary. Accordingly, article 58 of the Criminal Code (often in addition to the criminal one)”<sup>16</sup> was applied to those convicted under them. A. Sever also believes that “it was easier for the authorities to accuse corrupt officials of political crimes than of economic ones”<sup>17</sup>. Some foreign researchers also pay attention to this important detail, in our opinion. In particular, Chinese lawyer Wang Zhihua, studying the influence of Soviet law on the law of the PRC, notes that the boundaries of the use of law and non-legal methods of coercion in the USSR in the mid-1930s. “were in constant flux, for example, the theft of state property was initially classified as an ordinary criminal offense, but it could easily be linked to counter-revolutionary activities (emphasis added by us - M.Zh.), therefore it was assigned to the jurisdiction of state security agencies”<sup>18</sup>. It can be seen that, in view of the peculiarities of the classification of crimes, all plunderers, saboteurs, embezzlers, disruptors of production, thieves and bandits, today turned out to be victims of “political repression” and, in accordance with the Law of the Russian Federation of 1991, were rehabilitated with the ensuing legal, political and property consequences.

In conclusion, it should be noted that the final Soviet version of “objective truth” found its integrated expression in the provisions of Part 1 of Art. 20 of the Criminal Code of the RSFSR 1960<sup>19</sup>, according to which the court, prosecutor, investigator and person conducting the inquiry are obliged to take all measures

<sup>15</sup> See: Prudnikova E.A. Khrushchev. Creators of terror. M., 2007. P. 45.

<sup>16</sup> See: Lyskov D.Yu. “Stalin’s repressions.” The Great Lie of the 20th Century. M., 2009. P.27 – 28.

<sup>17</sup> North A. The mystery of Stalin’s repressions. M., 2007. P. 47.

<sup>18</sup> Wang Zhihua. The influence of Soviet law on the law of the PRC //State and Law. 2010. No. 4. P. 74.

<sup>19</sup> Gazette of the Armed Forces of the RSFSR. 1960. No. 40. Art. 592.

provided for by law for a comprehensive, complete and objective examination of the circumstances of the case, to identify both incriminating and exonerating circumstances of the accused, as well as mitigating and aggravating circumstances. The current Code of Criminal Procedure of the Russian Federation 2001<sup>20</sup> does not contain such a rule. Today's legislation imposes on the preliminary investigation the following requirements: comprehensiveness (examination of the case from all sides, from the standpoint of versions of both the prosecution and the defense), objectivity (impartiality of actions and decisions, accurate reflection of reality in them), completeness (sufficiency of the collected evidence and established facts) and speed. However, as evidenced by publications in the media, discussions about the need to consolidate this important institution in the current Criminal Procedure Code continue<sup>21</sup>, which indicates its demand from law enforcement practice. At the same time, the Code of the Russian Federation on Administrative Offenses of 2001<sup>22</sup> article 24.1 preserves this institution with a wording almost identical to the Soviet version: the objectives of proceedings in cases of administrative offenses are a comprehensive, complete, objective and timely clarification of the circumstances of each case.

The foregoing allows us to formulate some conclusions that do not pretend to be a priori, but allow, in our opinion, from the standpoint of historical objectivism to understand the complex problems of law enforcement practice in the last pre-war decade.

Firstly, the results of work on the preparation and implementation of the codification of criminal and criminal procedural legislation in 1922 testify to the creative and exploratory nature of Soviet legal science, the desire to provide legal support for the transition from the extreme nature of justice activities during the civil war and foreign military intervention to peaceful socialist construction.

Secondly, the emergence of fundamentally new institutions of "set of crimes", "analogy of law", "objective truth" show a steady tendency of the legislator to establish a regime of Soviet socialist legality, designed to abolish "revolutionary legal consciousness" as a source of law.

Fourthly, the Soviet sociological school of criminal law adopted philosophical principles, since from the latter's point of view, objective truth cannot be established due to the impossibility of reproducing all the circumstances of its existence. Through the prism of a philosophical approach, we can confidently talk about attempts to develop an investigation methodology that would support the authority of justice and the state in the eyes of the population.

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<sup>20</sup> Northwestern Russian Federation. 2001. No. 52 (part I). Art. 4921.

<sup>21</sup> See, for example: Truth in Bastrykin style <https://www.advgazeta.ru/arhivnye-zapisi/istina-po-bastrykinski/>. (Date of access: 11/09/2023).

<sup>22</sup> Northwestern Russian Federation. 2002. No. 1 (Part I). Art. 1.

Fifthly, the use of the institution of an ideal and real set of crimes fully complied with the legislator's conceptual definition of the definition of a crime, which made it possible in law enforcement practice to determine the totality of ordinary crimes depending on their socially dangerous consequences and other qualifying characteristics with counter-revolutionary ones.

It was the latter circumstance that made it possible to create in the public consciousness the image of mass repressions and the mass character of subsequent rehabilitation, which is successfully manipulated by the falsifiers of Soviet justice.

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腐败作为一种滥用法律的行为：原因和主要打击方法  
**CORRUPTION AS A TYPE OF ABUSE OF LAW: CAUSES AND  
MAIN METHODS OF COMBATING**

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抽象的。 本文关注教育和宣传活动，将其视为消除腐败的复杂但有效的方法之一。 结论是，这种方法需要大量的努力和社会的积极支持。 重组当局以打击腐败被认为是克服腐败的最佳途径之一。 有人假设俄罗斯联邦需要应用国际惯例，以此作为其反腐败结构现代化的机会之一。 文章的结论是，腐败是一种需要打击的消极现象。 人们注意到需要找到新的方法来克服它。

关键词：腐败、滥用法律、腐败成因、克服腐败的基本方法。

**Abstract.** *This article pays attention to educational and outreach activities as one of the complex but effective ways to eliminate corruption. It is concluded that this method requires a lot of effort and active support from society. The reorganization of authorities to combat corruption is considered as one of the best ways to overcome corruption. An assumption has been made about the need for the Russian Federation to apply international practice as one of the opportunities to modernize its own anti-corruption structure. The article concludes that corruption is a negative phenomenon that needs to be fought. The need to find new methods to overcome it is noted.*

**Keywords:** *corruption, abuse of law, causes of corruption, basic methods of overcoming corruption.*

The problem of corruption has not lost its relevance for many centuries.

One of the reasons is that “corruption” is a concept that covers abuse of power and official authority [19, P. 65], therefore, it is one of the types of abuse of law [5, P. 12]. The latter, in turn, was considered by the first Roman jurists.

Although the term “abuse of law” was not enshrined in the norms of Roman law, at the present stage the study of this legal category is largely based on Roman law [17, pp. 42-43].

The development of ideas about abuse of law occurs constantly, but the foundation for further research was laid only in Soviet times in the field of civil law. This issue was dealt with by domestic scientists V.P. Gribanov, M.Y. Baru, M. S. Malein and others.

In modern legal literature, it is very common to divide abuse of rights into two parts:

1) abuse by citizens of their subjective rights;

2) abuse of power, that is, those rights and responsibilities that, in accordance with current legislation, are vested in officials to implement the tasks and functions of the state [17, P. 44; 19, p. 13].

Since this part almost completely coincides with the concept of “corruption,” we can conclude that corruption is indeed a special type of abuse of law.

In modern legal literature, the concept of “corruption” is defined differently. For example, I. D. Fialkovskaya defines it as a criminal activity consisting in the use by officials of power for personal enrichment [1, p. 138]. A similar interpretation is provided by A.I. Dolgova, who defines corruption as a social phenomenon characterized by bribery and corruption of government or other employees and, on this basis, their selfish use for personal or narrow group, corporate interests of official official powers, associated authority and opportunities [ 2, p. 4].

I do not entirely agree with this interpretation, since corruption does not always involve bribery or bribery. For example, D. Bailey believes that corruption is the abuse of power, the use of it for one’s own purposes, which do not necessarily have to be material. K. Friedrich believes that corruption is behavior determined by personal motivation, which consists in the fact that one’s own goals are acquired at public expense [10].

It is also worth noting that corruption as a social phenomenon directly affects morality. Thus, P. A. Cheboksarov defines corruption as a set of negative phenomena occurring in society and the state.

It is, first of all, expressed in the disregard of moral standards by officials and their commission of acts directed against state power, the interests of public service and service in local governments for personal purposes [3, p. 220].

Now the term “corruption” is so widespread that it is defined not only by legal scholars, but also by legislative bodies.

Corruption has a long history; it is impossible to accurately determine its origins. Despite this, you can consider the first memories of her.

Thus, the first information about corruption can be found in the history of Ancient Babylon (XXIV century BC), namely during the time of Urukagina King of Lagash. He reformed the state apparatus to put an end to abuses by government officials and judges, as well as to protect the church [11, p. 94].

Similar references to corruption can be found in many legal monuments, in particular the “Edict of Narmaba”, the treatise “Arthashastra of Kautilya”, etc. Based on this, it can be argued that along with the formation and development of states, new forms and types of corruption appeared [12, p. 10].

Some of the first official manifestations of corruption on the territory of the Russian Federation can be dated back to the times of Kievan Rus. They were manifested in the activities of the vigilantes. During the Mongol invasion, Batu Khan eliminated bribery by force.

Also in the 16th century, corruption partially becomes the object of philosophical understanding; in particular, Nicolo Machiavelli made a significant contribution to the understanding of corruption. He compared it to a disease: “it is difficult to recognize at first, but easier to treat. If it is running, then it is easy to recognize” [13, pp. 78-79].

An equally famous lawyer and philosopher of the 18th century, S. L. de Montesquieu, the author of a work “on the spirit of laws,” also spoke about acts of corruption: “To prevent the possibility of abuse of power, an order of things is necessary in which various authorities could mutually hold each other” [14, p. 146].

Having examined the place of the state in social processes, we can make the assumption that it has been playing an increasingly important role in society since the 19th century. The state apparatus expanded, thereby acquiring new problems, one of which was corruption [15, p. 272].

It is impossible to try to counteract corruption without knowing exactly what it is based on. It is quite difficult to determine its main cause, since the reasons are all interconnected. But three main categories can be distinguished:

- 1) imperfection of modern society;
- 2) strengthening the role of the state, its influence on society, increasing the number of officials, etc.;
- 3) imperfection of the current legislation and law enforcement mechanisms.

Many scientists believe that corruption is an eternal imperfection of human nature. Some of them express an interesting opinion that corruption cannot be eradicated completely, since it is an indicator of the health of society [1, p. 132].

There is an opinion that it is the attitude of citizens towards corruption that determines this degree of “health” of society [4, p. 70]. It is difficult to disagree with the latest judgments.

In addition, E. Shackleton believes that as long as the state regulates the life of society in one form or another, some level of corruption will always exist [16, p. 26]. That is, corruption exists where there is state power.

It is worth noting that imperfect legislation and enforcement mechanisms affect the emergence of corruption no less than other reasons. In our opinion, the main criteria for such imperfection are:

- 1) insufficient professionalism of the legislator; intentional or unintentional simplification of legal norms, causing their ambiguity;
- 2) misunderstanding of laws by citizens;
- 3) lack of established anti-corruption mechanisms;
- 4) conflicts in legislation, for example, when one social phenomenon is regulated by several authorities.

Unfortunately, the lack of specificity in the legal infrastructure of the state creates conditions for corrupt government officials to subjectively and often incorrectly interpret articles of laws and regulations [9, p. 195].

Corruption is a global problem, therefore it manifests itself in any country, regardless of its development and mentality, although in different quantities.

Now there are quite a lot of ratings of the level of corruption in different parts of the world. We would like to focus more attention on the Corruption Perceptions Index. The reputable company Transparency International has been calculating this indicator of corruption since 1995. According to it, according to data for 2020, Singapore, Denmark, Switzerland, New Zealand, Finland, Sweden, Norway, etc. are considered the least corrupt countries in the world. But Russia is in 129th place.

The most corrupt countries are Venezuela, Syria, Somalia, Yemen, and South Sudan. It is also necessary to take into account that any ratings regarding corruption also contain a share of subjectivity [20, pp. 3-4].

According to the company, Belarus, with a score of 47 points, demonstrates positive dynamics, having risen in the ranking by 16 points since 2012. However, as the magazine notes, 2020 saw the start of weekly civil protests against the controversial presidential election results. Corruption has remained a pressing problem at the top of the government of this state [20, p. 17].

Corruption has become a serious problem in Germany. In fact, every day the media brings to the people information about new cases of abuse of power by officials. For 2020, Germany ranks 9th in the ranking [8, p. 59].

The current problem now is COVID-19 at the international level. The year 2020 - 2022 showed humanity a crisis in many areas, in particular a new wave of corrupt acts, which prevented the fair and equitable delivery of global assistance and led to the death of hundreds of thousands of people.

Taking a closer look at the statistics, we can assume that corruption continues to undermine democratic foundations even during the COVID-19 pandemic. Countries with higher levels of corruption are more likely to experience violations of the established legal order and the rule of law during the COVID-19 crisis.

Thus, Poland has dropped 7 points since 2015 due to the fact that the top government gradually adopted reforms that destroyed the independence of the judicial branch of government. According to the compilers of statistics, what has worsened the situation is that Poland's government leadership is using the crisis associated with the pandemic for political purposes, undermining democratic foundations, respect for human rights and efforts to combat corruption [20, p. 23].

The United States ranks lowest since 2012 in terms of performance. Certain problems regarding the implementation of the COVID-19 relief package have raised concerns about the fight against corruption [20].

Quite a few scientists have tried to determine effective ways to solve this problem. In our opinion, Yu. A. Burtsev better systematized and identified the most common methods of combating corruption:

- 1) the formation of a negative attitude in society towards corrupt behavior;
- 2) control, responsible for compliance with legislation by public and parliamentary institutions;
- 3) quarterly analysis of law enforcement practice  
in order to identify violations, take the necessary measures designed to exclude or eliminate corruption violations;
- 4) establishment of liability in the form of dismissal from the position held, release from the position being replaced, or the application of other measures of legal liability. Punishment is provided for failure to provide or, conversely, giving knowingly false information about income, property, expenses and obligations on the part of an official, his wife (husband) and children under the age of majority;
- 5) verification of information provided by citizens applying for a certain post or filling the position of a state or municipal employee;
- 6) introduction into the personnel work of state and municipal structures of the practice of effective and flawless performance by an official of his official duties [7, p. 67].

Let's try to look at some of them in more detail. I believe that one of the difficult and long-term, but the best ways to solve corruption in the world can be educational and educational activities that will contribute to the correct formation of the mentality of citizens.

This means relevant work in institutions of preschool, school, secondary and higher education, with great attention to legal institutions, intensifying the work of the scientific community to study the problem of corruption and its primary sources, establishing exactly its origins, proposals for solving them, as well as combating its consequences. Of course, efforts to form a specialized anti-corruption institution will be in vain without active support from citizens. Accordingly, one of the primary tasks is to establish cooperation with civil society [18, p. 23].

One of the methods of overcoming and eliminating corruption from public practice is the reorganization of relevant institutions and authorities that are cre-

ated with the aim of overcoming corruption, the establishment of effective mechanisms that stimulate interaction between civil society and executive authorities to implement anti-corruption policies. It can be quite effective for acquiring the positive experience of other countries.

For example, the Corrupt Practices Investigation Bureau was founded in Singapore in 1952 as an independent anti-corruption body. Its tasks include the prevention and investigation of crimes related to corruption in both the public and private sectors. The main functions of the BRKD include receiving and investigating complaints about possible cases of corruption, investigating illegal acts and abuse of power committed by government officials, and preventing corruption, taking into account the results of the analysis of the practices and procedures of government agencies in order to minimize the opportunities for the spread of consequences of actions corrupt officials [18, P. 43]. The Russian Federation, in my opinion, should use a similar practice, since this is one of the opportunities to modernize its own anti-corruption structure.

There are many factors that determine the spread of corruption in the state and the low effectiveness of countermeasures.

Corruption is a hot topic today, since the issues of corruption, its causes and consequences are truly discussed not only in all layers of society, but also at the state level.

Corruption is one of the types of abuse of law, since it involves the abuse of power, this is the use of power by officials, the management of power for personal purposes, which is contrary to moral norms and the interests of the state.

Thus, deepening the doctrinal development of corruption in the legal system, measures to prevent and counter it, and studying the prerequisites for its occurrence will contribute to the development of anti-corruption activities of the state and the formation of a system of practical measures to combat this negative phenomenon. Therefore, it is necessary to apply control methods aimed at reducing the frequency of corruption acts.

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论中华人民共和国法律范畴“法律渊源”问题（理论法律和比较法律方面）  
**ON THE ISSUE OF THE LEGAL CATEGORY “SOURCES OF LAW”  
OF THE PEOPLE’S REPUBLIC OF CHINA (THEORETICAL-  
LEGAL AND COMPARATIVE-LEGAL ASPECTS)**

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注解。 作者运用所考虑的研究的理论和法律方面，建立了影响中华人民共和国法律渊源形成和发展的历史、法律和国家法律因素。“法律渊源”这一法律范畴的比较法律方面揭示了中华人民共和国和俄罗斯联邦法律制度的特色。 该程度衡量法律渊源和法律制度对俄中关系形成的影响。 对中华人民共和国和俄罗斯联邦法律体系领域中概念性、预测性的法律不朽论得出结论。

关键词：中华人民共和国、俄罗斯、法律、法律、关系、合作、法律渊源、法律类别、法律制度。

**Annotation.** *The authors use the theoretical and legal aspect of the research under consideration and establish historical, legal and state legal factors that influence the formation and development of the sources of law of the People’s Republic of China. The comparative legal aspect of the legal category “sources of law” reveals the characteristic features of the legal systems of the People’s Republic of China and the Russian Federation. The degree is installed of influence of sources of law and legal systems on the formation of Russian-Chinese relations. A conclusion is drawn about conceptual, predictive legal immortalism in the field of legal systems of the People’s Republic of China and the Russian Federation.*

**Keywords:** *People’s Republic of China, Russia, law, law, relations, cooperation, sources of law, legal category, legal system.*

Current events in the world have an impact on various spheres of life of states, societies and individuals. The challenges and threats of the modern revolutionary



era determine new vectors of foreign and domestic policy of any state. Cooperation is the quintessential component of absolutely any state as a subject of law in the theory of state and law, aimed at achieving political, legal and social well-being for both society and individuals. The fact that cooperation is based on both domestic and interstate sources of law is invaluable. Therefore, the study of the legal category “sources of law” of the People’s Republic of China in the theoretical and legal aspect is undoubtedly significant, and the comparative legal aspect allows us to highlight legal immortalism in the field of long-term cooperation between the People’s Republic of China and the Russian Federation.

Thus, on September 5, 2018, a unique historical and documentary exhibition “Russia and China: the formation of relations. 1618-1727”. The documents presented at the exhibition contained the first known evidence of Russian-Chinese relations. Thus, the basis of bilateral relations, at the beginning of the 17th century, was laid by mutual trade interests, which today are no less relevant for the two countries [7].

The conclusion of the Treaty on Good Neighborliness, Friendship and Cooperation between the Russian Federation and the People’s Republic of China (hereinafter referred to as the PRC) already in the 21st century, in 2001 (ratified in 2002), is a practical application of diplomatic foreign policy, the so-called “Soft Power” of the PRC according to towards the neighboring country. The document contains provisions on mutual respect between the parties to the agreement and is based on the national interests of the parties, the purpose of which is to maintain peace and cooperation in political, economic, and cultural affairs. In addition, of interest is Article 21 of this document, which notes an agreement on the development of contacts and cooperation between branches of government, including the judiciary (both in the political sense and on the basis of legal education, facilitating the exchange of students and practice bases) [1]. So, for example, the Far Eastern branch of the All-Russian Academy of Foreign Trade regularly holds meetings of teaching staff and students with representatives of the PRC on various issues of economic and legal cooperation. At the latest event, a meeting was held with the Consul General of the Consulate General of the People’s Republic of China in Vladivostok [9]. The All-Russian Academy of Foreign Trade (Moscow) collaborates with the Beijing United University under the current agreement signed in 2020 on joint academic undergraduate and graduate programs.

Thus, comprehensive ties between China and Russia are promising and the most important areas for the development of both countries. After all, such cooperation is built not only on the convenient territorial location of states, but also on similar historical and legal aspects, respectively.

. Considering the legal aspect, we believe it is appropriate to explore it through the prism of the comparative legal method with regard to the legal category of the theory of state and law “sources of law”. If we address the question of the concept

of “sources of law” in Russia, there is a clear answer to it. Russia belongs to the Roman-Germanic legal family, which relates the concept to the Law of the Twelve Tables. In other words, first and foremost, the law will have the highest force as the source of all state law. When it comes to the Chinese legal system, it is difficult to pinpoint specific origins of the source of law and define it.

Remarkable and significant is the fact that the Chinese legal system has a history of more than two thousand years. Its formation, according to some sources, began in the 2nd century BC; during this period, an increase in legislative activity was noticeable. However, even from the kingdom of Qin, trade was carried out with other states and some reforms were carried out with the involvement of legalists [2, p. 37]. A special feature of the beginning of the formation of Chinese law is its formation from the norms of criminal law, which was reflected in state lawmaking and its sources.

The construction of law on the territory of the present-day PRC was significantly influenced by various philosophical schools (Confucianism, Legalism, and to some extent Buddhism), individual thinkers, and also, most importantly, the imperial power itself. This list undoubtedly includes the name of Confucius, who developed the idea of improving one’s own thought for its service to government and society as a whole. His students, Mencius and Xunzi, continued to develop the legacy of their Teacher. In particular, Xun Tzu established in the teachings of Confucius a focus on the normative nature of regulating the life of society [4, p. eleven].

Regarding dynastic lawmaking, its formation began with the establishment of the Han Dynasty (206 BC). The norms were codified based on the previously mentioned primary source from the provisions on criminal punishment.

Some norms arose from the issue of regulating the life of religious/philosophical schools. For example, provisions regulating the Buddhist sangha were introduced into the criminal, civil, administrative and procedural law of the Tang dynasty (“Tang lü shu yi”) [3, p. 31].

A significant theoretical and legal circumstance is that the Chinese legal system retains the features of socialist law, the sources of which were the norms established in China with the formation of the People’s Republic of China in October 1949. This period is characterized by the formation of law under the influence of Soviet power and Soviet legal science [6]. Of course, it can be assumed that this historical and legal period of China played a significant role in establishing long-term, fundamental and invaluable cooperation with Russia.

Today, the state has taken a focus on enhancing the importance of regulations in the organization of private and public law. On October 20-23, 2014, the 4th plenum of the 18th CPC Central Committee was held in Beijing. It set a course for building governance based on the law. An important aspect was to highlight the task of strengthening the implementation of the Constitution of the People’s

Republic of China. In addition, the powers of the people in the exercise of government were clearly defined, strict adherence to the rule of law and the principles of equality and fairness were established in the proceedings of cases in courts of all instances [10].

Giving a conclusion about the sources of Chinese law, one can also note the presence in it of elements of Romano-Germanic law, combined with primordial traditions and principles established during the period of ancient Chinese society.

The Russian legal system began to take shape much later than the Chinese one. The first sources of norms were customs passed on from mouth to mouth. Undoubtedly, custom is characteristic of the ancient state of China and, with specific features, is among the sources of law (only those that were sanctioned by the state). Subsequently, with the development of trade, an important element in concluding an agreement became an agreement (mainly with Byzantium). The texts conventionally contained norms of various branches of law, and were also often subject to reception.

There are also norms formed on the basis of religious texts (church statutes that regulated marriage and family relations, family relations in general). There was a period in the history of Russia when the Church was one of the bodies of state power. On January 25, Peter I signed the “Manifesto on the Establishment of the Holy Synod.” This body received a significant amount of powers within the framework of church activities. In addition, the Synod issued a decree to find the original Stoglav (collection of 1551, containing both religious and moral instructions and state administrative norms) [8]. Thus, at a certain stage in Russian history, church norms played an important role in public administration. Religious norms shaped the provisions, forming the basis for the further formation of law.

A distinctive feature of Russian law is the absence of a basis on the specific teachings of philosophers/thinkers, whose works would contribute grain to the formation of legislation. The only exceptions can be considered the works of Marx and Engels, which inspired V.I. Lenin to build communism.

Cooperation with the USSR in the modernization of Chinese society and the convergence of law between China and the Soviet Union had a productive impact on the relationship between the countries. Further history remembers the deterioration of relations, but despite this fact, no events changed the friendly mood on the part of both states. The principles laid down in 1992 in the Declaration on the Foundations of Relations between the People’s Republic of China and the Russian Federation have created plans that even now look far into the future [5].

The similarity of sources of law (formed with the formation of the PRC and the current goal of the state to govern the country on the basis of laws, the growth in the number of international treaties on all kinds of issues of cooperation) in legal systems makes it possible for more convenient interaction between states

due to the presence of homogeneous principles in the management of the state and society as a whole.

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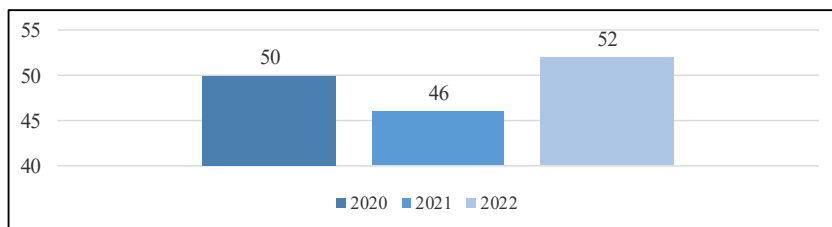
抽象的。在本文的框架内，作者研究了与适用俄罗斯联邦刑法第308条和俄罗斯联邦宪法第51条实践相关的问题，并提出解决建议。

关键词：近亲、近亲、证人、反对、逃避、拒绝、配偶。

**Abstract.** *Within the framework of this article, the authors examine problems associated with the practice of applying Article 308 of the Criminal Code of the Russian Federation and Article 51 of the Constitution of the Russian Federation, and make proposals for their resolution.*

**Keywords:** *close relatives, close persons, witness, opposition, evasion, refusal, spouse.*

The provisions of Article 308 of the Criminal Code of the Russian Federation [3] make it possible not only to apply penalties to persons who refuse to testify, but also to overcome such a negative, but characteristic of our legal system, phenomenon as opposition to the investigation. Analyzing the statistics on bringing persons to criminal liability, we can conclude that this article is actively used in practice, and, consequently, its “efficiency” (Fig. 1).



*Figure 1. The number of criminal cases sent to court under Art. 308 of the Criminal Code of the Russian Federation by investigators of the Investigative Committee of the Russian Federation*

However, I would like to note that despite the applicability of this article, in a number of cases law enforcement officers are faced with problematic issues. In particular, this concerns the interpretation of the concept of “close relative”, the classification of ex-husbands and wives into the categories of “close relative” or “spouse”, as well as cases of evasion from examination, from carrying out a forensic examination, or cases of evasion from providing handwriting samples and other samples for comparative research of the witness, since these acts, based on the content of Article 308 of the Criminal Code of the Russian Federation, are illegal only for the victim. Let’s look at these problematic issues.

In accordance with the provisions of Article 5 of the Criminal Procedure Code of the Russian Federation [4], close relatives should be understood as: spouse, parents, children, adoptive parents, adopted children, siblings, grandparents, grandchildren. Also, a description of the term close relatives can be found in Article 14 of the Family Code of the Russian Federation [2], according to which close relatives are considered to be relatives in a direct ascending and descending line (parents and children, grandparents and grandchildren), full-blooded and not full-blooded (having common father or mother) brothers and sisters.

Based on the previously stated, several contradictions can be noticed: firstly, in accordance with the Family Code of the Russian Federation, adoptive parents and adopted children are not included in the circle of close relatives, which cannot be said about the provisions of the Criminal Procedure Code of the Russian Federation, where these categories are directly indicated in the category close relatives.

Secondly, within the framework of the Family Code of the Russian Federation it is specified that close relatives are both full and half-blood brothers and sisters, but within the framework of the Criminal Procedure Code of the Russian Federation only the term “siblings” is mentioned.

Thus, due to the presence of such contradictions in the legislation, law enforcement officials often have difficulties as to who belongs to the category of close relatives.

The second problem we identified is to resolve the question of whether the ex-husband/ex-wife is classified as close relatives and, accordingly, whether a person in these cases can take advantage of Article 51 of the Constitution of the Russian Federation [1]. Analyzing the scientific and educational literature, we can conclude that the vast majority of scientists express a clearly negative position, arguing that from the moment of divorce, the former spouse does not belong to the category of close relatives. We agree with the stated point of view, however, it is worth noting that in practice it is a very common situation in which victims/witnesses during interrogation insist that, due to the close relationship that has developed between them and their former spouse, they do not want to testify, and at the same time, employees of investigative units often meet them halfway and indicate in the interrogation records that this or that victim/witness wants to take advantage of Art. 51 of the Constitution of the Russian Federation.

In our opinion, here we are again dealing with the problem of interpretation of a number of provisions. Thus, in our opinion, the former spouse cannot be classified as close relatives; rather, we are talking about close relatives, which, in accordance with the Criminal Procedure Law, are understood as persons who are related to the victim, witness, as well as persons, whose life, health and well-being are dear to the victim, witness due to existing personal relationships. However, do not forget that using Art. 51 of the Constitution of the Russian Federation and in accordance with this, a victim/witness can refuse to testify only in relation to himself, his spouse or his close relatives.

The third problem is the possibility of evading examination, conducting a forensic examination, or evading providing samples for a comparative study of a witness, since, today, if they refuse to undergo these procedures, there is no possibility of legal influence on them, and this in turn the queue may create unreasonable interference in the investigation of a criminal case.

Summarizing everything previously stated, we are convinced of the need for a detailed consideration of these provisions by the legislator and making a number of changes to them.

In particular, it seems necessary to formulate a unified definition of the term “close relatives”, based on an analysis of both the provisions of the Criminal Procedure Code of the Russian Federation and the Family Code of the Russian Federation.

Moreover, in our opinion, it is necessary to clarify who can be considered “close relatives” and “close persons”, while providing for various situations, for example, such as divorce (i.e., will a former spouse), deprivation of parental rights (i.e. whether children whose parents or adoptive parents were deprived of their parental rights will be considered close relatives).

As for Article 308 of the Criminal Code of the Russian Federation, in our opinion, in order to overcome possible resistance exerted by a witness, it is nec-

essary to establish criminal liability of the witness for evading examination, from conducting a forensic examination, or evading providing samples for comparative research in cases, when necessary for a comprehensive and complete investigation of a criminal case.

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以圣彼得堡胜利纪念碑为例 雕塑在民间艺术高中学生专业训练和爱国主义教育  
中的重要性

**THE IMPORTANCE OF THE SCULPTURE IN THE  
PROFESSIONAL TRAINING AND THE PATRIOTIC EDUCATION  
OF THE HIGH SCHOOL OF FOLK ARTS' STUDENTS ON THE  
EXAMPLE OF THE VICTORY MEMORIAL IN ST. PETERSBURG**

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抽象的。民间艺术高中教育过程的主要目标不仅是培养学生独特的专业知识，而且通过对话的方法，塑造他们作为祖国的爱国者的品格，为其英雄事迹感到自豪。历史。本文致力于同一任务。圣彼得堡的胜利雕塑纪念碑将其记忆传递给后人，并保留了 1941-45 年卫国战争和列宁格勒封锁的严峻形象。这些历史事件，我们的父辈、祖父辈和战时妇女们所做出的令人难忘的英勇事迹，是战后出生的新一代决不能忘记的。

关键词：纪念馆、雕塑、建筑、项目、博物馆、永恒之火。

**Abstract.** *The chief object of the educational process in the High school of folk arts is not only to train the students in the unique specialties but likewise, through the conversational method, to form their characters as those of the patriots of their country, proud of its heroic history. This article is devoted to the same task. The Victory sculpture memorial in St. Petersburg transmits the memory thereof to the posterity and retains the stern image of The Great Patriotic War of 1941-45 and of the Leningrad blockade. These historical events, the unforgettable acts of bravery done by our fathers, grand-fathers and women of the war time are the things that the new generation, born after the Great War, must never commit to oblivion.*

**Keywords:** *memorial, sculpture, architecture, project, museum, Eternal Flame.*

Of great importance in teaching and educating students of the Higher School of Folk Arts (Academy) in the classes of the discipline “Academic sculpture and plastic modeling” are the conversations conducted by the teacher about the art of sculpture, about sculptural historical monuments, the unique beauty of the city of St. Petersburg. Each monument carries information about the events in honor of which it is installed. Such significant historical monuments dedicated to the Great

Patriotic War and the Siege of Leningrad in 1941-1943 include the Memorial on Victory Square in St. Petersburg (Leningrad) (Fig.1).

In 1974-1975, architects Speransky S.B., Kamensky V.A. and sculptor Anikushin M.K. developed a project of a monument dedicated to the heroic defenders of Leningrad in the Great Patriotic War, which was supposed to be installed on Victory Square.



*Figure 1. Victory Square in St. Petersburg*

A group of talented artists managed to create a memorial worthy of the city of St. Petersburg (Leningrad). The place for the monument was not chosen by chance. In 1962, the area near the Middle Slingshot was renamed Victory Square, since the front line, the second line of defense of Leningrad, passed through this place. At the entrances to the city there were anti-tank steel hedgehogs, reinforced concrete gouges, trenches were dug, artillery installations were on alert. Until now, at the entrance to the city, you can see ditches, dugouts and scattered burial sites of soldiers defending Leningrad from the Nazis. A military road passed through Moskovsky prospekt. Eyewitnesses of those events say that there were such battles and raids by German planes that people sat on their heads and stood on end from fear. A whole generation of Leningraders died from bombing, hunger and cold during the blockade, but the city was saved from destruction. Future generations should remember about these terrible events, and understand at what cost Leningrad and the country were defended, the memorial on Victory Square is dedicated to this memory, which is a vivid example of one of the types of monumental sculpture and a historical monument of our city.

The idea of creating a memorial reflecting the indescribable suffering of the people of the besieged city arose during the war years, but the monument could be opened only on May 9, 1975, in celebration of the thirtieth anniversary of the Victory over Nazi Germany (Fig.2).



*Figure 3. Architects Speransky S. B., Kamensky V. A. Memorial to your Feat Leningrad*

A decent amount of money for a truly national monument was collected from grateful residents of Leningrad. The authors of the monument were themselves participants in the war. The author of the sculptures, M.K. Anikushin, was twice awarded the Order of Lenin and the medal for participation in the Patriotic War of the second degree and other awards. Anikushin M.K. talked about his idea, which he wanted to embody in sculpture. In group sculptural compositions, he wanted to depict everything: the bombing, the shelling, the terrible hunger, the bitter cold, the courage, the suffering, and the heartache of the Leningraders, who were tormented by a ruthless enemy. He seems to confirm the words of the outstanding Russian artist I.E. Repin, written in a letter to I.N. Kramskoy (31.03.1874). Repin suggested that the compositions of paintings (and sculptures) should express the reflections and experiences of artists that they would like to portray in their works: the mental state of a person, the drama of life, its meaning, the spirit of history, the main thing in any compositions is the content. Empty thoughts give rise to empty and uninteresting works.

The memorial on Victory Square is located at the entrance to the city from Moscow and Pulkovo Airport. This multifaceted structure consists of several tiers. On the upper tier, a wide staircase directs visitors directly to the center of the monument, to a sculpture depicting a soldier and a worker, winners in this war. The height of the figures is 5 meters (Fig. 3). In their hands they have a machine gun and a hammer – symbols of the unity of the front and rear. On the red granite obelisk, 48 meters high, the years of the war 1941-1945 are marked with golden numbers. A staircase descends from the obelisk to the lower tier of the memorial, and the “memory square” opens before the eye, which is enclosed in a symbolic “torn ring” made of concrete and granite, the diameter of the ring is 40 meters, its length is 124 meters (Fig. 4).



**Figure 3.** Anikushin M.K. *Fig. Soldier and worker.*



**Figure 4.** Architects Speransky S. B., Kamensky V. A. *The winners are the Broken Ring of the Blockade. The golden inscription "900 days and 900 nights" is carved on the ring. In the center of the ring there is a sculptural group "Blockade".*

The author of this sculptural composition is the famous sculptor Anikushin M.K. (Fig. 5), he uses the same artistic technique as in the upper tier of the memorial, combining several plot groups into one composition.



**Figure 5.** Anikushin M. K. *Sculpture "Blockade"*

On the left is a woman with a dead child in her arms, looking at the sky full of despair. Indescribable grief is reflected on her face with a question in her eyes, why and why did her child die? The woman stands petrified with grief. This is the most expressive figure in this sculpture. On the right, a soldier holds a completely exhausted elderly woman, ready to fall either from hunger or from grief. Two female figures are depicted in the center, one of them looks at the sky and tries to lift the other woman, who has completely collapsed or injured after another air raid. All the figures are depicted almost in human height and are located on a low ped-

estal so that the viewer feels like an accomplice of the events taking place. In the sculptural compositions of the memorial, M.K. Anikushin showed his outstanding compositional abilities. All the figural groups of the monument are plastically connected into a single whole. Interestingly, the silhouette of the sculptures is found in an expressive and diverse way, while their spiritual and psychological, semantic expressiveness and plastic interrelationship are not lost.

The surface of the walls of the surrounding ring around the central sculpture resembles the texture of a wooden wall, the architectural ring has broken edges, creating the appearance of a torn ring. On the inside, there are banners, awards and an inscription on awarding the city the title of “Hero City”.

Anikushin M.K., over the years of his work, has developed his own style of modeling, there is sketchiness in the works, not completeness and not telling, there is a feeling that the sculptor will continue his work and tell something else. The entire memorial was created in just two years. We know another well-known work of the author, this is a one-figure monument to A.S. Pushkin on the Arts Square, in St. Petersburg, the sculptor worked on it for 10 years and sculpted all the details of the monument well and created a masterpiece worthy of the Pushkin era.

When creating the memorial “Blockade”, M.K. Anikushin was assisted by his numerous students, 26 sculptural figures for the upper tier were sculpted in several sculpture workshops of the city under the guidance of the author. The students were able to convey the manner of sculpting the sculptor, also in their active creative activity they continue to imitate the teacher, but they cannot portray in their works that elusive spirituality and lyricism inherent in the works of M.K. Anikushin, by which his works are immediately recognized. Mikhail Konstantinovich corrected and finished all the sculptures prepared for the memorial in sculpture workshops himself. Some of the sculptor’s statements reveal the inner essence of his work: “Our profession is connected with nature, its construction, its nature, revealing the beauty of this nature.” Regarding modern sculptures, he says: “under the guise of big generalizations, stilted statues are made, which may immediately amaze the viewer, but most of all spoil the taste. All these conventional statues lead to the fact that we lose the feelings of life, simplicity and artistry” [4, l. 19].

Numerous sculptural groups created by Anikushin M.K. are located on side pylons converging in perspective. They turn to the center and face the Pulkovo Heights, in 1941 there was the front line of the defense of Leningrad. To the smallest detail, all the details of the memorial were thought out by architects and a sculptor. The sculptural compositions of the pylons plastically unite separate groups of people depicting episodes of the life of the besieged city and tell how the residents helped the front in the fight against the fascists (Fig. 6-11).



*Figure 6. Anikushin M.K. Side pylon*



*Figure 7. Anikushin M.K. Citizens standing protective structures for the city*



*Figure 8. Anikushin M.K. Seeing off to the front. Women steelworkers, foundry workers*



*Figure 9. Anikushin M.K. Seeing off to the front*

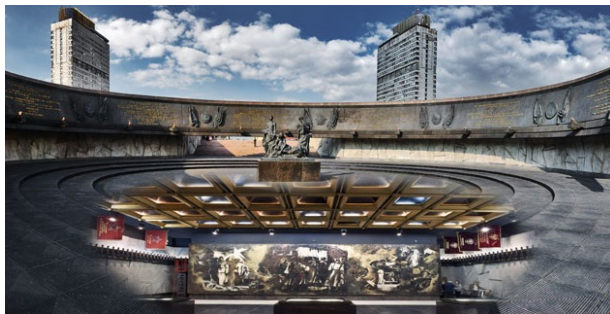


*Figure 10. Anikushin M.K. Defenders of the city*



*Figure 11. Anikushin. M.K. The end of the blockade*

On February 23, 1978, the memorial hall of the Museum of the Heroic Defense of Leningrad was opened. The decoration of the hall was carried out by muralist artists under the guidance of the famous artist A.A. Mylnikov: S.N. Repin, I.G. Uralov, N. Fomin (Fig. 12).



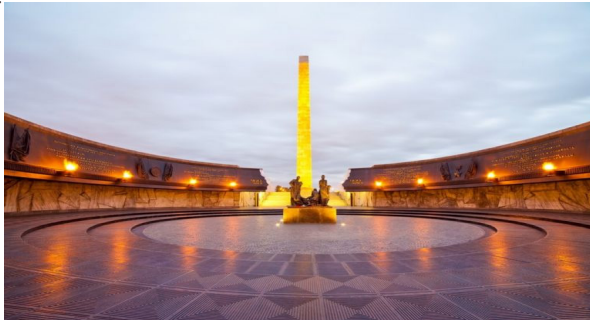
**Figure 12.** Architects Speransky S. B., Kamensky V. A. Memorial hall of the Museum of Heroic Defense of Leningrad in the lower tier under the “Torn Ring”

In the underground hall of the memorial there is an exposition dedicated to the defense and blockade of Leningrad, in the hall there are documents chronicling the war years of the Great Patriotic War period, household items of the blockade (Fig.13). The hall of the second tier of the ensemble illuminates 900 lamps equal to the number of blockade days of the city (Fig.14). Visitors to the memorial are accompanied by the sounds of D. Shostakovich’s seventh symphony, written by the composer in besieged Leningrad. the beats of the metronome are heard. In the memorial project created, talented architects and artists have achieved complete harmony of all elements of the monument: architecture with sculpture and paintings in the lower museum, with Eternal Flame and music. By the 70th anniversary of the Victory in the Great Patriotic War, the memorial was reconstructed. On the lower square of the “Torn Ring”, an Eternal flame was lit from a torch that combined flame particles from the main memorials of the countries of the former Soviet Union, because all citizens of the republics that are part of the USSR defended the country without sparing their lives.





*Figure 13. Architects Speransky S. B., Kamensky V. A. Memorial Hall of the Museum of Heroic Defense of Leningrad. Design: Repin S.N., Uralov I.G., Fomin N. Head Mylnikov A.A.*



*Figure 14. Architects Speransky S. B., Kamensky V. A. Eternal flame*

Everyone should remember about these historical events and remember the history of the state and remind the future young generation of our city, students who came to study in St. Petersburg and entered our Higher School of Folk Arts (academy), where the historical memory of folk traditional art is also preserved.

The excursion to the memorial dedicated to the heroism of the Leningraders and defenders of the besieged city helps to carry out the educational function of the spiritual impact of sculpture and architecture on the souls of people of new generations and preserve the historical folk memory of the besiegers and defenders of the city and the country from the German fascists of Germany.

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编舞训练在体育舞蹈中的重要性

ON THE QUESTION OF THE IMPORTANCE OF  
CHOREOGRAPHIC TRAINING IN DANCE SPORT

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**摘要：**本文论述了编舞训练在体育舞蹈中的作用和重要性。论述了编舞训练的主要方向、目标、目的以及舞蹈领域的主要方向。揭示了体育舞蹈编舞训练方向的特殊性和改进体育舞蹈编舞训练方法的必要性。

**关键词：**编舞训练、训练过程、体育舞蹈、舞蹈训练方向

**Abstract.** *The article discusses the role and importance of choreographic training in dance sport. The main directions of choreographic training, its goals, objectives and main directions in the dance port are discussed. The specificity of the direction of choreographic training in dance sports and the need to improve the methodology of choreographic training in sports dances are revealed.*

**Keywords:** *choreographic training, training process, sports dances, directions of choreographic training.*

In the sports field, choreographic training has become an integral part of the training process in almost all sports related to the art of movement [V. I. Maslov, 2003]. These are sports such as rhythmic, artistic and aesthetic gymnastics, acrobatics, figure skating, synchronized swimming, etc.

**The relevance of research.** Choreographic training in dance sports is one of the components of special training in the general system of development of an athlete-dancer. Choreography is used in a number of sports, for example in rhythmic and artistic gymnastics, figure skating, synchronized swimming as one of the means of specialized training for athletes of various levels of preparedness, which allows creating compositions that are more expressive and spectacular.

**Purpose of the study:** determine the main directions of choreographic training in dance sports.

**The research hypothesis** is that identifying areas of choreographic training in dance sports will improve the efficiency of the athletes' training process.

**The object of the study** is the training process in dance sports.

**Research objectives:**

- identify the features of choreographic training in dance sports,
- determine the directions of choreographic training in dance sports,
- give suggestions for increasing the effectiveness of choreographic training in dance sports.

During the educational and training session, which includes elements of a choreographic focus, athletes become increasingly close to art. The ability to convey emotions, mood, feelings through movements, as well as create vivid images, is formed.

Choreographic training in dance sports is aimed at:

- formation of dance posture;
- development of coordination of movements;
- formation of vestibular stability;
- strengthening the musculoskeletal system,
- form a culture of movements.

In the process of choreographic preparation, the following tasks are solved:

- mastering the elements of choreographic “school”
- formation of dynamic posture;
- “cultures of movements”;
- sense of balance;
- intermuscular coordination;
- motor memory, etc.

To solve problems, you can use a set of specific preparation tools:

- classical choreography exercises;
- folk dance exercises;
- exercises of historical folk and ballroom dance;
- free plastic movements;
- rhythm;
- pantomime.

The initial stage of preparation corresponds to the stage of mastering the elements of the choreographic “school”. In this regard, the list of skills being developed includes:

- elements of classical dance on the ground, at the support, then in the middle in simplified conditions (individual movements);
- elements of folk dance (at the support, in the middle, posture, hand movements in the nature of folk dances, basic steps);

- elements of historical and everyday dances: mastering preparatory movements (added, variable steps), polka steps, gallop, polonaise, etc.;
- rhythmic-plastic skills: developing a sense of rhythm, musical dynamics in the simplest movements, in musical games;
- artistic and expressive performance of exercises (free plastic movements, pantomime).

**Research methods:** analysis of scientific and methodological literature, pedagogical observation, conversation, comparison method.

### **1. Research results:**

Having studied the content of training choreographic preparation for classes in rhythmic gymnastics, figure skating and ballroom dancing, the following conclusions can be drawn:

1. Choreographic training is considered as special physical training and is an important part of training that helps athletes improve their physical fitness. Primarily, elements of classical dance (ballet) are used to train the muscles, especially the legs, core, arms and shoulders, as well as rotational training.

2. Choreographic training is mainly based on classical dance, which can help athletes develop elegant forms and improve body control ability, which are the most important elements of sports dance.

3. Improving musical and emotional expression abilities: By preparing to perform a dance composition, athletes can improve their perception of musical rhythm and help them better interpret music. Exposing athletes to different dance styles can develop their emotional integration in dance.

4. Emotional regulation and improvement of creative abilities. The inclusion of elements of various dance styles in the training process allows not only to eliminate the psycho-emotional fatigue of athletes but also to simultaneously develop their creative abilities.

5. Prevention of sports injuries: choreographic training helps dancers prepare the muscular system for significant loads when performing a competitive composition. Improving physical fitness can help dancers perform more complex dance moves more easily and reduce the risk of injury.

Choreographic preparation, based on our observations and analysis of special literature, must comply with sports characteristics, rules and requirements for constructing a competitive composition. It mainly focuses on the elements of classical dance training and includes some other types of dances in a targeted manner, and be modified according to the needs of the project and transformed into choreography suitable for the training and development of athletes participating in competitions.

The main goal of dancer athletes (dance pairs) is to increase the level of sportsmanship, the criterion of which is successful performance in competitions at var-

ious levels. The result consists of two parts: the technical side and “artistry” (performing skill).

The concept of artistry is associated with the level of choreographic preparedness, interaction in a pair, as well as the relationship between movement and music.

In general, the exercise (competitive composition) should:

- create a holistic image in combination with technically accurate dance movements;

- must be structured so that the couple can demonstrate the ability to emotionally express the “mood” of the music.

Choreographic training in dance sport in general and an individual couple in particular is reflected in the system of choreographic training. This type of training should include the development of synchronized work in pairs, when performing combinations at the barre, in the middle, in advancement, on the ground.

**2.Choreographic preparation, in our opinion, has the following features:**

(1) Choreographic preparation for dance sport should still be based on elements of classical (ballet) training, but some movements need to be adapted to better suit the technical characteristics of dance sport.

(2) Developing Music and Style: While classical dance can develop athletes’ elegant posture and musical expression, some sports dances are emotional and energetic, requiring explosive power and passionate performance from athletes. For example, Cha-Cha, Jive, Samba, etc. Therefore, more dance elements need to be added to help them train in other aspects. For example, you can add Syncopation (rhythm variation) to a jazz dance. Syncopation is a complex rhythm variation often used in jazz dance that involves rapid changes in tempo and rhythm. Syncopation training can improve a dancer’s sense of musical rhythm and dynamic expression.

(3) Incorporate elements of a Pilates workout: Pilates emphasizes core muscle training and increases body stability and flexibility through a variety of controlled movements and breathing techniques.

This type of training not only helps improve the posture and body symmetry of sport dance athletes, but also improves their body control and balance. For example, The Hundred (Pilates): This is a basic Pilates exercise that focuses on breathing and core muscles. Dancers can practice continuous arm swings to activate their core muscles, improve breath control, and build core strength.

(4) Add training elements of modern dance: Modern dance focuses on flexibility and mobility of the body, which can improve the flexibility of sports dance athletes and help them better perform various movements and poses, thereby reducing the risk of injury. Performing these elements Spirals (spiral movements), Suspension and Momentum (suspension and impulse) helps improve physical coordination and fluidity of movements of sports dance athletes.

Partnering (Duet Dance): Modern dance also often involves interaction between partners. Sports dance is a typical pair dance that requires silent cooperation between dance partners. By introducing this exercise, you can improve the ability to cooperate and interact in pair dance.

**Conclusions:**

1. Choreographic training is part of the educational and training process and should be interconnected with other types of training in dance sports.
2. The need for a qualitative change in the choreographic component in the training system for those involved in dance sports has been identified.

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在莫斯科国立师范大学教育空间普遍数字化的背景下发展未来外语教师的信息通信技术能力

**DEVELOPMENT OF ICT-COMPETENCE OF FOREIGN LANGUAGE STUDENTS WITHIN THE UNIVERSAL DIGITALIZATION OF THE MOSCOW STATE PEDAGOGICAL UNIVERSITY**

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注解。 本文致力于探讨莫斯科国立师范大学所奉行的技术政策的特点及其对外语和文化教学领域专业人才培养过程的影响。 作为学术空间数字化的一部分,考虑了在教育过程中成功使用的主要创新、项目和创新技术。

关键词: 数字教育、技术政策、ICT能力、交际能力、外语和文化教学、电子教育平台Teams、BigBlueButton软件。

***Annotation.** This article is devoted to the features of the technological policy pursued by the Moscow State Pedagogical University and its impact on the process of training professional personnel in the field of teaching foreign languages and cultures. The main innovations, programs, and innovative technologies that have been successfully used in the educational process as part of the digitalization of the academic space are considered.*

***Keywords:** digital education, technological policy, ICT-competence, communicative competence, teaching of foreign languages and cultures, electronic educational platform Teams, BigBlueButton software.*

The goal of modern pedagogical education is to create conditions for the successful personal development and self-realization of each person. These conditions are largely ensured by the technological policy of the MSPU, pursued in recent years.

As A.V. Lubkov emphasizes, current education cannot remain unchanged along with the constantly changing conditions and interests of the younger generation. The answer to the challenge of the time is the general digitalization of education, in which the Moscow State Pedagogical University has chosen a humanitarian vector of development, placing special emphasis on the formation of moral

foundations during the training of future teaching staff, since only this way all the positive and negative aspects of digitalization can be taken into account and train real specialists who are able to carry out educational activities successfully within the informatization of the society and be useful against the backdrop of increased demands made by the labor market today [3; p. 158].

The process of training foreign language teachers deserves special attention, on which the technological policy pursued by the Moscow State Pedagogical University has a significant influence, and due to which there has been a positive trend in increasing the level of efficiency of this process. At the Moscow State Pedagogical University new academic disciplines aimed at developing the ICT-competence of future teachers of foreign languages and cultures are being widely developed and introduced. First of all, we are talking about programs such as “Digital Education Technologies”, “Digital School”, as well as “Design of courses and modules in a foreign language”.

The educational disciplines “Digital Education Technologies” and “Digital School” are considered to be associated; their goal is to form a system of knowledge, as well as skills and abilities to use digital resources in the course of teaching activities.

Students of the Institute of Foreign Languages in the process of mastering these disciplines:

- learn to process information while working with various digital resources;
- improve skills in working with programs such as Microsoft Word, Microsoft PowerPoint, Microsoft Excel, where they move on to creating information products in the form of documents, presentations, tables, etc.;
- learn the basics of programming;
- carry out multimedia projects in such services such as Figma, LearningApps, MindMeister, Wordwall, etc.;
- familiarize themselves with the methods and techniques of using modern digital resources in the course of teaching activities.

These disciplines cover a basic range of programs, the use of which may be useful in the future for foreign language teachers in designing lessons, drawing up lesson plans, creating interactive tasks, as well as in preparing reports and maintaining documentation. As you know, modern Moscow schools in September 2017 completely switched to the electronic educational platform “MES”, developed by the Department of Education and Science of the city of Moscow. For many teachers the use of MES services causes a considerable number of difficulties, and many of them cannot adapt to this platform, preferring, for example, working with a blackboard to interacting with a modern electronic version of this board [4; p. 21]. Therefore, “Digital Education Technologies” and “Digital School” help to overcome barriers in interaction with electronic resources and help teachers to develop skills in using these resources in the educational process.

The academic discipline “Design of courses and modules in a foreign language” is a new program developed by the Department of Linguodidactics and Modern Technologies of Foreign Language Education, which is studied in the second semester of the fourth year. In the process of mastering the discipline students of the Institute of Foreign Languages take on the role of developers of educational materials in a foreign language.

During classes, students:

- select the target audience to which the educational materials of the developed module will be directed;
- predict the subjective and objective needs of the target audience, which during the study this course will have to satisfy, assess these needs;
- determine a set of goals and objectives of the module;
- select approaches to course development and draw up a curriculum.

Based on the results of studying the discipline, students demonstrate and defend the created course. During the module, the development of probabilistic forecasting and critical thinking of students occurs. They learn to analyze, process and structure information in such a way that the materials are informative, interesting and useful for learning by the target audience. This discipline has established itself as a very promising and new subject area, has shown its effectiveness, and most importantly, has found an emotional response among students of the Institute of Foreign Languages.

With the development of educational technologies, new teaching professions are emerging. In 2022, the Institute of Foreign Languages at the Moscow State Pedagogical University introduced a new master’s program: “Instructional Design: Development of Educational Resources and Materials in Foreign Languages.” This program was created on the basis of a detailed analysis of the labor market in the conditions of technologization of the pedagogical space and is aimed at training highly qualified specialists of a wide range of profiles: educational designers, moderators, developers of educational trajectories, game teachers, mentors, etc.

Students who choose this direction are engaged in an in-depth study of the methods of teaching foreign languages, master modern pedagogical educational technologies, thus enriching the fundamental level of knowledge acquired at the undergraduate stage. Particular attention is paid to the psychological aspect of learning, since educational products developed during the educational process must not only correspond to the individual characteristics of the target audience, but also be relevant and meet the increased requirements of EdTech market companies [2].

The conceptual model of pedagogical design in the field of foreign languages assumes diversity and flexibility in the use of modern digital resources in teaching, therefore, participants in this educational program during classes:

- study the basics of programming and modeling electronic resources;
- explore current trends and educational tracks;
- study the effectiveness and features of the inclusion of certain educational technologies (design technologies, health-saving technologies, block-modular learning technologies, collaborative learning technologies, gaming technologies, technologies for the development of critical thinking, etc.) in the process of designing educational methodological and didactic materials [6; p. 89];
- create new educational products in accordance with modern trends in digital development.

The Instructional Design program allows teachers in the field of foreign languages to look at the teaching profession from a different angle and translate their accumulated knowledge and experience into created educational products. Its special significance lies in the fact that it provides conditions for the comprehensive development of future teaching staff, introduces them to the labor market as such, which provides good chances of successful employment in the future.

The Moscow State Pedagogical University is widely introducing modern electronic platforms into the educational process, which have managed to successfully establish themselves during the period of distance learning. Let's consider such digital platforms as BigBlueButton and Microsoft Teams, and also determine their importance and capabilities in the process of training teachers in the field of foreign languages and cultures.

BigBlueButton is a modern cloud platform with high functionality and designed for video conferencing (webinars). This program ensures effective interaction between teacher and students online due to its ease of use and basic set of functions:

- the ability to create one or several rooms at once for a conference;
- enabling the presentation format and connecting several web cameras simultaneously;
- the ability to manage online broadcasting; management of listeners and speakers, transfer of rights to conference participants.

It is especially convenient to record conference materials in this program and then upload them to InfoDa Moodle, for the purpose of viewing and consolidating them by students in the future. Microsoft Teams is a corporate platform designed for interaction between conference participants in a remote format. The main functions of the program include:

- conducting video conferences, meetings, webinars, online calls;
- creating personal and group chats for communication with all conference participants;
- the ability to share the screen while showing presentations, documents, files;
- use of a virtual board, etc.

Since distance learning is rapidly gaining popularity these days, although, as practice shows, this is very often caused by necessary measures, these interactive platforms create conditions for conducting the educational process productively and without risks to communication [1; p. 113]. Their main advantage is that they are educationally oriented, which is emphasized by the presence, for example, of such a function as “raise of hands” in the Microsoft Teams application, when the conference participant who raised his hand first can present his answer without interrupting the others participants.

A long period of work with these platforms has shown that the programs are quite promising in terms of teaching foreign languages in a distance format.

Firstly, it provides the opportunity to form language skills and develop students’ communication skills online. As A.N. Shamov emphasizes, the main attention in the process of teaching a foreign language is paid to the formation of foreign language communicative competence which is the leading one among the main set of competencies and represents a complex systemic education [5; p. 182]. This process is carried out on the basis of educational disciplines and communicative modules, the implementation of which, in turn, has become more effective and successful due to the digitalization of the educational space and the use of modern computer technologies (in particular, Microsoft Teams and BigBlueButton platforms), which are actively being implemented by the Moscow State Pedagogical University in the process of teaching.

Secondly, working with multimedia language material becomes more convenient as the teacher has the opportunity to “share the screen” with students, transferring ownership of the broadcast into the hands of one or another student.

Thirdly, during the speaker’s performance other participants can join in an active discussion of the material using both a microphone and camera, and chat.

Thus, the technological policy of the Moscow State Pedagogical University, carried out in recent years, has formed a new vector for the development of the educational space. Modern digital technologies are being introduced, new academic disciplines and programs appearing are aimed at developing the ICT-competence of teaching staf, and new multimedia platforms are being actively introduced to help ensure the effectiveness of the educational process. Owing to this trend, the possibilities of providing digital support to students in the academic field and their successful adaptation are increasing, which, in turn, has a beneficial effect on the formation of a cultural and speech environment in which the formation and comprehensive development of the personality of teachers of foreign languages and cultures takes place.

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教学实践中的跨学科项目作为青少年价值观形成的方法  
**CROSS-DISCIPLINARY PROJECTS IN PEDAGOGICAL  
PRACTICE AS A METHOD OF THE FORMATION OF YOUNG  
PEOPLE'S VALUE**

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注解。 在本文中，作者认为，与年轻人进行有效的创造性、教育和科学工作需要使用特殊的教学方法。 对创建跨学科项目所使用的教学方法和策略进行了分析，以形成符合国家政策的学生价值取向。 还指出了机构师范教育对于形成国内教育新模式、保证公民在学习过程和项目任务实施中的自我认同的重要性。 文章还提供了各个教育领域成功项目的实际例子及其对年轻人价值观的影响。

关键词：跨学科方法、跨学科、高等教育、项目工作、能力、方法、价值准则、爱国主义教育。

**Annotation.** *In this article, the authors argue the thesis that effective creative, educational and scientific work with young people requires the use of special pedagogical methods. An analysis of pedagogical methods and strategies used in creating cross-disciplinary projects is provided in order to form value orientations of students, which corresponds to state policy. The importance of institutional pedagogical education for the formation of a new model of domestic education and ensuring the self-identification of citizens in the learning process and the implementation of project tasks is also pointed out. The article also provides practical examples of successful projects in various fields of education and their impact on the values of young people.*

**Keywords:** *cross-disciplinary approach, interdisciplinary, higher education, project work, competencies, methods, value guidelines, patriotic education.*

**Introduction:**

Globalization, technological innovation and sociocultural changes create unique conditions for the development of new values and the revision of old ones.

And educational institutions play a key role in shaping the civic identity and self-awareness of young people. In this context, the most important task of modern pedagogy becomes the formation of stable, deep and responsible value guidelines among young people, which will serve as the basis for making informed decisions and participating in public life. It can be noted that educational institutions have been faced with new challenges and responsibilities in recent decades. All external changes are also reflected in the educational process: the introduction of new modern technologies, solving the problems of socio-economic development and ensuring the security of the country. All this meets the national interests of the Russian Federation [1].

Studying various aspects of this problem is an urgent task, since project activities not only allow students to gain professional knowledge and skills, but also help them develop an understanding of the role of the younger generation in public life, awareness of the value of the country's historical and cultural heritage, and so on. The relevance of the problem is due to the fact that using the potential of interdisciplinary projects within the digital educational environment for educational activities significantly influences the formation of students' worldview and their system of value orientations. The scientific novelty of the presented research lies in the theoretical justification and practical demonstration of the effectiveness of using interdisciplinary projects as a teaching method in the higher education system.

The purpose of the article is to substantiate the effectiveness of using the interdisciplinary project method for obtaining professional knowledge and skills, to describe the methodology for implementing group projects aimed at developing an understanding of the role of the younger generation in public life and awareness of the value of the historical and cultural heritage of the country, as well as to analyze the experience gained during the implementation projects "Living Mosaic", "Bukvitsa", "Culture & Media".

### **Main part**

According to the Strategy for the Development of Education in the Russian Federation for the period until 2025, civic education includes "the creation of an active citizenship position, civic responsibility based on the traditional cultural, spiritual and moral values of Russian society" [2]. Thus, the teacher is entrusted with even greater responsibility, the role of the teacher is changing, he becomes a key link not only in the transfer of academic knowledge, but also in the transmission of spiritual and moral culture, which contributes to the value development of students. A modern educator is also a guide, facilitator, and mentor, who helps students develop as individuals and responsible citizens.

To perform this role, the teacher needs to constantly develop by exploring their professional practice and applying a creative approach, reflection, and innovation



in pedagogical activities. According to a number of studies by Polyakov N.A., Abdurakhmanova A.T., Mazur I.I. the use of the project method provides new opportunities for innovation in the field of education [3; 4; 5]. We agree with D.F. Bjorklund that the project method is an effective tool within educational activities and can be used at all stages of the educational process [6].

In the context of practice-oriented learning, research related to the use of interdisciplinary connections in project activities in a digital educational environment is relevant [7]. The problem of developing students' meta-subject competencies through a project approach is raised in his works by M.V. Romanenko, which in turn proves how project work influences the comprehensive development of a student's personality starting from primary education, and the education of a creative personality contributes to the effective organization of one's own cognitive activity [8].

The methodological basis of the work is the works of L. S. Vygotsky, Yu. S. Manuylov, M. M. Shevtsova. as well as Shalamova O. O., Shalamova D. A. and Yakovleva N. O. [9;10;11;12].

For a deeper understanding of this problem, the works of E. A. Arbatskaya, E. G. Tarkhanova are of interest. in the field of research on the concept of "soft skills", as well as Gorbunova N.V. from the point of view of the development of project activities and project methods in education [13;14].

An analysis of the published research results of Russian and the foreign scientists shows significant differences in the understanding of cross-disciplinary projects in the education system. The authors X. Huang and C. Wang note in their works that the scope of application of project-oriented disciplines is insufficiently studied [15]. At the moment, the research of Magomedov M.N., Noskova N.A. is of particular interest. in the field of regional aspects of conducting design disciplines [16]. The need for a comprehensive study of the advantages and features of using an interdisciplinary approach in project activities as a means of training and education in the higher education system has been sufficiently expressed. Project activity is one of the key components of the modern educational process. It allows students to apply acquired knowledge in practice and develop skills in solving various problems [17].

As part of project activities, students can choose project topics, determine methods for their implementation, and work in a team. This promotes the development of creative thinking, communication skills and the ability to work with various sources of information. Students' project activities are inextricably linked with the creative, moral elements of life, and awareness of social place [18].

Cross-disciplinary projects are a special method in which knowledge and skills from different fields of science and art are integrated to solve complex problems. This method promotes the development of critical thinking, creative activity and the ability to collaborate, which, in turn, contributes to the formation of value orientations of young people.

In Russia, programs are actively developing aimed at identifying and supporting talented youth, increasing the competencies of teachers and students, and ensuring the participation of educational organizations of higher education in the socio-economic development of the constituent entities of the Russian Federation.

For example, the goal of the youth project competition of the Federal Agency for Youth Affairs is to identify and support the best projects in the field of education, science, economics and politics. This competition is designed to stimulate the participation of young people in the social activities of the state. Students of the Don State Technical University, under the guidance of teacher-mentors, took part in the teams of the following projects that received grant funding for implementation: “Living Mosaic”, “Bukvitsa” and “Culture & Media”.

A good example and illustration of the development of meta-subject competencies in students and a cross-disciplinary approach in the educational process is the “pupil-student” work format, where mentoring plays a key role. Based on this principle, the cultural and educational project “Culture & Media” was developed. This is a creative workshop for schoolchildren in grades 8-11 and students of specialized specialties. The concept of the project is based on media production, namely on the creation of youth multimedia content in order to popularize the cultural and historical heritage of the Don region. By involving schoolchildren in project work under the supervision of students of specialized specialties, students are immersed in the study and research of the culture and history of the region, learn to think critically and present information in various formats, adapting it to the characteristics of their media consumption.

Thus, during the implementation of the “Culture & Media” project, such meta-subject results are achieved for the target group as the development of creative thinking, communication skills, and the ability to think critically, which allows students to transform methods of activity from their learning goals into a means of developing abilities. Project participants acquire new knowledge and skills in the field of media production, broaden their cultural and historical horizons. This also makes it possible to increase the production of high-quality sociocultural youth content on the Internet by distributing it by schoolchildren on social networks. As a result, the above project-based cross-disciplinary approach in the educational process also contributes to the formation of value orientations of young people, where knowledge and skills from different fields of science and art are integrated to solve complex problems.

The second project that clearly illustrates the importance of a cross-disciplinary approach in the development of meta-competencies is the educational animation project “Bukvitsa”. It is created by a group of proactive students of the Don State Technical University as series informative short videos about objects that are in every Russian family, but are called differently in different regions of the Rus-

sian Federation. The project's feature is the creation of educational and enlightening content for schoolchildren by schoolchildren and students, thereby solving the problem of involving the younger generation in the history of their homeland and country, fostering a conscious attitude towards the language as a national-cultural value in the context of implementing state and public interests in promoting Russian culture, and shaping national identity in a playful form.. The project promotes career guidance for students - both project participants and volunteers, and becomes the first step to entering the global market of animation and animation technologies. Forming civic consciousness and strengthening social competencies is one of the priority goals in this project, and teachers act as mentors.

No less interesting is the "Living Mosaic" project, which includes a team of students of different competencies: programmers, robotics engineers, media specialists, engineers, urban planners and even clothing designers. In the context of the digital transformation of modern tourist flow, the project team created a unique seamless multimedia tourist route along the city's underground passages. Thus, she created a promising direction for the development of tourism infrastructure as a factor in optimizing the region's economy. A key feature of the route was the revitalization of unique Rostov mosaics through animation and drawing attention to this cultural heritage site. There is no need to make large investments for this project, since the existing urban infrastructure is being exploited, which ideally corresponds to the educational paradigm of project-oriented activities. The mobile application, as an integral part of this project, allows you to replicate animated content along underground passages using current practices of media content consumption.

This project is one of the most effective ways to develop both hard skills and soft skills. In addition to knowledge of certain animation and programming technologies, students are deeply immersed in the semantic environment of the history of their native country and actively develop soft skills, interacting in a team of different ages, successfully establishing communication with both colleagues and experts.

The method of teaching the history of the development of the country and one's small homeland through the study of examples of Soviet monumental industrial art, reflecting the development of the region from Peter I to the present day, showed high effectiveness and a deep understanding of the subject among the project team.

Having analyzed different ways of interacting with students and project team work using a cross-disciplinary approach to forming value guidelines for young people, the following key stages were identified that can be included in the formation of an educational program:

1. Determining the purpose and direction of the project. In the conditions of patriotic education of youth, the most relevant area for work is the cultural and

historical heritage of the state. When implementing projects on this topic, students from different areas of study can be involved to achieve maximum results, and the projects themselves can take different forms and formats.

2. Team formation. A cross-disciplinary approach allows us to develop the most complex projects. Based on the skills and abilities of students, a team is formed, which includes creative, technical and scientific. In this way, students interact with each other and are united by one common goal. In leading universities, such an approach to building the educational process is becoming one of the key ones; it meets both the individual learning trajectory and is practice-oriented.

3. Project implementation and development of competencies. Today, one of the requirements for candidates for a particular position is the presence of a professional portfolio. Participation in cross-disciplinary projects closes this request - graduate students have ready-made cases that receive funding from the state and, as a result, continue to develop in this area, attracting new participants.

4. Social effect. The developed projects do not remain within the walls of the university; they are aimed at a wide audience. Here we can trace both internal indicators: increasing the level of knowledge and competencies of students, and external indicators: distribution project (product) to the audience, coverage of socially significant problems and their solutions.

**Conclusion:**

The idea of socially significant and patriotically oriented project activity lays the foundation for the work of the group and each of its participants with important social goals, encouraging students to actively explore the surrounding reality and determining the development of educational, cognitive, creative, communicative and reflective skills. This contributes to the formation of one's own social and, therefore, patriotic position.

All of the above projects are aimed at creating an individually significant product. The result of creativity serves to form a general model of behavior and its application in the student environment. In this case, the project line can be applied in another educational organization, if resources are available, and can be useful to other participants in the educational sphere.

According to the analysis of the above projects, we came to the conclusion that cross-disciplinary projects deeply immerse students in the material due to independent study of information and practical activities and gradually serve as a method of forming the value orientations of young people, without causing rejection and helping to delve deeply into historical and cultural aspects life of the country and region.

At the same time, the use of cross-disciplinary project methods creates conditions for students' self-realization, their self-determination and self-actualization. It also helps students develop independent work skills and a sense of responsibility.

ty. Cross-disciplinary projects promote the development of critical thinking, creativity and communication skills of students. This teaching method allows them to learn not only to study subjects, but also to apply knowledge in different contexts.

Cross-disciplinary projects create conditions for the formation of youth values, including respect for knowledge, tolerance, ethical principles and active participation in public life. Students, by participating in projects, can become aware of the importance of values and principles that are relevant to specific tasks and problems. Also, cross-disciplinary projects represent a modern and effective method of forming the value orientations of young people. Teachers who skillfully use this method can help not only improve students' academic performance, but also develop their personality as a valuable member of society.

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盎格鲁撒克逊排他性概念背景下的英国帝国野心的起源（基于维多利亚时代英国历史学家的研究）

**THE ORIGINS OF BRITISH IMPERIAL AMBITIONS IN THE  
CONTEXT OF THE CONCEPT OF ANGLO-SAXON EXCLUSIVITY  
(BASED ON THE STUDY OF BRITISH HISTORIANS OF THE  
VICTORIAN AGE)**

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抽象的。 本文致力于在盎格鲁-撒克逊排他性概念的背景下，以古代日耳曼部落的种族优越性思想为基础，研究英国帝国和霸权野心形成的历史——中世纪——起源。 盎格鲁人和撒克逊人），现代英国人的前身。 这一概念的基本组成部分被揭示：日耳曼主义、传统主义、国家的独特性、政治历史和权力机构、法律和君主在国家历史中的主导作用。 其资料来源是英国杰出的自由史学史学家的著作，这些著作在维多利亚时代的英国历史科学中占据主导地位。 事实证明，英国人声称统治世界可以追溯到十二至十三世纪早期在不列颠群岛的扩张时期（征服爱尔兰和威尔士），这标志着大英帝国创建的开始。

关键词：帝国野心、盎格鲁-撒克逊排他性概念、辉格党自由主义史学、英国历史学家、维多利亚时代。

*Abstract. The article is devoted to the study of the historical – medieval – origins of the formation of imperial and hegemonic ambitions of the British in the context of the concept of Anglo-Saxon exclusivity, based on the idea of racial superiority of the ancient Germanic tribes (Angles and Saxons), the predecessors of modern Englishmen. The basic components of this concept are revealed: Germanism, traditionalism, the uniqueness of state, political history and institutions of power, the dominant role of law and the monarch in the history of the country. The sources were the works of outstanding English historians of liberal historiography, which occupied a dominant position in the historical science of Great Britain of the Victorian age. It is shown that the claims to world domination of the British go back to the period of early expansion of the XII–XIII centuries in the British Isles (the conquest of Ireland and Wales), which marked the beginning of the creation of the British Empire.*

**Keywords:** *imperial ambitions, the concept of Anglo-Saxon exclusivity, Whig-liberal historiography, English historians, the Victorian age.*

The origins of the imperial ambitions of Great Britain, which for several centuries owned a huge colonial empire, finally collapsed in 1997 after the transfer of Hong Kong to China, which was rejected in 1897, are rooted in its medieval past, associated with the colonization of Ireland and Wales in the XII–XIII centuries. Since then, the process of “expansion” of England and its “amazing greatness” has begun, a convincing picture of which was presented by J.R. Seeley, a founder of British imperial history [1, p. 12], promoted a concept of Greater Britain, who wrote about the steady territorial growth of the British Empire since the XVI century, but sagaciously noted that “the great colonial expansion” England “exposes it to new dangers from which, in its ancient insular insignificance, it was free” [2, p. 1–2].

In general, the conquering policy of the British Crown was usually justified in the writings of British historians. Thus, H. Hallam argued that the conquest of Ireland had a positive impact on its further development, that “Ireland, if left to herself, would have settled in time under some one line of kings, and assumed, like Scotland, much of the feudal character, the best transitional state of a monarchy from rudeness and anarchy to civilization”; “in the middle of the sixteenth century Ireland could have no reasonable prospect of independence; nor could that independence have been any other than the most savage liberty, perhaps another denomination of servitude” [7, vol. 2, p. 723]. According to J.R. Green, thanks to the wise policy of Edward I, based on the principles of justice and harmony, “the most barbaric Welsh traditions” were eliminated in Wales and a lasting peace was established for “hundreds of years” [11, p. 163].

The desire to rule the world is manifested by the Anglo-Saxons (British and Americans) at the present time, but is suppressed by the policy of the Shanghai Cooperation Organization, primarily China, India and Russia, among which China is recognized as the most powerful economy, which advocate the creation of a just multipolar world order.

The concept of Anglo–Saxon exclusivity, as an explanatory model of the imperial and hegemonic claims of Great Britain for centuries, was developed in England by a galaxy of outstanding historians of the Victorian era (formally, 1837–1901, but, according to the established historiographical tradition, covering the entire XIX century and the first third of the XX century) from the standpoint of the liberal/neoliberal (Whig) paradigm of history, which dominated in Great Britain, – H. Hallam (1777–1859), F. Palgrave (1788–1861), T.B. Macaulay (1800–1859), E. Freeman (1823–1892), W. Stubbs (1825–1901), J.E. Acton (1834–1902), J.R. Seeley (1834–1895) J.R. Green (1837–1883), F.W. Maitland (1850–1906). They



used an approach which presents the past as an inevitable progression towards ever greater liberty and enlightenment, culminating in modern forms of liberal democracy and constitutional monarchy. Whig historians emphasized the rise of constitutional government, personal freedoms and scientific progress. H. Butterfield, who introduced the term “Whig history” in scientific study, argued that Whig historians praised revolutions provided they have been successful, and emphasized certain principles of progress in the past and to produce a story which is the ratification if not the glorification of the present [3, p. 2]. An excellent illustration of this thesis is the purpose of E. Freeman’s monograph “The growth of the English constitution from the earliest times”, which was “to show that the earliest institutions of England and of other Teutonic lands are not mere matters of curious speculation, but matters closely connected with our present political being” [4, p. IX].

At the beginning of the twentieth century, on the basis of racial Anglo-Saxonism, a pattern emerged according to which the civilization of English-speaking nations surpasses the civilization of other nations due to racial traits and characteristics inherited from the Anglo-Saxons who conquered Celtic Britain in the V–VI centuries. Already in the middle of the XIX century T.B. Macaulay in his book “The History of England from the Accession of James II”, known as a seminal example of Whig history, expressed his contention of the superiority of the Western European culture and of the inevitability of its sociopolitical progress. This was the opinion of a very authoritative British historian of the liberal formation, about whom Lord Acton wrote that he “had done more than any writer in the literature of the world for the propagation of the Liberal faith, and he was not only the greatest, but the most representative, Englishman then living” [5, p. 482].

As the Whig historians of the XIX century, they inherited from historians and politicians of the XVII–XVIII centuries an enthusiastic admiration for the antiquity of English parliamentary traditions and a firm belief in the unconditional superiority of the English political system in the past and present over the political systems of all other countries. This position was based on the inherent British “domestic” patriotism, which in political life was as a “faith in religion, and it stands to the domestic feelings and to home-sickness as faith to fanaticism and to superstition” [6, p.293].

British Whig historians of the Victorian age in their research argued the ideas of a “unique” way of the historical development of England, the “spirit of freedom” inherent in the British and positioned England as the cradle of European parliamentarism and an “exemplary” state structure, paying special attention to the study of the Magna Carta, medieval parliament, royalty, the state and the constitutional order, including the number of the imperial. Relying on solid source material, interpreted accordingly, Whig historians sought to prove the superior-

ity of the British constitutional monarchy, the state system of government and to substantiate the idea of the historical “conditionality” of Britain’s dominance in the civilized world. So, according to the statement of H. Hallam, “England... had acquired in the fifteenth century a just reputation for the goodness of her laws, and the security of her citizens from oppression” [7, vol.1, p. 2].

The inviolability of the British Empire was based on the superiority of English law, the embodiment and bearer of which was the monarch, who ruled over “millions and millions of people who were not only English”, as well as the concept of “the never dying kings”, which determined the continuity of the monarchical form of government in Great Britain and enshrined in the Act of Succession in 1701 [8, p. 341, 343-344].

Being Germanists, the English historians of the XIX century argued their positions by demonstrating the advantages of the Anglo-Saxon and Anglo-Norman past of England, in the depths of which a monarchical form of government was born, limited to “popular” institutions, preserved in the post-Norman era, that is, they built the history of the emergence and consolidation of English statehood to the V–XIII centuries [9, vol. 2, p. 161]. The historians focused on three phenomena of national history – the Magna Carta, the medieval Parliament and the British constitutionalism, which, from their point of view, were the most vivid embodiment of the spirit of “ancient English freedom” and characterized the British as carriers of “the only true democracy” and adherents of peaceful evolutionary development. All British Victorian historians defended the idea of the “exclusivity” of the English medieval parliament as a phenomenon of native English democracy, “people’s representation”, the expression of the “harmony of the interests of the king and the people” and the source of the principle of “people’s freedom” [9, vol. 2, p. 166]. Thus, in the English historiography of the XIX century, two mythical images of the English medieval parliament were created – as an organ of “people’s freedom” and “an organ of class harmony of the nation under the rule of the king” [9, vol. 2, p. 158-166; 10, p. 77, 148]. Magna Carta has traditionally been considered in British historiography as the basis of the English constitutional system, the basis of English freedom, which preceded the formation of the parliamentary system of government [11, p. 123-124].

This is how the understanding of the gradual formation of the English constitutional order, its “growing up” from medieval roots, was established. According to the Whig politician and historian of the first third of the XIX century Sir James Mackintosh: “Constitutions are not made, but grow” [6, p. 58].

One of the important components of the concept of Anglo-Saxon exclusivity of the English historians of the XIX century was the idea of continuity of the historical development of England, its national and political history, from the V to the XIX centuries inclusive, which have always been marked by “the predominance

of freedom over non-freedom / slavery, tolerance over intolerance” [4, p. X]. Even earlier, the same idea was developed by H. Hallam, who claimed that “the government of England, in all times recorded by history, has been one of those mixed or limited monarchies which the Celtic and Gothic tribes appear universally to have established, in preference to the coarse despotism of eastern nations, or to the more artificial tyranny of Rome and Constantinople, or to the various models of republican polity, which were tried upon the coasts of the Mediterranean Sea” [7, vol. 1, p. 1–2].

The roots of the English “mixed or limited monarchy”, the rising of parliamentarism, were seen by many English historians of the XIX century in the witenagemot, the people’s assembly of the Anglo-Saxon period. J.R. Green believed that the witenagemot transformed into the Royal Council and played a decisive role in the emergence of the Parliament of the XIII century. According to him, since Edward I, the structure of English society – the parliament, the House of Lords, the House of Commons, the judicial system, relations between church and state – has acquired modern forms [11, p. 164, 169-170].

Thus, the fundamental components of the politicized concept of Anglo-Saxon exclusivity, developed in the English liberal-Whig historiography of the XIX century and bearing conservative and protective content, are: Germanism / Teutonism (racial and intellectual Anglo-Saxonism), traditionalism (the idea of the continuous development of statehood and parliamentarism; the inviolability of constitutional foundations), the uniqueness of the state-political history and national institutions of power, the system-forming importance of law and the royal power in political and social spheres of England.

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历史作为一门科学。 俄罗斯在世界历史进程中的地位  
**HISTORY AS A SCIENCE. RUSSIA IN THE WORLD HISTORICAL  
PROCESS**

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注解。 人权活动家 I. R. Shafarevich 丰富了对俄罗斯历史轨迹的分析,目前正在进行中。

关键词: 职业; 大众认可; 订书钉; 主权; 东正教信仰; 仇俄意识形态; 文明; 杂交。

*Annotation. An analysis of the trajectory of Russian history, enriched by human rights activist I. R. Shafarevich, is being carried out.*

*Keywords: vocation; popular recognition; staples; sovereignty; Orthodox faith; Russophobic ideology; civilization; hybridization.*

**Introduction. It was called to defend the history of Russia.**

June 5, 2023 marked the 100th anniversary of the birth of our compatriot Igor Rostislavovich Shafarevich (June 3, 1923 - February 19, 2017), a Soviet and Russian mathematician, a major scientist who made a fundamental contribution to algebraic number theory and algebraic geometry.

Being an academician of the Russian Academy of Sciences, Igor Rostislavovich also held the title of corresponding member of the national academies of a number of foreign countries. Nevertheless, Igor Rostislavovich Shafarevich gained his truly national recognition not only as an accomplished leader in the field of mathematical knowledge, but also as a person who masterfully mastered the methodology of studying history as a humanities science. National recognition is not only a marker indicating acceptance and respect from others, but also awareness of the importance of one's person and the significance of one's own contribution to society

The platform of history as a scientific field of knowledge includes not only data based on reliable facts, but also uses methods for modeling the historical process while operating with alternative models that make it possible to variably display

reality through the construction of ideal objects. If necessary, the actual content of scientific research can be recorded in the form of theoretical calculations. As an inquisitive researcher (historian, sociologist, publicist and philosopher) in the humanitarian field of knowledge, Igor Rostislavovich, thanks to his high dedication in the field of serving the good of the people, gained popular recognition, which is appropriated and matures in the hearts and souls of grateful readers. Popular recognition overtook him after the end of Igor Rostislavovich's term of service in the conditions of his earthly sojourn. And the news of his departure caused a real resonance in modern society, which is named after I.R. Shafarevich is correlated with his educational activities aimed at the benefit of the people, to serve which he was literally called by his Fatherland. And service to the Fatherland, as the officer code of military honor teaches us, requires deep passion, complete dedication, commensurate, perhaps, with the officer's duty, the bearers of which are Soviet and Russian officers (and previously Russian officers), who form the core basis and support of our army and the fleet and acting as bearers of the example of high service to the Motherland and guardians of military honor in our native Fatherland. To the same extent, solving the problem of protecting the interests of the people required the highest level of dedication from Igor Rostislavovich

Service to the Fatherland, coming from the depths of the soul and having root motivations to search for one's calling, encourages the bearer of this high life purpose to constant personal creative growth and self-education realized in the process of one's own self-development.

The calling to serve one's Fatherland (as a solution to the tasks of strengthening statehood and respecting the interests of the people) is acquired in the process of realizing one's personal duty in observing and fulfilling the socially important obligations taken in connection with this decision.

The willingness to follow one's own path, chosen on the basis of inner motivation, is dictated by one's own personal calling, which is acquired and elevated as a result of the search for truth, comprehended in satisfying the thirst for creativity aimed at serving the interests of the people.

In the course of analyzing the life path of Igor Rostislavovich, the attentive reader will certainly discover the meaning of a person's stay on this earth. And an inquisitive person cannot help but become interested in questions about the meaning of life. Using this example of studying the function of calling (I think Igor Rostislavovich would approve of such an analogue), the essence of calling can be discovered as a duty to serve the Motherland, consecrated with a divinely high meaning. Civic duty, which is carried out under the flag "WE", guarantees the sovereignty of our people (as a factor ensuring the stability of state power) and directs us to achieve a special quality of public life for our citizens. serving as an indicator of the stability of people's lives. The calling "serve the people" is carried out subject to a number of basic conditions, including the following requirements:

– acceptance of one’s civic responsibility in the field of education, understood as the process of realizing the inherent desire of the teacher to found, educate and develop in growing individuals a set of qualities intended to serve the good of the people;

– readiness to act as a bearer of divinely high truth, associated with opening the path to Orthodox values realized in the public life of citizens (both our compatriots and all respectable people);

– the ability to realize that the path to acquiring Orthodox values is thorny, which is associated with the presence of active opposition to spiritual life provided by opponents of Orthodox culture;

– preparedness to repel attempts to destroy the system of Orthodoxy as one of the identifying marks of the spirituality of the Slavic civilization. The importance of preserving the Orthodox faith is due to the fact that the Orthodox faith affirms the triumph of Orthodox morality, realized as the consolidation of Orthodox commandments in the social life of the people.

If we talk about the service of a teacher or educational service, then the emerging thirst for serving one’s Fatherland is transformed into a thirst for knowledge of the process of formation of the beginnings of the formation of truly human qualities in the course of the education and development of both an individual and the development of the spirit of collectivity and civil sovereignty in social associations of any scale and any positive direction of their activities.

Thus, the peculiarity of the scientific approach applied by I.R. Shafarevich, is due to the projection of mathematical methods to the study of historical facts and events that take place both in the history of Russia and in world history as a whole.

A beneficial consequence of the symbiosis of means and motives that arise during the active application of investigative methods is, in our opinion, the process of establishing elements of identity, similarity, similarity, as well as establishing the authenticity of historical facts. And if in a number of cases the researcher manages to establish the course of history adequate to the truth, then in the space of historical events and facts of modern times and the millennium period preceding it, there are often insoluble contradictions caused by the fact that history as a scientific field is often not identified with establishing the truth of significant events and, in addition, the requirements for the correct use of facts and their careful storage and the requirement to master the methods of transmitting established key facts to people are not met.

. Focusing all his research efforts on the problem of protecting the rights of the Russian people, protesting against the outrageous phenomenon prevalent in the realm of historical scientific facts, I.R. Shafarevich unveiled the specifics of the phenomenon of distorting the course of history, based on falsification of events and facts in the course of the historical process.

Despite the fact that the chronicle of events that emerges from the pen of falsifiers may exist as history, claiming to be the scientific nature of falsified data, however, this reality, characterized as “Pseudohistory”, is this chronicle. not nourished by scientific ideas and not containing concepts on historical topics, its essence was the “rewriting” of events of the past, in accordance with the personal interests of the falsifiers, presenting the described events in the light of possible personal gain from them in modern times. The pseudoscientific history of Ukraine is especially rich in this kind of “tales”, which asserts the origin of Russia from the depths of the historical past of “Nezalezhnaya”. Russia, which does not take measures to counteract the massive pressure of hoaxers, could lose its history.

In connection with the threat arising from outside that Russia will be deprived of its rich history of the development of Russian civilization, I.R. Shafarevich became like an archivist due to the fact that he was forced to switch his attention to investigating the facts of archival cases with events significant for the course of history. Thus, thanks to scientific research and painstaking efforts of I.R. Shafarevich, the History of Russia, from a list of historical and not always reliable data, was expected to be transformed into a scientific field, organized as a system in accordance with scientific requirements.

Based on the danger of russophobic psychology for the preservation of Russian statehood, and being under pressure from the falsification of Russian history, Igor Rostislavovich outlined the problem of taking preventive measures to form the self-awareness of the Russian people on the basis of preserving their subjectivity as a sociocultural phenomenon and uniqueness as an ethnic group.

In his works, I. Shafarevich illuminated the true motives of the action of special social formations - anti-systems, negatively disposed towards the implementation of state development strategies of other states. Anti-systems frantically plant instruments of mystification that serve not to establish the people’s line, but to push the anti-people line into the life of the positive system in order to subjugate the people’s self-consciousness to an alien will. However, NATO’s machinations aimed at destroying the bonds of our Russian statehood will not be in vain, bearing in mind the identification of an important characteristic of Russian civilization, which acts as an intercessor and tamer of anti-systemic tendencies both in the national life of its civilization and in the global world order.

**Part 1. The relevance of the worldview function of the heritage of I.R. Shafarevich as a factor in the stability of the self-awareness of the Russian people.**

The socio-political crisis that unfolded in Ukraine entailed a change in the geopolitical conditions of Russian statehood. At the same time, the problems of preserving the self-awareness of the Russian people emerged, which arose due to the fact that significant damage was caused to the national self-awareness of Russian civilization by the anti-systems of the collective West, and this result was due to



the targeted use by the United States of America and Western European countries of technologies for modeling russophobic psychology and the widespread spread of russophobia as principle of life.

The problem of raising the level of development of the self-awareness of the Russian people was updated by I. R. Shafarevich in connection with the threats to statehood that arose in the post-Soviet space of Russia and pointing to problems of a special kind found in the structure of the internal life of Russia, and provoked by the adoption of the development strategy of the Russian state “from Western curators » development of a society focused on the interests of financial structures.

The position of a patriot of the Russian people, which Igor Rostislavovich Shafarevich occupied, prompted him to provide a platform based on impeccable logic for constructing a picture of the world. Awareness of the importance of his calling and commitment to it characterizes I.R. Shafarevich as a patriot of his homeland.

The platform represents a kind of ideological coordinate system that allows the reader’s personality to identify his own moral position and determine the paths for the revival and development of the self-awareness of the Russian people.

The worldview coordinate system outlined by I. Shafarevich serves as the basis of the modern worldview and contributes to the holistic formation of ideas about the world order in the context of a sharply intensified large-scale information confrontation between the West and Russia. In this confrontation, the West’s clever ways of waging a propaganda war, aimed at fooling people, are of particular importance. At the same time, the “propagandists of the West” do not take into account the insufficiently mature age of the growing individuals who have fallen under their inhumane zombification. As the Speaker of the Federation Council Valentina Matvienko said, Russia is dealing with attempts to destroy the personality of its citizens, “in connection with which the need to create in our country a powerful, effective system of promotion, conveying our values and our meanings to the younger generation is long overdue and is felt more and more urgently.” [1] (RIA Novosti) from 03.03. 2023.

In a systematic approach to the analysis of the organization of society as an integral entity, I. R. Shafarevich constructs a picture of the world of society as a special social subject of activity, capable of developing on the basis of specific mechanisms of functioning and development, characteristic of a given ethnic group.

Modern social processes influencing the formation of world space in the course of interaction of civilizations have actualized the problem of civilizational identity, reflecting the desire of peoples to preserve their sociocultural identity in a global world.

Civilization means a broader community than a nation, capable of creating sustainable social, material and spiritual values that are different from other values

produced by other sociocultural formations, and that leave a special mark in history, serving as a contribution to the development of humanity. Civilization, thus, acts as a stable community of sociocultural systems that preserve their originality and integrity over significantly long periods of historical time [2, Zhade, Z.A.]

According to another definition given by V.S. Shapovalov [3], civilization is “a sociocultural community formed on the basis of universal values (i.e., values that rise above local values and are expressed in world cultural components (religions, moral systems, law, art). Universal values are combined with a complex of practical and spiritual knowledge [3].

The success of the development of society, as I. Shafarevich showed in his works, is directly dependent on the conditions of the external and internal social environment, influencing the presence of factors of stability of society or its destabilization. A comprehensive analysis of the dynamics of interaction between social systems (large and small nations, individual groups, individuals) was revealed by I. Shafarevich in a number of aspects of the life of society: axiological, ideological, informational, economic, and political, in the requirement of conformity with nature. Such a comprehensive analysis by I. Shafarevich prepared the ground for the reader to deeply understand the importance of the role of the individual in the formation of a strong statehood, for the formation of ideas about oneself as an integral part of the Russian people and for understanding the importance of education and self-education of a special kind of personality attitudes as a socio-cultural systemic formation. The acquisition of such socio-cultural attitudes (let’s call them that) will allow the individual to self-realize and interact productively both with the totality of systemic formations of the state society and in the world community, functioning in a constructive dialogue of cultures on the principles of mutual respect and mutual assistance, recognition of the uniqueness of each individual socio-cultural unit.

### **Part 1. Russophobia and lack of integrity of national life as factors of destabilization of the state**

In the preface to the book “Russophobia” [16] I.R. Shafarevich denotes the leitmotif of his fundamental work: “The main idea, which I support in different works with different arguments, is the following. The strength and vitality of a state is determined not by the efficiency of its administration, the power of its army or the productivity of its economy, but by the integrity of its national life!!

For an example of a violation of the integrity of the national life of the Russian people, the scientist turns to the phenomenon of a state uniting several nations. Examples of such states are Great Britain and Russia. But if in Great Britain and other states of this type, among several nations, “there is always one “state-former”, through whose efforts the state was created, on whose cultural rules it is based.” then in this regard, Russia (like the USSR before it) is a “sick organism.”

Twenty republics within Russia have the status of a titular nation, while these “titular nations” make up only about 8% of the population.

There is another indicator of the “sick organism” of Russia: nationality as a legal concept disappeared due to the elimination of the column of the same name from the passport. For this reason, it is impossible to find out the national composition of the people of Russia, just as it is impossible to regulate the flow of immigrants arriving in Russia after the collapse of the Soviet Union, based on the national interests of the Russian population.

The discoveries and generalizations made by I. R. Shafarevich contribute to enriching the reader of his works with important and relevant knowledge that carries the power of spiritual protection from the suppression of the phenomenon of Russian self-awareness by russophobic ideology (based on hatred of everything Russian and pursuing the goal of destroying the Russian people). “But the most dangerous manifestation of russophobia is the formation of a country’s internal worldview, infected with a “russophobic color” (V.A. Popovich) [4]. One of the prerequisites for the formation of conditions for the dominance of russophobia within the country is sociological ignorance (lack of knowledge of the history of the state, neglect of culture and the customs of their people), which cannot but affect the degree of self-awareness as a citizen of their country. to promote civil unity, “to promote the transformation of the Russian into a community citizen.” “If we are destined to be citizens of a great cultural country, <...>, and I continue to believe in this, then one of the means leading to this goal is the dissemination of knowledge” [5], which is “relevant” especially taking into account the current trends associated with the consolidation of society and the rise of patriotism” [Ibid.]

In a 1989 interview with I. Shafarevich for Soviet television about russophobia and Russian national identity, Igor Shafarevich briefly explains: a small nation is a group of people who feel like strangers among this people. These people strive to destroy the “big” people and their culture. They do not have any restrictive framework for the application of their destructive activities. The contrast to the small is the characteristic of a large people, defined by the scientist as “the whole country.” He attributes a certain current of Jewish nationalism to the “small people”.

At the same time, the “small people” movement does not have national status and may include representatives of other nations, but it has an “influential Jewish core.”

## **Part 2. Patriotism as a factor in the structural stability of the Russian people**

A person’s worldview is the product of the interaction of rational and irrational ways of comprehending the world, sensory perception of it and rational awareness of the essence of things and phenomena with which a thinking person deals.

In the system-synergetic approach, the complementarity of the rational and irrational worldview components of the worldview forms the basis of the worldview, acting as a necessary condition for the integrity of the personal worldview. The value of a holistic worldview determines the systemic integrity of a person as a living self-regulating system of an open type, capable of self-development (in other words, of increasing the level of its structural organization).

Spiritual values act as the ideological core, which is “the connecting link between the values of social consciousness and the spiritual world of the individual, between social and individual existence and consciousness.” Value orientations are considered as a reflection in the human mind of the dominant values that determine strategic life goals and ideological guidelines. The content of a person’s consciousness becomes a worldview as the components of the worldview acquire the character of beliefs [6], confidence in the correctness of their ideas, which motivate, determine the direction and content of practical activity [Ibid; P. 4] Thus, “the main content of value orientations is determined by the worldview and moral beliefs and ideals of a person [Ibid., P. 10]

Together with a person’s freedom of expression, the integrity of a worldview serves as an indicator of the systemic stability of an individual, which imparts a stable character to a worldview that can develop into a set of beliefs.

Beliefs, acting as integrated components of a worldview, can serve as determinants in determining a person’s subjective position, guided by values, will, prompted by his own emotional contribution, generated on the basis of an individual personal choice of behavior strategy.

The most important belief is patriotism, which promotes the unity of the people as a social integrity, formed on the basis of individual personalities included in this systemic formation as subsystems. Hence the importance of the need to make efforts to debunk the anti-national motives of the activity of social units (individuals, individual groups, small nations, state systems), which act as carriers of aggressive plans and actions aimed at falsifying the rich traditions of Russian culture, leveling its historical achievements, and erasing its unique national-religious path.

Patriotism is not so much a rational phenomenon as it is an emotional one. (A.I. Kugai [7]). Patriotism, acting as a psychological attitude, is a moral and political belief and is a subjective view of the individual, reflecting love for one’s country, a willingness to be proud of its history (past, present and future), and to protect the interests of one’s people. A patriot is characterized by accepting the priority of the good of the Fatherland over the satisfaction of his own interests (O. P. Glushchenko [8]).

So Igor Rostislavovich was, I think, glad due to the fact that he gained confidence in his calling to serve the interests of the Russian people, and... Moreover, in my opinion, he was enlightened in the highest sense of the word.

Patriotism, according to I. Shafarevich, is necessary for every individual, because it is included as a subsystem in the system of the people as a unique socio-cultural community. "Patriotism is a sense of value, the necessity for the life of every person of his inclusion in the greater individuality of the people or, on the other hand, the instinct of self-preservation of the people's individuality. It is a charge of energy, an engine that sets in motion those numerous means by which the unity of the people is maintained: language, national culture, a sense of the historical establishment of principles, national features of the religion of the people. Therefore, the extinction of patriotism serves, according to I. Shafarevich, as a sure sign of the beginning of the end of the people: from a living being, the people turn into a dead machine, disconnected from its source of energy. Therefore, the artificial destruction of patriotism serves as a reliable way to destroy the people. The influence of russophobia, which became active at critical moments in Russian history of the last century, "can be compared to a disease of the national body, to the spiritual analogue of AIDS, affecting not just one aspect of this body, but its central defense system." [9].

The need to develop a patriotic position in an individual is dictated not only by the instinct of self-preservation, but also by the generation of energy fed by primordially national sources that contribute to the unity of the people into a collective integrity (this is language, national culture, a sense of historical folk rituals, national features of the religion of the people).

### **Part 3. Anti-systems as destructive forces in the political system of modern Russian society**

The concept of anti-system, the author of which is recognized as L.N. Gumilev, is included in the context of the topic under discussion, correlated with the position of countering anti-systemic tendencies in the national life of the Russian people and other peoples of the world, to analyze the path of development of Russian civilization.

An anti-system is defined as a group of people united by a negative attitude, expressed in an acute degree of rejection of reality, and aimed at destroying the positive system. In the systems approach, the destruction of a system is classified as a decrease in structure. It is this kind of concept of anti-system that helps to identify an important characteristic of Russian civilization, which acts as "an opponent and tamer of anti-system tendencies both in its national life and on a global scale" [10].

The anti-system as a type of social community is characterized by a number of features: [

- 1) parasitism at the expense of the resources of positive systems; non-viability;
- 2) the desire to replace the ethnic group, which may result in destructive consequences: a) the death of the ethnic group as a system, or b) the destruction of the anti-system by positive systems;

3) nihilism manifested by the anti-system leads to deformation of the structure of ethnic groups (destruction of originality, moral values, worldview, life activities, etc.);

4) substitution of truth and lies; “the maturation of a murder program”;

5) the closed nature of the anti-system leads to the attraction of the “anti-system horde” in order to suppress the existing rituals inherent in the social community;

6) the inevitability of the invasion of one ethnic group into the area of residence of another (the aggressor intends to live at the expense of the defeated ethnic groups);

7) the superposition of two different ethnic fields with different vibration frequencies, practiced in areas of interaction between ethnic groups of the anti-system.

8) an ongoing violation of the systemic order (which leads to an increase in entropy, causing the phenomena of an anti-systemic attitude).

But such losses are not expected where a general interaction strategy has been found, and forced mixing of different cultures is not allowed, where the interaction of systems is realized on the basis of recognition of sovereignty, respect for the otherness and originality of ethnic groups, where a symbiosis of heritage is possible, occurring without destruction core supports of consistency - bearers of cultural and spiritual values.

Analysts have noted (in particular, Pitirim Sorokin) that “it is necessary to disseminate knowledge of the social nature and the mechanisms of their generation, their dissemination and functioning in society so that the lives of neighboring ethnic groups are not infringed. On the contrary, where mutual annihilation of hierarchies and spiritual cores of positive cultures occurs (annihilation is the reaction of the transformation of a particle and an antiparticle (when they collide) into particles different from the original ones), an anti-system develops there, but harmony does not arise.

Thus, a society that has come under attack by an anti-system that has even a small scale of representation finds itself weakened by the threat of local anti-systems (existing in almost every society) developing into a full-fledged antisystem.

In connection with these potential threats, it is necessary to raise the question “about a program of proactive strengthening of a kind of immunity for the canons of civilization, preserved in a regime of dynamic conservatism [10]

#### **Part 4. Small people as an anti-system**

To the study of anti-systems, the French historian O. Cochin and the Russian scientist I.R. Shafarevich used the category “small people”. The “small people” were classified by O. Koshen as a community of intellectuals, lawyers, philosophers, and publicists, which represented the active smaller part of society. I.R. Shafarevich emphasized that the small people are a layer separated from the rest

of the people, perceived by the small people only as material for the master (whose function is performed by representatives of this small layer). Moreover, clarifies I.S. Shishkin [11], a small nation is born in conditions of a break with historical unwritten laws: religious, ethnic, political - and the replacement of historical established practices with their new faith in Reason. Thus, “the destructive power of the anti-system depends on its ability to accumulate the energy of social, religious or national protest” [11] (Shishkin I.S. Internal Enemy) Small people correlate with anti-systems prepared to seize power. The mood of anti-systems is assessed as paranoid-nihilistic [10].

### **Part 5. Global anti-system as conceived by the USA and the West**

The process of globalization, which emerged as a phenomenon in spiritual culture, is being realized in a special line of social transformation associated with the promotion of the idea of hybridization. Hybridization is aimed at destroying the originality of ethnic and cultural complexes by blurring the boundaries between civilizations and religions. As a result, in the course of globalization, an illegitimate system is formed, based on the mutual annihilation of deep cultural identities [10], the annihilation of hierarchies and spiritual cores of several, albeit very different, but positive cultures, occurs. As a result of anti-system actions, society is split into parts:

- “small people” as a world parasitic anti-system;
- residual accumulations of “large nations” and civilizations, which are destined to serve as an object of exploitation and absorption by the anti-system.

The US state meets the goals and objectives of anti-systems as an instrument for implementing anti-system measures in the interests of the global anti-system.

Globalization, implemented according to the Western scenario, erasing the spiritual and cultural foundations of civilizations, ignores the diversity of the world, which led to the naming of the global anti-system as “negative civilization” and “anti-humanity”. [10]. The processes of formation of competitive forces of different scales initiated by globalization lead to the undermining of the unity of the national state.

The United States, being the most powerful system in the world, is aimed at weakening other government systems. For a certain time, the US “anti-system activists” strengthened the military-political state structures to solve the problems of the global anti-system. The true motives generated by the programmatic tasks of the transnational anti-system elite are hidden. Under the guise of solving global problems, “anti-system activists” are looking for a reason to interfere in the industry of other countries and impose their development strategy on them. The true cause of the world imbalance, generated by Western civilization, which has a passion for unlimited material enrichment, remains unspoken. The dominant technology of technological progress for the global anti-system is becoming modern

information technologies and special technologies of consciousness control. The growing dictatorship of the anti-system transnational elite is manifested in the discrediting of established cultural values and state sovereignty of countries that are destined to be destroyed by the global anti-system. As a result, there is a mutual annihilation of hierarchies and spiritual cores of positive cultures.

### **Part 6. The Russian path of development of civilization - as opposed to the Western path**

The civilization of the West strives to realize its idea of bringing the world into a more “perfect” state (in the sense that the West itself sees it). However, according to I. Shafarevich, the Western civilization, which is following the path of technological development, “based on the concentration of population in large cities,” is oriented towards achieving superprofits, towards a strategy of excessive exploitation of Nature, which leads to an ecological crisis.

Using a specific example from I.R. Shafarevich illustrates that the way of life characteristic of the idea of a “single civilization” embodied by the West also affected Russia at one time. In the 30s of the 20th century the government of the country mistakenly accepted the principle proclaimed by Western civilization: “industrialization of the country at the expense of the countryside.” This principle implemented corresponded to the Western concept of “progress” (interpreting history as the movement in a given direction of the peoples of two different classes: the “advanced” peoples who had advanced further along the path of progress, in comparison with the “backward” peoples, which included Russia. [https://proza.ru/2022/06/03/407-Igor Shafarevich: Why does Russia need the West?](https://proza.ru/2022/06/03/407-Igor%20Shafarevich%3A%20Why%20does%20Russia%20need%20the%20West%3F)

Thus, with the adoption of the mentioned slogan, as I. Shafarevich states, the leading role of the West in world progress was recognized (which was confirmed to an even greater extent during the subsequent “perestroika” in our Fatherland). I. Shafarevich, denying the possibility of the phenomenon of a single world development, puts forward a statement about the individual indicators of the development process of individual civilizations, each of which goes its own way as an individual - a developing organism that passes through successive stages: from birth to maturity, decline and death. In particular, the principle of uneven development of civilizations guarantees the end of the era of dominance of Western civilization, then guarantees the onset of its decline, which is finally replaced by its death.

On the contrary, Russia’s future is determined by the role that Russia will play during the coming collapse of Western civilization. For Russia itself, I. Shafarevich warns us, any form of integration of Russia into the world community will be a disastrous option.

As I. Shafarevich notes, the chance for the survival of Russian civilization is seen in any separation of Russia from the West with the condition of reducing its dependence on the West. And the path of development of Russia is different from



the path of progress preached by the West. The scientist warns that designing the further path of development of civilization is not permissible if the historical past of civilization is ignored.

It is impossible to design, based on a rational approach, the historical path of development of the future of Russia. Russia has evolved over the centuries as an agrarian country, with an agricultural dominant deeply rooted in the subconscious of the people. According to I. Shafarevich, "The village was not just an economic category, it did not just have a certain method of producing food products. "It was an independent civilization that developed organically over many millennia, with its own economic structure (and several different types of agriculture), its own morality, aesthetics and art. with its religion - Orthodoxy, which has absorbed ancient agricultural cults, a series of agricultural holidays that last throughout the calendar year and correlate with the Orthodox cycle of church services"

In his article "The Future of Russia" I.R. Shafarevich says that the laws of the market do not apply to agricultural labor: "agriculture remains the only form of creative labor open to the majority of the population" [15].

The essence of Western progress is capitalism, focused on extracting maximum profit. I. Shafarevich identifies the signs of Western civilization (rationalism and the choice complex), which contribute to the development of a variant of a small people in the depths of Western American civilization professing the pursuit of profit [13]. The thinker considered the best way to protect Russian civilization from the corrupting activities of the global anti-system for Russia to find its own path of development, subject to the complete liberation of the development of Russian society from the corrupting ideas of Western "progress", which preaches the ideology of increasing consumption.

Researches by I.R. Shafarevich were subordinated to the fate of Russia in the conditions of the onset of globalism. The possible collapse of the West (to which I. Shafarevich applies a civilizational approach in analyzing its future) is considered by the thinker as a natural phenomenon in the progressive process of the emergence, development, extinction and death of civilization.

With the collapse of the West, predicted I.R. Shafarevich, the possibility of creating a state in Russia that will protect our people will be identified. Only through the creation of a strong Russian state can the people become viable.

The fate of Russia depends on the spiritual processes taking place within the people themselves. And the future of the Russian people will depend on the decisions that the people themselves make. A people capable of self-organizing into a socio-cultural structure can make recommendations for regulating management decisions that are provided by power structures acting on behalf of the state.

Then we can expect an effect from the coordinated positive interaction of civil society as a conglomerate of social systems of different scales and different natures of their organization and the management function of the Russian government

The idea of a strong Russian state is also developed by Ivan Ilyin, who also pins his hopes on the revival of a strong Russian statehood

Russian civilization poses a direct threat to the global anti-system if it follows its own path of development. To combat the threats of the global anti-system, Russian civilization puts forward an antithesis to the global anti-system, which is embodied in the triumph of creative constructive labor. I. Shafarevich spoke about such creative work of the farmers of Russia - Russian peasants - representatives of the working class of the Russian people, objecting to his possible opponents who did not perceive critically the previously proclaimed principle in Soviet society of the development of cities due to the extinction of the life of villages. Igor Rostislavovich said that industrialization can arise in a short time, but agricultural culture takes thousands of years to develop. The peasant was the master of his inalienable creative work; he planned it himself, and then creatively translated it into reality. (I. Shafarevich. Two roads to one cliff [12])

The philosopher Ivan Ilyin also wrote about the creative work envisaged in the future Russia, intended to serve the interests of the people and bringing the spirit of liberation to the people, who compiled a number of instructions for posterity to take positive actions leading to the revival of Russia through the strengthening of its statehood.

The main task of Russian national salvation after the revolution of 1917 I.A. Ilyin saw the promotion of the best people in the state vertical of power - loyal to Russia, capable of “feeling nationally” and thinking about states, strong-willed, ideologically creative, endowing the people not with revenge and disintegration, but with the spirit of liberation, justice and beyond class unity. Moreover, if the selection of such “new people” can be accomplished quickly, then the restoration and revival of the country will take place in a few years, but if it fails, then Russia will face a long period of all sorts of disintegration and international dependence [14, P.201]. I.A. Ilyin notes the growth of Russian spiritual culture. However, the healthy forces of the people require “mature objectivity” and energy in self-affirmation [14, P.203].

When the Russian people free themselves from the “leading layer”, they will need a “new leading layer – “a new elite, a new Russian national intelligentsia, which, having comprehended the historical past, must extract from it the mind of history 14, P.206].

And for this you need:

1) recognize and nominate people of high quality spiritual charge who meet patriotic and national-state objectives;

2) “Leading your people is not a privilege, but a responsibility that requires spiritual focus. 14, p. 207];

3) at the same time, it is necessary to eradicate the “bad manners” of officials 14, C. 208];

4) it is necessary to get rid of too high an assessment of state power, there are limits to power: for example, all creative states of the soul are not subject to the jurisdiction of state power.

Representations of the philosopher I.A. Ilyin about building a state based on the spiritual culture of Russia, just like the synergetic approach that we apply to the self-organization of sociocultural formations sound highly relevant in modern times, especially now that we have recent examples of self-organization of new power structures in the territories of the Donetsk and Lugansk people's republics. There is confidence that in their creative decisions the new state elite of the people's republics of Ukraine is guided by the imageresurgent Russia of the future.

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艺术和艺术教育学的创新过程：作用和特征  
**INNOVATIVE PROCESSES IN ART AND ART PEDAGOGY: ROLE  
AND FEATURES**

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注解。 本文探讨了艺术和教学过程现代化的作用和特征，如果不将创新的教学技术引入实践，这是不可能实现的。 研究的目的是证明在教学和艺术活动（游戏、模块化、开发、设计等）中采用的新技术在实际实践中的使用主要只是声明。 对于具体创新教学技术的设计和应用，有不少方法论建议。 问题在于评估教学技术有效性的理论和体系还不够完善。 考虑到主要选择因素的确定以及艺术和教育学创新技术体系的确定，该研究主题具有相关性并需要科学分析。

关键词：创新过程、技术、技术手段、数字化、艺术教育学、数字能力、技能、数字一代、改革、互联网。

**Annotation.** *The article examines the role and features of the modernization of the artistic and pedagogical process, which is impossible without the introduction of innovative pedagogical teaching technologies into practice. The purpose of the study is to prove that the use of new technologies adopted in pedagogy and artistic activity (games, modular, developmental, design, etc.) in real practice is mainly only declared. There are quite a few methodological recommendations for the design and application of specific innovative teaching technologies. The problem is not sufficiently developed in the theory and system for assessing the effectiveness of pedagogical technology. Considering the identification of the main selection factors and the system of innovative technologies in art and pedagogy, the research topic is relevant and requires scientific analysis.*

**Keywords:** *innovation processes, technologies, technical means, digitalization, artistic pedagogy, digital competence, skills, digital generation, reforms, Internet.*

Information and computer technologies have become one of the main building blocks of modern society, which influence a person and all spheres of life. Today there is no doubt that modern citizens must be digitally literate.

The study of problems of technological effectiveness of teaching is associated with the names of such scientists as J. Bruner, V. Bespalko, T. Sakamoto, D.

Carnegie, M. Woolman, G. Grace, B. Skinner, M. Clark, P. Mitchell, G. Selevko, G. Thomas, A. Khutorskoy and others. Despite a certain amount of research, aspects of the essence, structure, features of functioning, selection factors, systems of innovative processes in art and pedagogical technologies have not yet been illuminated, and this problem still requires a solution.

First of all, let's pay attention to the processes of digitalization in Russian society. In recent times, we have witnessed the ability of children to use digital technologies even before they come to school. In primary schools, as well as art schools, it is difficult to find students who are not familiar with the use of computers and mobile technologies, or who do not have access to the Internet.

Due to the presence of stationary and mobile digital technologies around them and their saturation in everyday life, modern school graduates can be recognized as "digital natives" [10]. We must distinguish them from "digital immigrants" - people who were born during a period of widespread use of digital technologies.

Today's digital generation has skills that allow them to work naturally with technology, but this does not mean that all students are automatically aware of digital resources or have digital literacy [12]. Therefore, there is a big difference between knowledge about technology and students' ability to use it [5].

Digital competence is a concept that describes technology-related skills. In recent years, several terms have been used to describe digital technology skills such as information and computing competence, technological competence, 21st century skills, information literacy, digital literacy and digital skills. These terms are also often used interchangeably; for example, digital competence (Krumsvik) and digital literacy (Adeyemon).

The term digital literacy was first popularized in 1997 by Paul Gilster in his book of the same name (Gilster, 1997). He defined digital literacy as the ability to critically understand and use computer-generated information in a variety of formats from a wide range of sources.

This definition was fleshed out by Allan Martin, who defined digital literacy as the awareness, attitudes and ability of individuals to appropriately use digital tools and media to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources; building systems of new knowledge, as well as communicating with other people for the purpose of constructive social actions in the context of specific life situations.

"The European Commission has defined digital competence as the confident and critical use of information society technologies for work, leisure and communication" [2, p. 106]. Computer literacy is based on basic skills in the field of information and computer technology, that is, the use of computers to obtain, evaluate, store, produce, present and exchange information data, as well as for communication and collaboration via the Internet.

Expanding ideas about digital literacy and turning to the concept of digital competence in art and pedagogy are explained by the following reasons. Firstly, the rapid growth of opportunities provided by the Internet and its popularity in childhood and adolescence make it insufficient to consider the Internet only as a specific sphere of human activity. Academic performance in general education and art schools is beginning to directly depend on the digital “success” of school-children.

Secondly, the emergence of the digital world, which changes human creative activity and life, requires research and analysis of the social, political, ethical and psychological processes occurring in it. In philosophy and sociology, this idea is developed in the formation of digital culture and digital citizenship.

At the same time, digital culture is understood as part of the everyday culture of a citizen of the information society, which must also be regulated by both laws and ethical rules of behavior and security rules created jointly by the citizens of this society. In the research of scientists, the analysis of aspects of culture and ethical rules is especially relevant, since, due to the rapid development of information and computer technologies, reflection “lags behind” the achievements of scientific and technological progress. At the same time, new norms and values that should become regulators of human behavior are often not sufficiently developed and understood.

Thirdly, the transition to the concept of digital competence has practical grounds, since it is well consistent with changes in the education system within the Russian school [4, p. 106].

The post-industrial era is characterized by the development of the electronic environment and the transition to information civilization. In this regard, developed countries of the world pay great attention to the development of the digital economy. The basic guideline for Russia and EU countries when building a digital economy is the Digital Order, which has defined measures to achieve specific goals by 2021.

In recent years, the Russian Federation has managed to stop the economic decline, and in 2021 the economy grew by several percent. However, further acceleration of economic and social development is only possible through digital transformation. It is the digital economy that is the accelerator of the socio-economic life of society in the modern world; it is it that can quickly increase the country’s GDP.

The key directions for the development of the digital economy and society of the Russian Federation are the development of digital infrastructure - they plan to cover the entire territory of Russia with broadband Internet; and it is also planned to digitalize educational and creative processes, which will give impetus to digital transformations in the system of education, culture, medicine, ecology, cashless economy, infrastructure, and transport.

As part of one of the main components of the program - educational, it is planned to work on improving the awareness of Russians in the digital sphere and developing digital culture skills. Key reforms in the country require the transformation of modern educational society, as well as the activation of the subject position of students in the educational process and increasing their interest in educational activities. That is why the issue of developing the digital competence of primary school students and teachers is relevant, which is a necessary condition for ensuring the quality of the educational process.

Take a look at the computer science programs of the countries that were included in the TOP 10 ranking of the best educational systems in last year's World Top 20 Education Poll [13]. One of these representatives is Singaporean education - one of the most successful in the world. According to the latest PISA (Programme for International Student Assessment) report, which assesses the abilities of students from member countries of the Organization for Economic Co-operation and Development (OECD), Singapore has surpassed everyone in the indicator of scientific knowledge of young people [9].

The primary school computer education system in Singapore consists of three dimensions:

1. Computer as a science. It examines the scientific aspect of computer science, focusing on the core components of computational and systems thinking.

2. Computer as a tool. It is based on the use of a computer and computer programs. Students will learn about the uses of computer hardware, technology, and peripherals used in everyday life, work, and play activities.

3. Computer in society. This dimension focuses on the ethical, legal, and safety issues associated with the use of computers and information technology in society. Issues that are often associated with this aspect include Internet security, intellectual property, computer addiction, and data privacy [8].

The Computer Science curriculum, approved in 2019, for primary school students in the UK, also highlights three key aspects of computer science: computer science, information technology and digital literacy [7].

In South Korea, which took 2nd place in the ranking of the quality of primary school education, the process of learning computer science is somewhat different. The last update of educational programs occurred in 2015 [11]. According to the changes, computer science in primary school is not taught as a separate subject, but is studied as part of the "Practical Arts" discipline.

The learning objectives that relate to this subject are: developing life literacy necessary for living in the real world through practical experience and creative problem solving through information literacy [6].

According to the curriculum, as part of the study of the discipline, students develop the following competencies: the use of cyberspace in everyday life, the



formation of information ethics, the creation and creative use of multimedia materials using information devices.

The student will be able to:

- determine the type and functions of an information device, become familiar with the various ways of using digital devices;
- create presentation materials using simple software, create and use multimedia materials using an information device that is usually used in the student's daily life [1, p. 5].

The general learning outcomes of the education applicant include: presentation, transformation, analysis, generalization and systematization of data, critical assessment of information to solve life problems; creation of information products and programs for effective problem solving / problem solving, creative self-expression individually and in collaboration, with and without digital devices; conscious use of information and communication technologies and digital devices to access information, communicate and collaborate as a creator and (or) consumer, as well as independent development of new technologies; awareness of the consequences of using information technologies for oneself, society, the environment and sustainable development, compliance with ethical, intercultural and legal norms of information interaction.

Partnership pedagogy and a competency-based approach will require a new educational environment. In the Russian Federation, as part of the digitalization of secondary education, in particular in matters of defining digital literacy and classifying it as key competencies, the development of such an educational environment is expected. It helps to create, in particular, the latest information and computer technologies that increase the efficiency of the teacher, the productivity of managing the educational process, and at the same time form an individual approach to learning.

As such a solution, the National Educational Electronic Platform is proposed, which:

- will raise basic educational technologies of secondary school to the modern level;
- will help level the conditions of access to quality education for all students;
- will contribute to the development of creative elements in the teacher's work;
- will become the launching pad for the Big Project of e-learning and digital competence in Russia;
- will create an innovative sector of the economy - the production of modern electronic educational resources and technologies [3, p. 106].

The platform should provide mechanisms for continuous research into the effectiveness of the technologies used, and stimulate advanced development; help teachers design curriculum for subjects or courses; provide teachers with interac-

tive online materials that will help them effectively use competency-based teaching methods.

The electronic platform will include methodological recommendations for designing curricula for subjects and courses, learning resources according to specific expected results in educational areas and assessment tools.

The main products that can be launched on the platform: teacher search system, Marketplace of electronic textbooks, electronic educational resources.

Take a look at the electronic educational resources that can be used in primary schools: distance courses for primary school teachers; a selection of STEM (science, technology, engineering, mathematics) materials, multimedia, interactive elements; innovative teaching materials for primary schools.

Thus, the development and implementation of high-quality electronic digital resources in the educational and creative process, which will enable the formation of digital competence among primary school students, particularly in the field of computer science, is a pertinent issue.

Numerous studies show that under the influence of computer games, entertaining game programs, television, elementary school students develop clip thinking, as a result of which the level of critical consciousness decreases, changes occur in the perception of the world around them, in the system of moral and ethical values, as well as in the ability to analysis and synthesis of information.

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克拉斯诺达尔边疆区小水道(沟壑)的生物群落  
**BIOCENOSSES OF SMALL WATERCOURSES (GULLIES)  
OF KRASNODAR KRAI**

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注解。首次对克拉斯诺达尔边疆区20条梁的动物群落进行定性和定量特征描述和分析。给出了梁的进给底座的简要描述。给出了浮游植物、浮游动物、底栖动物生物量的信息。提供了有关鱼类动物群物种组成的信息。梁的生物群落研究不仅具有科学动物学意义,而且对于在强烈的人为影响条件下研究和保护生物多样性具有实际意义。

关键词: 沟壑、浮游植物、浮游动物、底栖动物、鱼类动物。

**Annotation.** *For the first time, the description and analysis of qualitative and quantitative characteristics of zoocenoses of 20 beams of the Krasnodar Territory were carried out. A brief description of the feed base of the beams is given. The information about the biomass of phytoplankton, zooplankton, zoobenthos is given. Information on the species composition of the ichthyofauna is presented. The study of the biocenosis of beams is of both scientific faunal interest and has practical significance in the study and conservation of biological diversity under conditions of powerful anthropogenic impact.*

**Keywords:** *gullies, phytoplankton, zooplankton, zoobenthos, ichthyofauna.*

The aim of the work was to study the structure of phytoplankton, zooplankton and zoobenthos communities, as well as fish populations in 20 gullies of the Krasnodar Territory. In nature, gullies play an important role, since they are part of the catchment area of river systems. They also represent valuable ecosystems in maintaining and preserving biological diversity and the natural environment.

The study of the ichthyofauna of gullies is of both scientific faunal interest and has practical significance in the study and conservation of biological diversity under conditions of anthropogenic impact.

The variety of natural conditions in the Krasnodar Territory determined the uniqueness of hydrography and hydrology of rivers. On the territory of the Krasnodar Territory there is a large number of gullies, as components of steppe rivers.

Currently, the water gullies in most catchments are formed by the ratio of two components – natural and anthropogenic. According to the classification of O.A. Alekin [1], water belongs to the sodium sulfate of the second type.

The materials for this work were hydrobiological and ichthyological data. Selection and processing of hydrobiological samples, analysis of ichthyological material were carried out according to generally accepted methods [ 6, 7, 8, 9, 10, 11].

The hydro-hydrochemical regime in the gullies determines the possibility of fish habitat, but the main factor is the availability of the necessary amount of feed and, above all, microalgae (phytoplankton), invertebrates (zooplankton and zoobenthos).

Phytoplankton is the first trophic level in the ecosystem. It should be noted that the phytoplankton of the studied beams is mainly represented by five taxonomic divisions – diatom (*Bacillariophyta*), green (*Chlorophyta*), blue-green (*Cyanobacteria*), Euglen (*Euglenozoa*) and yellow-green (*Xanthophyta*) algae. The “Other” group includes representatives of the departments of golden (*Ochrophyta*), Charophyta (*Charophyta*) and Cryptophyta (*Cryptophyta*) microalgae, which do not significantly affect either the number or the biomass. Quantitative indicators of phytoplankton are presented in Table 1.

**Table 1**  
*Floral diversity and phytoplankton indicators*

Gullies	Number of species	Ratio of algae groups, % in biomass						Average biomass, g/m <sup>3</sup>
		diatom	green	blue-green	euglen	yellow-green	other	
Vodyanaya (river Eya)	38	9,2	22,3	47,1	16,3	3,5	1,6	2,39
Vodyanaya (river Chelbas)	42	19,3	28,8	38,2	10,3	1,3	2,1	2,43
Golubovskaya (river Right Beysuzhek)	37	24,6	19,3	40,5	11,3	2,7	1,6	2,15
Gorky ((river Eya)	28	19,8	14,2	48,4	5,2	9,7	2,7	1,87
Degtyareva (river Chelbas)	36	23,7	28,3	31,3	10,4	3,9	2,4	8,54
Jimailova (river 3rd Kochety)	32	17,2	23,8	42,7	8,3	5,2	2,8	3,62
Dobrenka (river Sosyka)	40	21,0	14,8	46,4	5,1	10,5	2,2	4,07
Zhiryakova (Beysug estuary)	51	23,2	21,9	32,8	9,7	7,3	5,1	2,73
Zubova (river Miguta)	33	15,3	21,7	60,4	1,1	0,9	0,6	4,67
Kartushina ((river Eya)	31	10,1	25,8	50,7	6,8	4,2	2,4	3,47
Kravtsova (river Sosyka)	37	14,1	19,2	56,4	5,9	3,7	0,7	4,11
Kutsaya (river Sosyka)	34	16,4	53,3	14,7	12,8	0,2	2,6	1,41

Maximova (river Sosyka)	80	18,4	10,8	51,3	4,7	8,4	6,4	2,53
Ocheretovaya (river Beysuzhek Left)	42	15,2	50,0	12,2	22,2	0,3	0,1	1,43
Popova (river Sosyka)	28	4,7	11,3	70,4	7,5	1,3	4,8	1,49
Farewell (river Beysuzhek Right)	31	14,1	20,3	51,1	9,8	3,3	1,4	2,94
Smertina (river Sosyka)	27	6,2	15,3	65,9	7,1	3,4	2,1	3,72
Salty (Beysug estuary) й лиман)	52	17,7	25,4	41,2	11,6	2,1	2,0	1,84
Sopova (Swan Estuary)	33	12,7	18,4	57,9	8,4	1,7	0,9	2,39
Chervonnaya (river Sosyka)	41	23,2	12,1	49,3	6,2	4,9	4,3	4,23

Zooplankton of the surveyed watercourses is typically limnophilic with a predominance of copepods and branchous crustaceans over rotifers (Table 2). The maximum species diversity of zooplankton is observed in the summer.

**Table 2**  
*Quantitative indicators of zooplankton*

Gullies	Number of species	Ratio of algae groups, % in biomass			Average biomass, g/m <sup>3</sup>
		Copepoda	Cladocera	Rotifera	
Vodyanaya (river Eya)	6	17,1	4,3	78,6	0,84
Vodyanaya (river Chelbas)	9	26,8	8,5	64,7	0,77
Golubovskaya (river Right Beysuzhek)	7	40,6	18,3	41,1	0,87
Gorky ((river Eya)	7	70,3	6,1	23,6	1,08
Degtyareva (river Chelbas)	9	55,3	31,9	12,8	0,93
Jimailova (river 3rd Kochety)	7	57,9	27,6	14,5	1,18
Dobrenka (river Sosyka)	8	51,3	17,5	31,2	2,12
Zhiryakova (Beysug estuary)	9	62,1	7,7	30,2	0,84
Zubova (river Miguta)	5	60,7	5,2	34,1	0,82
Kartushina ((river Eya)	5	42,3	21,8	35,9	0,79
Kravtsova (river Sosyka)		57,9	9,8	32,3	1,78
Kutsaya (river Sosyka)	6	63,1	15,2	21,7	2,39
Maximova (river Sosyka)	7	45,4	20,3	34,3	1,73
Ocheretovaya (river Beysuzhek Left)	7	33,2	38,5	28,3	0,27
Popova (river Sosyka)	4	43,7	21,9	34,4	0,19
Farewell (river Beysuzhek Right)	5	48,4	19,3	32,3	0,63
Smertina (river Sosyka)	6	63,7	20,8	15,5	2,11
Salty (Beysug estuary) й лиман)	5	50,3	17,8	31,9	0,69

Sopova (Swan Estuary)	6	63,4	18,7	17,9	1,12
Chervonnaya (river Sosyka)	9	61,3	12,8	25,9	3,14

The bottom fauna of the gullies is mainly represented by “soft” zoobenthos. At the beginning of spring, the lowest biomass of zoobenthos is observed. As the water warms up, benthic production also increases, mainly due to the mass development of chironomid larvae (Table 3).

**Table 3**  
*Quantitative indicators of soft zoobenthos*

Gullies	Ratio of algae groups, % in biomass				Average biomass, g/m <sup>2</sup>
	Chironomids	Oligochaetes	Insect larvae	Others	
Vodyanaya (river Eya)	45,0	20,2	24,1	10,7	4,78
Vodyanaya (river Chelbas)	48,3	12,8	27,3	11,6	5,67
Golubovskaya (river Right Beysuzhek)	47,1	18,8	26,8	7,3	2,94
Gorky (river Eya)	46,1	23,7	20,9	9,3	2,83
Degtyareva (river Chelbas)	69,5	8,2	12,1	10,2	5,87
Jimailova (river 3rd Kochety)	46,5	19,5	22,3	11,7	3,72
Dobrenka (river Sosyka)	49,3	17,6	28,3	4,8	5,82
Zhiryakova (Beysug estuary)	43,9	23,2	22,4	10,5	4,11
Zubova (river Miguta)	59,0	17,4	21,3	2,3	3,61
Kartushina ((river Eya)	49,3	16,7	30,7	3,3	5,14
Kravtsova (river Sosyka)	47,4	31,2	16,6	4,8	4,32
Kutsaya (river Sosyka)	28,3	16,8	53,0	1,9	4,82
Maximova (river Sosyka)	41,3	22,1	29,2	7,4	4,92
Ocheretovaya (river Beysuzhek Left)	45,8	49,0	4,1	1,1	3,89
Popova (river Sosyka)	71,5	9,5	10,3	8,7	3,43
Farewell (river Beysuzhek Right)	52,3	15,2	18,4	14,1	3,22
Smertina (river Sosyka)	63,2	12,4	17,5	6,9	4,31
Salty (Beysug estuary) й лиман)	47,2	29,8	19,4	3,6	5,12
Sopova (Swan Estuary)	53,4	19,2	24,6	2,8	4,58
Chervonnaya (river Sosyka)	52,3	19,7	19,8	8,2	6,07

The ichthyofauna of the surveyed watercourses does not differ in great species diversity and is represented by aquatic fish species.

Vodyanaya (river Eya) – 9 species: carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), white carp (*Hypophthalmichthys molitrix*), white cupid (*Ctenopharyngodon idella*), walleye (*Sander lucioperca*), perch (*Perca fluviatilis*).

Vodyanaya (Chelbas river) – 8 species: carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), white carp (*Hypophthalmichthys molitrix*), white cupid (*Ctenopharyngodon idella*), perch (*Perca fluviatilis*).

Golubovskaya gullies – 10 species: carp (*Cyprinus carpio*), bream (*Abramis brama*), white carp (*Hypophthalmichthys molitrix*), silver carp (*Carassius auratus gibelio*), roach (*Rutilus rutilus*), tench (*Tinca tinca*), rudd (*Scardinius erythrophthalmus*), bleak (*Alburnus alburnus*), perch (*Perca fluviatilis*), river goby (*Neogobius fluviatilis*).

Bitter gullies – 9 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), tench (*Tinca tinca*), white carp (*Hypophthalmichthys molitrix*), perch (*Perca fluviatilis*).

Degtyarev's gullies – 15 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), tench (*Tinca tinca*), bream (*Abramis brama*), white carp (*Hypophthalmichthys molitrix*), variegated silver carp (*Hypophthalmichthys nobilis*), white cupid (*Ctenopharyngodon idella*), common minnow (*Gobio gobio*), river goby (*Neogobius fluviatilis*), walleye (*Sander lucioperca*), perch (*Perca fluviatilis*).

Jimailov's gullies – 11 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), bream (*Abramis brama*), silver carp (*Carassius auratus gibelio*), roach (*Rutilus rutilus*), tench (*Tinca tinca*), rudd (*Scardinius erythrophthalmus*), bleak (*Alburnus alburnus*), walleye (*Sander lucioperca*), river perch (*Perca fluviatilis*), European catfish (*Silurus glanis*).

Dobrenka gullies – 13 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), tench (*Tinca tinca*), white carp (*Hypophthalmichthys molitrix*), mottled carp (*Hypophthalmichthys nobilis*), white cupid (*Ctenopharyngodon idella*), walleye (*Sander lucioperca*), perch (*Perca fluviatilis*), sand goby (*Neogobius fluviatilis*).

Giryakova gullies – 15 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), tench (*Tinca tinca*), bream (*Abramis brama*), white carp (*Hypophthalmichthys molitrix*), variegated silver carp (*Hypophthalmichthys nobilis*), white cupid (*Ctenopharyngodon idella*), common minnow (*Gobio gobio*), river goby (*Neogobius fluviatilis*), walleye (*Sander lucioperca*), perch (*Perca fluviatilis*).

Zubov's gullies – 12 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius au-*



*ratus gibelio*), bleak (*Alburnus alburnus*), tench (*Tinca tinca*), white carp (*Hypophthalmichthys molitrix*), variegated carp (*Hypophthalmichthys nobilis*), white cupid (*Ctenopharyngodon idella*), perch (*Perca fluviatilis*), sand goby (*Neogobius fluviatilis*).

Cartouche gullies – 8 species: carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), white carp (*Hypophthalmichthys molitrix*), white cupid (*Ctenopharyngodon idella*), perch (*Perca fluviatilis*).

Kravtsov's gullies – 10 species: carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), tench (*Tinca tinca*), white carp (*Hypophthalmichthys molitrix*), white cupid (*Ctenopharyngodon idella*), perch (*Perca fluviatilis*), sand goby (*Neogobius fluviatilis*).

Kutsaya gullies – 9 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), silver carp (*Carassius auratus gibelio*), roach (*Rutilus rutilus*), tench (*Tinca tinca*), rudd (*Scardinius erythrophthalmus*), bleak (*Alburnus alburnus*), walleye (*Sander lucioperca*), perch (*Perca fluviatilis*).

Maximov's gullies – 13 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), gusterka (*Blicca bjoerkna*), golden crucian carp (*Carassius carassius*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), tench (*Tinca tinca*), white carp (*Hypophthalmichthys molitrix*), variegated carp (*Hypophthalmichthys nobilis*), white cupid (*Ctenopharyngodon idella*), perch (*Perca fluviatilis*).

Ocheretovaya gullies – 12 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), verkhovka (*Leucaspis delineatus*), bleak (*Alburnus alburnus*), tench (*Tinca tinca*), white carp (*Hypophthalmichthys molitrix*), white cupid (*Ctenopharyngodon idella*), common plucker (*Cobitis taenia*), perch (*Perca fluviatilis*).

Popov's gullies – 8 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), white carp (*Hypophthalmichthys molitrix*), perch (*Perca fluviatilis*).

Farewell gullies – 9 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), white carp (*Hypophthalmichthys molitrix*), common minnow (*Gobio gobio*), perch (*Perca fluviatilis*).

Smertina gullies – 12 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), white carp (*Hypophthalmichthys molitrix*), walleye (*Sander lucioperca*), perch (*Perca fluviatilis*), sand goby (*Neogobius fluviatilis*).

Salty gullies – 12 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), redfin (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), tench (*Tinca tinca*), silver carp (*Hypophthalmichthys molitrix*), common minnow (*Gobio gobio*), river goby (*Neogobius fluviatilis*), walleye (*Sander lucioperca*), perch (*Perca fluviatilis*).

Sopov's gullies – 10 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), white carp (*Hypophthalmichthys molitrix*), perch (*Perca fluviatilis*), sand goby (*Neogobius fluviatilis*).

Chervonnaya gullies – 13 species: pike (*Esox lucius*), carp (*Cyprinus carpio*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), silver carp (*Carassius auratus gibelio*), bleak (*Alburnus alburnus*), white carp (*Hypophthalmichthys molitrix*), walleye (*Sander lucioperca*), perch (*Perca fluviatilis*), sand goby (*Neogobius fluviatilis*), Caucasian river goby (*Neogobius rhodioni*).

In conclusion, it should be noted that the conducted studies of some beams of the Krasnodar Territory allowed us to assess the state of the forage base and establish the modern species composition of their ichthyofauna. The data obtained on the state of biocenoses of the studied rivers can serve as a basis for rational nature management of watercourses and the development of environmental protection measures.

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为北奥塞梯-阿拉尼亚共和国偏远地区人口提供的药物服务的数量和质量  
**THE VOLUME AND QUALITY OF PHARMACEUTICAL CARE  
PROVIDED TO THE POPULATION IN REMOTE AREAS OF THE  
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抽象的。 医疗保健是国家社会政策的一个特殊领域，旨在为公民提供医疗和药学服务。 目前，根据居住地的不同，向人们提供的药学服务的数量和质量差异很大[4]。 对于偏远地区的农村人口来说，药学服务的质量取决于多种复杂因素的影响：交通不便、农村地区人口密度低、社会基础设施薄弱、社会人口状况不利、农民收入低等。 农村居民。

关键词： 护理人员 and 助产士站、农村住区、药品供应。

**Abstract.** *Healthcare is a special area of state social policy to provide citizens with medical and pharmaceutical care. Currently, the volume and quality of pharmaceutical care provided to the population varies greatly depending on the place of residence [4]. For the rural population of remote areas, the quality of pharmaceutical care provided is determined by the influence of a number of complex factors: low transport accessibility, low population density in rural areas, reduced social infrastructure, unfavorable socio-demographic situation, low income of rural residents.*

**Keywords:** *paramedic and midwife stations, rural settlement, drug provision.*

## Introduction

A retrospective analysis of literary sources showed that at the end of the 19th and beginning of the 20th century, issues of drug provision for residents of rural areas were resolved through the development of “reduced requirements for rural pharmacies” and determining the possibility of opening them in certain types of settlements [1]. To increase the availability of medicine in sparsely populated areas, rural pharmacies were allowed to open branch pharmacies, including temporary branch pharmacies during temporary mass gatherings of people (at fairs, in dacha areas), in the absence or poor development of roads, etc. After the Great Patriotic War, when opening rural pharmacies, the presence of a medical institution in rural areas was taken into account, and in order to achieve break-even, the need to expand the range of medicinal drugs (hereinafter referred to as MD) with other pharmaceutical products was noted. The opening of pharmacies at FMSs has greatly contributed to the approach of drug assistance to the rural population [4]. Much attention was paid to finding new organizational forms for the work of pharmacies, in particular, the patronage of urban pharmacies over rural ones was introduced, and a mobile form of delivery and trade of MD to certain remote rural areas was developed. Due to the fact that during the Soviet period the state policy was of a social nature, the availability of medicinal care for residents of rural settlements was at a high level [2].

With the country’s transition to market conditions, unprofitable rural pharmacies began to close en masse, and with the introduction of licensing procedures for pharmaceutical activities, so did pharmacy points at FMSs, since their activities without a license began to be considered illegal [3].

With the adoption of the Federal Law of the Russian Federation “On the Circulation of pharmaceutical products”, the solution to the issue of access to medicinal care for the rural population is associated with the provision of the right to carry out retail trade in MD to municipalities that have a license for pharmaceutical activities, and their separate divisions located in rural settlements where there are no pharmacies organization (hereinafter referred to as PO). However, this problem currently remains quite acute. According to the literature, in many regions of the Russian Federation, lists of medicines for separate divisions of medical organizations (hereinafter referred to as SDMO) have not yet been determined, places for the sale of medicines have not been equipped, and not all medical organizations are ready to carry out pharmaceutical functions and undergo the licensing procedure [1].

In pursuance of the Federal Law of April 12, 2010 N 61-FZ “On the Circulation of Medicines”, in order to increase the availability of medicines to the population living in rural settlements of the Republic of North Ossetia-Alania, in which there are no pharmacy organizations, the Ministry of Health of the Repub-

lic of North Ossetia-Alania issued an Order dated October 18, 2021 N 1012 o/d “On measures to implement the Federal Law of April 12, 2010 N 61-FZ “On the circulation of medicines.”

Analysis and synthesis of literature data, legislative and regulatory acts made it possible to identify the main aspects of the problem of drug supply. Analysis of the current regulatory framework for the organization of pharmaceutical activities of MOs and SDMOs

- Identification and identification of the problem of drug provision for residents of rural areas

Socio-demographic and economic characteristics of the rural population;

Study of consumer behavior of residents of rural settlements and identification of their needs for drugs, analysis of the range of drugs presented in the MD assortment, identification of stably present MD names and comparing it with the preferences of residents and the current ND

Study of the needs of SDMO specialists engaged in retail trade of drugs in certain areas of the pharmaceutical industry information on drug provision for residents of rural settlements.

Development of the main directions for optimizing the drug supply to the rural population through municipalities and public health organizations and determining the principles for optimizing the drug supply

Optimization of information support for SDMO specialists dispensing drugs in rural areas.

The study of drug supply to the rural population was carried out using the example of 8 municipal districts of North Ossetia-Alania that do not have joint stock companies, most of which are located in areas with a low and very low level of development of social infrastructure. Medical care is provided to the population by the FMS.

A study of the socio-demographic characteristics of the rural population showed that 45.51% of the residents of the studied settlements are people over 40 years of age. Among them, the most numerous group is the elderly (over 60 years old), making up 16% women and 22.1% men of the total population. The number of residents with a permanent stable income is 58.25%, of which 32% are people who have a permanent job, as well as seasonal workers, including working pensioners, and 26.24% are non-working pensioners. On average, for all the settlements studied, the average monthly family income was 12,700 rubles. The working age population mainly has secondary and specialized secondary education (54.14%).

A study of the structure of the main pathologies of residents of the studied settlements showed that the leading place among them belongs to diseases of the cardiovascular system (28%), as well as to the musculoskeletal system (18%), gas-

trointestinal tract (9%), eye diseases (8%), etc. In total, several groups of pathologies were identified.

An analysis of the factors influencing the choice and purchase of drugs showed that more than half of the respondents (56.12%) primarily purchased drugs in the primary care clinic of their locality, and 27.33% of respondents, due to the lack of some drugs in the assortment of the primary care clinic, constantly turned to pharmacies of the district or regional center. Mostly, medications were purchased by respondents in case of illness (44.78%). When choosing medications, respondents most often sought advice from a medical professional (82.04%), 51.83% of respondents relied on their own experience.

An analysis of consumer behavior of rural residents showed that 65-85% of respondents in various localities have a home first aid kit. The composition of home first aid kits mainly includes drugs (56.4-74.2%) and medical products (25.5-38.6%). When comparing the composition of home first aid kits with the assortment of PO medications for FMS, it was revealed that some home first aid kits contain drugs that are not included in the assortment of PO medications.

The results of the analysis of storage conditions in home medicine cabinets showed that a significant proportion of respondents store drugs in a separate box (cabinet) - from 23.53% (5.88%) to 34.61% (42.31%). Quite often, medications are stored on a shelf or on a chest of drawers (29.41%).

As the survey showed, medicinal plants occupy an important place in the treatment and prevention of various diseases among rural residents (on average, 94.1% of all respondents use medicinal plants for treatment). At the same time, the majority of respondents (82.4%) harvest them themselves, some respondents (11.7%) noted that medicinal plants are brought to them by neighbors, acquaintances or a health worker, 47% of respondents harvest wild plants; 20.1% - grown in personal plots, and 13% of respondents - indoor plants. When procuring pharmaceuticals, about 55% of respondents are guided by the experience of parents, acquaintances, and relatives; 28% of respondents trust popular media. However, these sources do not always offer scientifically based information and often recommend the use of unofficial herbal raw materials.

An analysis of the assortment of PO drugs for FMS during the period of retail trade in 2018-2021 showed that the total number of nomenclature items in the assortment ranged from 45 to 128. In the group of drugs, the most widely represented were antigitout, antirheumatic, analgesic, antipyretic, antibacterial and cardiovascular agents. In terms of affordability, the range of drugs was formed taking into account the low solvency of the population, and consisted mainly of domestic drugs of low and medium price categories.

Analysis of the assortment of medicines from the standpoint of consistency in the PO nomenclature (at least three years) and repeatability (availability in all

POs) made it possible to identify a list of medicines that are in constant demand among residents of rural settlements. The most widely represented groups of drugs are those acting on the central nervous system, the cardiovascular system and nerve endings.

The study of the information needs of SDMO specialists was carried out by interviewing paramedics-heads of the FMS during the period of the existence of the PO and their retail trade in medicines. The majority (97.73%) of respondents noted that they need information about drugs: indications for use -87.4%; contraindications - 79.5%; side effects - 79.5%; data on substitutes (synonyms) - 75.6%; mechanisms of action -74.8%; treatment regimens - 73.2%; snoring conditions - 73.2%; flails - 66.1%; time of administration - 62.2%; combination with food products 61.4%. The largest number of respondents would like to receive information about HS (96.9%), in particular, about the use of drugs for specific diseases; on methods for preparing extemporaneous dosage forms from HS; the possibility of combining HS when taking several plants together, etc. Contraindications when using a separate HS. Possibilities of combining HS when taking two or more types of drugs together, HS drugs made on the basis of HS.

Duration of storage of extemporaneous dosage forms. Methods of technology for producing extraction dosage forms from HS at home. Use of HS for a specific disease.

Thus, the results of the analysis made it possible to determine directions for further research to optimize the organization of drug supply to the rural population.

### **Conclusion**

Medical and demographic processes and health indicators of rural residents of the Republic of North Ossetia - Alania are characterized by stable indicators, with a tendency to deteriorate. The structure of the main pathologies of residents of the studied settlements showed that the leading place among them belongs to diseases of the cardiovascular system (28%), as well as to the musculoskeletal system (18%), gastrointestinal tract (9%), eye diseases ( 8%), etc. In total, several groups of pathologies were identified. A low level of medical awareness and medical and social activity of rural residents was revealed.

Of course, high-quality provision of medicines to residents of rural settlements depends not only on the availability of approved lists. The conditions and timing of the supply of medicines to separate units of a medical organization play an invaluable role in the timely and prompt provision of medicines to citizens.

In the regions of the Republic, the supply of medicines is carried out on the basis of civil contracts with pharmacy organizations or wholesale trade organizations in medicines.

From the above it follows that the provision of medical outpatient clinics must be developed in the direction of combating identified pathologies and in accord-

ance with the elements of the Strategy for the provision of medicines to the population of the Russian Federation for the period until 2025 (the “Strategy” was developed on the basis of the Law “On the Fundamentals of Protecting the Health of Citizens in the Russian Federation” dated November 21, 2011 No. 323-FZ and Decree of the President of the Russian Federation No. 598 of May 7, 2012 on improving state policy in the field of healthcare.) it is necessary to ensure consistency of actions of government authorities at various levels in the areas of development of drug provision in the long term.

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家族性高胆固醇血症儿童血清素及其代谢物水平的研究  
**STUDY OF THE LEVEL OF SEROTONIN AND ITS METABOLITES  
IN CHILDREN WITH FAMILIAL HYPERCHOLESTEROLEMIA**

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抽象的。心血管疾病是世界上死亡和残疾的主要原因。家族性高胆固醇血症是最常见的遗传性脂质代谢紊乱，是循环系统疾病发生和发展的主要原因。世界文献讨论了血清素作为心血管疾病发病机制中重要环节的作用。它的高浓度对血管壁有破坏作用，刺激动脉粥样硬化斑块的形成并增加血栓的形成。这项横断面研究涉及 64 名儿童，他们被分为两组：家族性高胆固醇血症患者和条件健康的儿童。这些组的年龄、性别、体重和身高均相同。与健康同龄人相比，患有家族性高胆固醇血症的儿童血浆和血小板中的血清素、5-HIAA 浓度较高。获得的结果证实了我们的推论，即血清素和5-HIAA参与了动脉粥样硬化性心血管疾病的发病机制，增加了家族性高胆固醇血症儿童发生不良心血管事件的风险。

关键词：家族性高胆固醇血症、心血管疾病、血清素、儿童、动脉粥样硬化。

**Abstract.** *Cardiovascular diseases are the leading cause of mortality and disability in the world. Familial hypercholesterolemia is the most common genetically determined disorder of lipid metabolism, which is the main cause of the development and progression of diseases of the circulatory system. The role of serotonin as an important link in the pathogenesis of the development of cardiovascular diseases is discussed in the world literature. Its high concentration has a damaging effect on the walls of blood vessels, stimulates the formation of atherosclerotic plaques and increases thrombus formation. The cross-sectional study involved 64 children who were divided into two groups: patients with familial hypercholesterolemia and conditionally healthy children. The groups were identical in age, gender, weight and height. Children with familial*

*hypercholesterolemia had higher concentrations of serotonin in blood plasma and platelets, 5-HIAA compared to their healthy peers. The results obtained confirm our inference that serotonin and 5-HIAA are involved in the pathogenesis of cardiovascular diseases of atherosclerotic origin, increasing the risk of adverse cardiovascular events in children with familial hypercholesterolemia.*

**Keywords:** *familial hypercholesterolemia, cardiovascular disease, serotonin, children, atherosclerosis.*

### **Relevance**

Cardiovascular diseases (CVD) are the leading cause of mortality and disability in the world [1]. Every hour in Russia, about 100 people die from circulatory system disorders, per year - 1 million. Despite the implementation of various preventive measures aimed at reducing the risk of cardiovascular events, mortality due to dysfunction of the cardiovascular system is steadily increasing from year to year. [2].

The manifestation of CVD associated with the progression of atherosclerosis usually occurs in adulthood, but atherosclerosis is a slowly developing process. In the overwhelming majority of observations, the cause of these conditions is hereditary disorders of lipid metabolism, and these processes debut in childhood. The results of two large studies, Pathobiological Determinants of Atherosclerosis in Youth (PDAY) and the Bogalusa Heart Study, demonstrated that atherosclerosis begins in childhood. [3].

Familial hypercholesterolemia is a common monogenic disease that occurs with high concentrations of total cholesterol (TC) and low-density lipoproteins (LDL) in the blood plasma. Long-term exposure of elevated concentrations of atherogenic lipoproteins on the arterial wall leads to premature development of CVD at a young age [4]. According to the latest data, 1 out of 313 examined patients has a heterozygous form of familial hypercholesterolemia [5]. Taking into account the results of numerous studies, it can be assumed that the number of patients with familial hypercholesterolemia in the world may be about 35 million people, including 6-8 million children under 18 years of age [6]. It is known that during the first decades of life, the heterozygous form of familial hypercholesterolemia, as usual is asymptomatic, and accordingly there are no clinical manifestations of the disease. The manifestation of symptoms most often occurs over the age of thirty years, while the quality of life deteriorates significantly, and its duration is reduced by an average of 25 years [4].

The role of serotonin as an important link in the pathogenesis of the development of CVD is discussed in the world literature. Serotonin (5-HT) is one of the body's main neurotransmitters, which was discovered more than 70 years ago. [7]. The presence of a large number of functions of 5-HT is due to the diversity

of its receptors. There are fifteen serotonin receptors belonging to seven families (5-HTR1-7), which cause different intracellular responses [8]. Receptors 5-HT1, 5-HT2, 5-HT3, 5-HT4, 5-HT7 and their subtypes 5-HT1B, 5-HT2A, 5-HT2B, 5-HT4, 5-HT7 are responsible for the peripheral effects of serotonin on cardiovascular vascular system [9]. Serotonin plays an important role in the pathogenesis of the development of atherosclerotic vascular diseases. Excessive concentration of serotonin has a damaging effect on the blood vessels walls, and also affects the activation and aggregation of platelets, which can subsequently lead to the formation of blood clots and the development of ischemia. Serotonin stimulates the proliferation of vascular smooth muscle cells and fibroblasts, thereby leading to structural and morphological changes in the vascular wall. 5-HT2A receptor signals may enhance foam cell activation induced by oxidized LDL or saturated fatty acids, promoting atherosclerotic plaque formation [10]. Platelets are the main circulating reservoir of serotonin. They store it in their dense granules in high concentrations and release it when activated [8, 11]. Serotonin is excreted from the body by the kidneys in the form of its main metabolite, 5-hydroxyindoleacetic acid (5-HIAA) [12].

The physiological interaction between serotonin, its metabolite and elevated concentrations of lipids in the blood plasma can be a predictor of the unfavorable course of atherosclerosis, coronary heart disease, and arterial hypertension [11]. Despite a large number of studies, the serotonergic system still remains a poorly understood link in the pathogenesis of cardiovascular diseases [13].

### **Materials and methods**

64 children took part in the cross-sectional study, which took place at the Republican Center for Pediatric Lipidology. The children were divided into two groups: main and control. The main group included children aged 5 to 17 years, with genetically confirmed diagnosis of the heterozygous form of familial hypercholesterolemia, who were not taking lipid-lowering drugs or drugs affecting the monoaminergic system. The control group included relatively healthy children aged 5 to 17 years, without CVD and with a TC level of  $<5,2$  mmol/l. All study participants or their legal representatives signed informed consent before participation.

To determine the concentration of serotonin in blood plasma and platelets, 5-HIAA in blood plasma, venous blood in a volume of 4 ml was used and collected in tubes with ethylenediaminetetraacetic acid. To separate plasma from blood cells, samples were centrifuged at 1000 rpm for 20 minutes and transferred to a labeled eppendorf. The study was carried out using high-performance liquid chromatography with electrochemical detection.

Statistical processing of the obtained data was carried out on a personal computer using the Statistica 8 program. Statistical significance was set at  $p$ -value  $<0,05$ .

## Results

64 children took part in a cross-sectional study. The main group included 32 patients with an established diagnosis of heterozygous form of familial hypercholesterolemia. In all children secondary dyslipidemia was excluded. In order to confirm compliance with the inclusion criteria, patient medical histories were examined and anamnesis (disease and family) was collected. The diagnosis of familial hypercholesterolemia was made in accordance with the Simon Broome diagnostic criteria. The control group also included 32 children. The groups were identical in age, gender, weight and height. The average age in the main and control groups was 10,4 ( $\pm 4,2$ ) and 10,7 ( $\pm 3,8$ ) years, respectively. The main group included 17 boys (53%) and control group included 19 (59%). In both the main and control groups, more than half of the children had normal BMI values.

The groups underwent a complete blood count, biochemical blood test, lipid profile and coagulation tests. Statistically significant differences between groups were revealed only when comparing lipid profile indicators. The average level of TC and LDL in children with familial hypercholesterolemia compared with healthy children was 2 and 2,4 times higher, respectively (Table 1).

**Table 1**  
*Lipid profile results*

	Main group		Control group		p <sup>1</sup>
	Mean <sup>2</sup>	SD	Mean	SD	
TC, mmol/l <sup>3</sup>	7,6	0,946	3,8	0,592	<0,001
HDL, mmol/l	1,3	0,286	1,6	0,356	0,016
LDL, mmol/l	5,4	0,876	2,2	0,478	<0,001
TG, mmol/l	0,8	0,334	0,6	0,201	0,003

<sup>1</sup>p – the level of statistical significance of differences

<sup>2</sup>- Mean – arithmetic mean, SD – standard deviation

<sup>3</sup>- TC - total cholesterol, HDL - high density lipoproteins, LDL - low density lipoproteins, TG – triglycerides

During comparing serotonin concentrations in blood plasma in children of the main and control groups, it was found that patients with familial hypercholesterolemia had higher levels of 5-HT. The mean (Me) of the serotonin concentration in the main group was 85,7 pmol/ml (Q<sub>1</sub>-Q<sub>3</sub> 63-103,1), in the control group – 65,5 pmol/ml (Q<sub>1</sub>-Q<sub>3</sub> 38,1-88,1) (p=0,039).

In the main group, the average concentration of serotonin in platelets in total quantity and per platelet was higher by 7,93% and 33,33% compared to the control, but did not reach the level of a statistically significant difference (Table 2).

**Table 2**  
*Serotonin concentration in platelets in examined children*

	Main group		Control group		p <sup>1</sup>
	Median <sup>2</sup>	Q <sub>1</sub> -Q <sub>3</sub>	Median	Q <sub>1</sub> -Q <sub>3</sub>	
Platelets 5-HT (pmol/10 <sup>9</sup> platelets)	0,03	0,01-0,03	0,02	0,01-0,03	0,512
	Mean <sup>3</sup>	SD	Mean	SD	
Platelets 5-HT (pmol/ml)	7906758	±3396853,8	6488977	±3264703,9	0,093

<sup>1</sup>- p - level of statistical significance of differences

<sup>2</sup>- Median – mediana, Q<sub>1</sub>-Q<sub>3</sub> – interquartile range

<sup>3</sup>- Mean – arithmetic mean, SD– standard deviation

The median of 5-HIAA, the main metabolite of serotonin, in patients of the main group was higher by 16,06% (24,9 pmol/ml) compared to healthy children (20,9 pmol/ml) (p = 0,047).

#### **Discussion and conclusion**

The role of the serotonin system in the development of diseases of atherosclerotic origin has been studied mainly in animal models or in adult populations. In a recent study that aimed to determine the role of 5-HT in the development of atherosclerosis, scientists showed that an increase in the synthesis of triglycerides, very low-density lipoproteins and a decrease in the production of high-density lipoproteins were associated with activation of the serotonin system in the liver of experimental mice. In addition, they found that macrophages infiltrating the arterial intima and forming foam cells during the formation of atherosclerotic plaques were also associated with activation of the serotonin system [10]. Other studies have found that people with advanced coronary artery disease have higher plasma serotonin concentrations [14], and the serotonin 5-HT<sub>2A</sub> receptor antagonist sarpogrelate improved prognosis in people with atherosclerotic peripheral artery disease [15]. This is consistent with the data obtained in our study. In children with familial hypercholesterolemia, compared with their healthy peers, higher concentrations of serotonin in blood plasma and platelets, 5-HIAA were determined. The results obtained confirm our assumption that serotonin and 5-HIAA are involved in the pathogenesis of cardiovascular diseases of atherosclerotic origin, increasing the risk of adverse cardiovascular events in children with familial hypercholesterolemia.

Studying the pathophysiological mechanisms underlying the development of atherosclerotic vascular lesions, as well as the search for new diagnostic and prognostic biomarkers, is important for early detection of the disease and timely initiation of adequate lipid-lowering therapy, which will help curb the rate of progression of atherosclerosis and significantly reduce disability and mortality from cardiovascular diseases in older age groups.

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负责实施 TLR 介导的免疫反应的新染色体位点  
**NEW CHROMOSOMAL LOCUS RESPONSIBLE FOR  
IMPLEMENTATION TLR-MEDIATED IMMUNE RESPONSE**

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抽象的。两个新的染色体位点已被鉴定，它们有助于 TLR4 介导的脂多糖 (LPS) 以及其他几种 Toll 样受体激动剂的反应。特别是，10 号染色体上的一个位点增强了对 LPS 以及其他 TLR 配体的反应。13 号染色体上的一个位点对响应 LPS 和其他 TLR 配体而降低细胞因子水平的表型具有抑制作用，这表明 13 号染色体编码的抑制剂不仅在 TLR 介导的免疫反应中发挥作用，而且在其他煽动性的答案。位于这些位点的候选基因列表不包含任何已知的 TLR 介导的激活成分，从而表明这些基因在实施所研究的性状中具有新的、以前未知的功能。

关键词：炎症、LPS、同源小鼠系、测序、候选基因。

**Abstract.** *Two new chromosomal locus have been characterized that contribute to the TLR4-mediated response to lipopolysaccharide (LPS), as well as to several other Toll-like receptor agonists. In particular, a locus on chromosome 10 enhanced the response to LPS as well as to other TLR ligands. A locus on chromosome 13 had an inhibitory effect on the phenotype of reducing cytokine levels in response to LPS and other TLR ligands, suggesting that the chromosome 13-encoded inhibitor plays a role not only in the TLR-mediated immune response, but also in other inflammatory answers. The list of candidate genes located in these locus does not contain any of the known components of TLR-mediated activation, thereby indicating new, previously unknown functions of these genes in the implementation of the trait under study.*

**Keywords:** *inflammation, LPS, congenic mouse lines, sequencing, candidate genes.*

Today, many components of TNF $\alpha$ -activated reactions are known, however, the reasons for the hypersensitivity of the human body still remain unclear. The



current concept of the TNF $\alpha$ -mediated signaling pathway is not able to fully explain the complexity of the process and, accordingly, cannot predict the final outcome. The model experimental systems described below have shown that the signaling mechanisms triggered by TNF $\alpha$  or leading to its overproduction are much more complex than until recently thought. Obviously, they involve additional, previously unknown components that perform a trigger/modulatory function [1, 2]. Therefore, further study of the mechanisms of activation of TNF $\alpha$  production and its action is an extremely urgent task of modern immunology and immunogenetics.

To study the molecular genetic mechanisms of the innate immune response to infection (including factors determining sensitivity/resistance to septic shock), strains of laboratory mice are widely used [3, 4]. The presence of inbred mouse strains that differ phenotypically in terms of anti-infective immunity, as well as a sequenced and sufficiently fully annotated mouse genome, allows the use of classical genetic analysis to identify genetic factors that determine susceptibility to bacterial infection. The high degree of homology and similar organization of the mouse genome and the human genome makes it possible to translate information obtained in experimental systems to the level of clinical research [5].

The fundamental difference of the genetic approach is the search for a correlation (association) between the genotype and phenotype at the level of the entire genome, while the main factor in the scientific search is the phenotype, and not preliminary information about any gene [6]. In this study, we identified differences in the immune response to LPS between C57BL6 and MOLF mice. The immune response to LPS was measured by the amount of TNF $\alpha$  (Tumor Necrosis Factor  $\alpha$ ) secreted by peritoneal macrophages. One of the locus, located on chromosome 10, enhanced the immune response in MOLF macrophages, while another locus, responsible for reducing TNF $\alpha$  production, was located on chromosome 13. The boundaries of this locus and its approximate size were determined, and it was also found that in addition to TNF $\alpha$ , this locus inhibits the production of several other cytokines (eg, CXCL1). In accordance with the results obtained, it was further planned to narrow (as far as possible) the size of the locus on chromosome 13, to study the mechanism of inhibition of cytokine production in response to LPS by a genetic element from chromosome 13, and also to determine the production of any other cytokines in response to LPS, in addition to CXCL1 and TNF $\alpha$ , depends on the locus on chromosome 13. The following results were obtained from mapping the locus on chromosome 13, which we called Lcx (Low CXCL1):

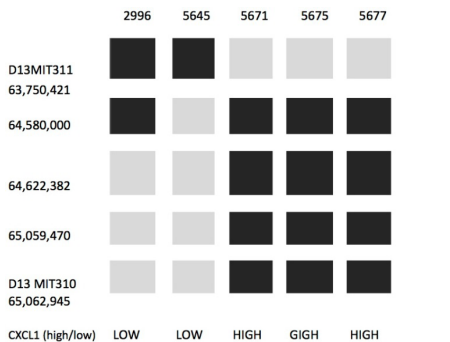
1. The size of the genomic interval of the critical region was narrowed to 0.83 Mb;
2. It has been established that Lcx affects gene transcription. Cxcl1 and Tnf, without disturbing the stability of their transcripts;

3. Analysis of expression by deep next-generation sequencing allowed us to establish a list of genes whose transcription depends on Lcx;

4. Using the serial outcross method, we obtained a line of congenic mice containing the Lcx locus in the B6 genome;

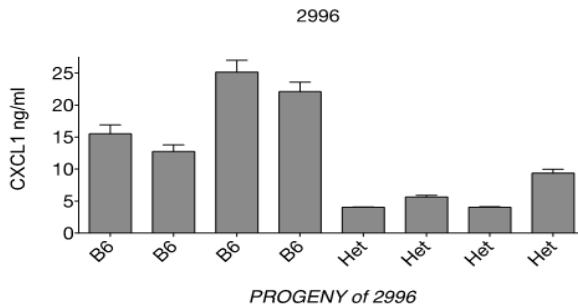
5. Using the resulting congenic mice, they showed that the Lcx locus influences the immune response in vitro and in vivo to bacterial infections caused by *Klebsiella pneumoniae* and *Legionella pneumophila*. These results highlight the physiological importance of Lcx in the immune response to Gram-negative infections.

Initial mapping of reduced TNF and CXCL1 production in response to LPS was performed independently in two intercross (F2 = MOLF × C57BL6) panels of mice and twice revealed linkage of the phenotype to Lcx. Due to significant genetic differences between the parents and, as a consequence, the heterogeneity of the F2 hybrids used for the initial mapping, in the second stage of the study, mapping was carried out using the sequential backcross method, according to which mice with residual heterozygosity for Lcx were further crossed with B6 parents to produce offspring, whose genome is enriched with the B6 genome, but at the same time contains the Lcx locus. Thus, we tested more than a hundred N3 mice and selected mice that were heterozygous for Lcx and had low TNFα production. Next, we obtained generations of mice N4 and N5. There are now N4 mice that recombine in the vicinity of Lcx and which allow us to delineate the critical interval between the D13Mit310 and D13Mit311 markers (Fig. 1). Some N5 offspring lost heterozygosity for Lcx, while some remained heterozygous. N5 mice were tested for LPS response to either obtain a recombination event or confirm the parent’s N4 phenotype.



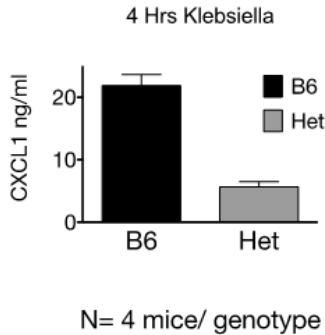
**Figure 1.** Haplotypes of N4 recombinant mice descendants of sequential crossing of the Lcx locus with the control C57BL6 line of mice. The Lcx locus is limited by markers D13Mit311 and D13Mit310. B6/B6 are indicated in black, B6/MOLF haplotypes are indicated in gray. The numbers on top are the numbers of N4 mice, low/high on the bottom are the N4 phenotype (response to LPS). Marker positions are indicated on the left (millions of nucleotides)

As an example, phenotyping of N5 offspring obtained from an N4 mouse is shown (Fig. 2). The response of N5 offspring to LPS was consistent with the haplotype at the *Lcx* locus (Fig. 2), namely, N5 mice heterozygous for *Lcx* produced low amounts of CXCL1, while cells from mice that lost heterozygosity and became B6/B6 at this locus secreted a lot of CXCL1 in response to LPS. The results obtained allow us to confirm the phenotype of the mouse and correlate the low response to LPS with its genotype, which is B6/B6 at D13Mit311 and at position 64,580,000 bp. Because inheritance of *Lcx* heterozygosity reduces response to LPS, these data allow us to place *Lcx* downstream of the D13Mit311 marker. The phenotyping results were confirmed by comparative analysis of the response of N5 offspring to *Klebsiella pneumoniae* infection in vitro. *Klebsiella pneumoniae* is a Gram-negative bacterium that is epidemiologically relevant and resistant to antibiotics.



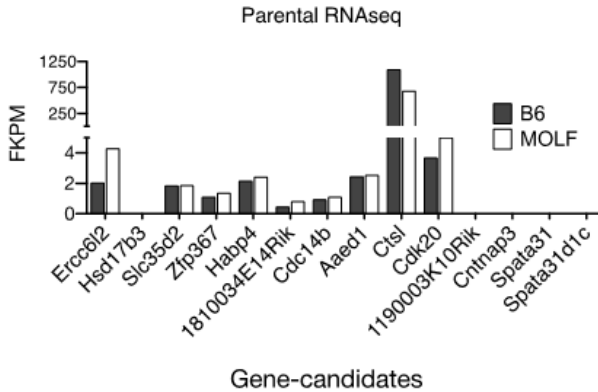
**Figure 2.** Confirmation of the N4 phenotype in N5 offspring. The production of CXCL1 by macrophages of mice descendants of mouse №2996 in response to LPS is shown. Statistical significance between *Lcx* heterozygous and homozygous mice is  $<0.001$

Figure 3 shows the response of peritoneal macrophages isolated from a panel of mice to *Klebsiella pneumoniae*. A clear distribution of the response to infection is seen according to the haplotype of these mice at the *Lcx* locus: mice that remain heterozygous for *Lcx* produce little CXCL1, while mice that become homozygous for B6/B6 release much more of the cytokine into the supernatant. Taken together, these data allow us to clearly define the upper limit of the *Lcx* locus and locate the *Lcx* gene product downstream of D13Mit311. A similar mapping procedure made it possible to establish the lower boundary of *Lcx* in the area of marker D13Mit310.



**Figure 3.** *Physiological significance of Lcx in the response to Gram-negative infection. Macrophages from homozygous (B6) and heterozygous (Het) Lcx mice were incubated with Klebsiella pneumoniae, and the level of CXCL1 in the supernatant was determined using ELISA*

The *Lcx* locus was originally 1.3 Mb. and contained 11 protein-coding genes, 3 unclassified genes, 9 predicted pseudogenes, and 2 non-coding RNAs. Despite this list, mapping data allows us to prioritize the *Cntnap3* and *Spata31* genes, which, like *Lcx*, are located in the vicinity of the D13Mit310 marker. In addition to identifying transcripts regulated by the *Lcx* locus, deep sequencing data also allowed comparison of candidate gene expression in the parental lines C57BL6 and MOLF. The most likely candidate would have either different levels of expression in the mouse strains used or polymorphisms resulting in amino acid substitutions. The search for polymorphisms was carried out using MOLF exome data (whole-genome sequencing of exons). From analysis of the MOLF exome data, it follows that the only amino acid substitution is present in the *Cdc14b* gene: arginine changes to glutamine, from which we can conclude that this locus is unusually conserved in the MOLF lineage. Analysis of the transcript levels of candidate genes from the *Lcx* locus using RNA-seq showed that there was also no significant difference in expression between the parental lines (Fig. 4). In the absence of obvious candidates, we considered the possibility of finding unannotated transcripts in the *Lcx* locus.



**Figure 4.** Expression levels of candidate genes from the critical region of chromosome 13 in parental lines. RNA-sequencing data were used, expression levels are expressed in FPKM

Because the inhibitory effect of Lcx in response to LPS was observed not only at the protein level but also at the mRNA level, we compared the stability of CXCL1 and TNF $\alpha$  transcripts in Lcx-congenic and control mice (C57BL6). It is well known that both transcripts are largely regulated at the level of mRNA stability. Experiments with actinomycin showed that the rates of degradation of both transcripts in mouse strains are the same, which allows us to conclude that the effect of the Lcx product on the promoter regions of Cxcl1 and Tnf is more likely.

CXCL1 plays an important role in the recruitment of neutrophils to the site of infection or affected area. We studied the effect of Lcx on peritonitis (septic shock) induced by Toll receptor agonists, such as CpG. To do this, Lcx-congenic and control mice were injected with CpG and the percentage of neutrophils in the peritoneal wash was analyzed an hour later. It turned out that Lcx-congenic mice contain significantly fewer neutrophils compared to control mice, which generally confirms the physiological significance of Lcx in the inflammatory response in vivo. The physiologically important role of Lcx in inflammation and the immune response was also confirmed by an experimental in vitro infection model in which macrophages from congenic and control mice were infected with *Klebsiella pneumoniae*, the surface LPS of which activates the immune response through TLR4. The results showed that CXCL1 production in response to infection was much greater in cells from control than from congenic mice.

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激活生物体的抗菌因子，作为对抗耐药细菌的抗生素替代品：在游离氨基酸存在下激活溶菌酶

**ACTIVATION OF ANTIBACTERIAL FACTORS OF THE ORGANISM AS AN ALTERNATIVE TO ANTIBIOTICS IN THE STRUGGLE AGAINST RESISTANT BACTERIA: ACTIVATION OF LYSOZYME IN THE PRESENCE OF FREE CHARGED AMINO ACIDS**

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抽象的。首次揭示，在生理pH值下，在游离氨基酸赖氨酸、组氨酸和精氨酸（各5 mM）存在下，鸡蛋溶菌酶对革兰氏阴性菌的抗菌作用增强8.5倍。在谷氨酸、组氨酸和精氨酸（各 5 mM）存在下，人溶菌酶对抗革兰氏阴性菌的活性增强 8.0倍。通过对生物体安全的游离氨基酸的联合作用显著激活溶菌酶的发现，揭示了开发新的有效药物来对抗抗生素耐药菌株的可能性。新品种可包括两类：1、激活人体内溶菌酶的物质组合物；2、鸡溶菌酶与活化添加剂的组合物。这项研究选择了安全的低分子物质组合，这些物质很容易被消化系统吸收，从而立即输送到血液中，激活免疫系统的组成部分，这似乎是治疗抗生素患者的一种新的有前途的方法。耐药感染。

关键词：鸡蛋溶菌酶、人溶菌酶、溶菌活性、溶菌酶激活剂、大肠杆菌。

**Abstract.** *It was revealed for the first time that at physiological pH values, the antibacterial effect of chicken egg lysozyme against Gram-negative bacteria is enhanced by 8.5 times in the presence of free amino acids lysine, histidine, and arginine (5 mM each). The activity of human lysozyme against Gram-negative bacteria is enhanced by 8.0 times in the presence of glutamate, histidine, and arginine (5 mM each). The discovery of significant activation of lysozyme through the combined action of free amino acids, that are safe for the organism, reveals possibility to develop new effective drugs to combat antibiotic-*

*resistant strains of bacteria. The variety of new drugs can include two types: 1. Compositions of substances that activate internal human lysozyme; 2. compositions of chicken lysozyme with activating additives. This research selected combinations of safe low-molecular substances that are easily absorbed in the digestive system and thus are immediately delivered into the blood, activating components of the immune system, which appears to be a new promising approach in the treatment of patients with antibiotic-resistant infections.*

**Keywords:** *chicken egg lysozyme, human lysozyme, bacteriolytic activity, lysozyme activators, Escherichia coli.*

**Introduction.** Due to the rapid increase in the number of antibiotic-resistant strains of pathogenic bacteria, the search of alternative bactericidal agents to antibiotics, in particular drugs based on bacteriolytic enzymes, is becoming an extremely urgent challenge. Lysozyme, which is studied in this research, is one of the most commercially available enzymes with antibacterial activity. Chicken egg lysozyme has found numerous issues of application in medicine and biotechnology. [1, 2]. Endogenous human lysozyme is an important factor of innate immunity, present in human organism both in free form and as part of phagocytic immune cells [3, 4]. According to recent research, lysozyme appears not only as an enzyme, but also as an immunoregulator [5], and probably acts as an opsonin, that improves the recognition of pathogenic bacteria by immune cells; this fact is partly explained by the ability of lysozyme to bind simultaneously to both bacteria and immunoglobulins G [6, 7]. Besides, the unexpected ability of lysozyme to bind bacterial endotoxins (lipopolysaccharides) was lately discovered. [7]. A relatively recently discovered and previously unstudied phenomenon deserves special attention: free charged amino acids and glycine can significantly enhance the antibacterial effect of lysozyme against Gram-negative bacteria [8, 9]. At the same time free aromatic amino acids practically have not effect on the activity of lysozyme [8]. The recent discovery of the phenomenon of activation of lysozyme by compositions of free charged amino acids will help to improve existing drugs based on lysozyme, and will also allow the creation of fundamentally new drugs to combat sepsis and infections caused by gram-negative bacteria.

In this work, we investigate the activation of lysozyme in the presence of various combinations of free amino acids at physiological pH values. We chose *Escherichia coli* as a model microorganism, since some strains of this bacterium themselves can cause sepsis, and this bacterium also belongs to the Enterobacteriaceae family. This family also includes such pathogenic bacteria as *Shigella*, *Salmonella*, *Yersinia*, that cause extremely dangerous diseases [11, 12]. We choose Chicken lysozyme as the object of our research due to its widespread use in medicine, while human lysozyme was chosen due to its outstanding role in the normal functioning of the human immune system [5].



**Aim.** The purpose of this work is to find the best combinations of free amino acids that can significantly enhance the antibacterial effect of the endogenic human lysozyme as well as lysozyme in the composition of drugs.

**Material and research methods.** Materials applied in this work include: chicken egg lysozyme, recombinant human lysozyme (Sigma-Aldrich», USA), L-arginine, L-histidine, L-lysine («Serva», Germany), glycine («Roth», Germany), sodium L-glutamate («MeiHua (梅花)», China), glucose («Rokett Frer», France), yeast extract («Biospringer», France), magnesium sulfate, hydrochloric acid, sodium hydroxide, sodium hydrogen phosphate, potassium dihydrogen phosphate, sodium chloride («Panreac», Spain), peptone, tryptone, bactoagar («BD Difco», USA).

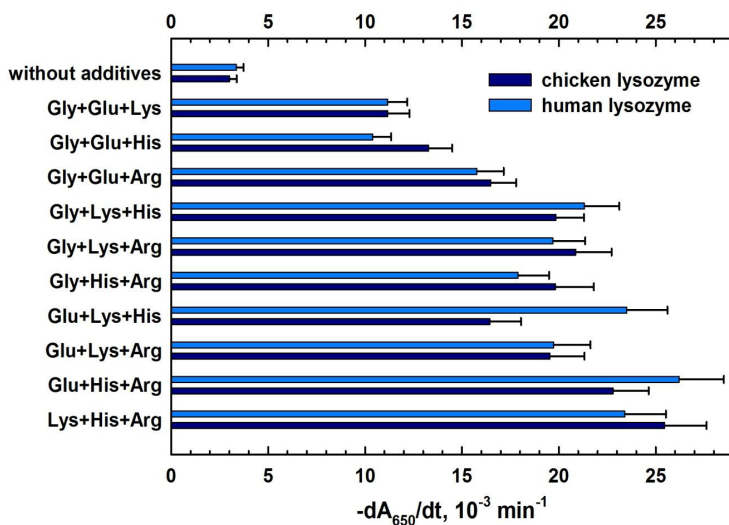
*Escherichia coli* (K-12 strain) cells were used as the lysozyme substrate. Cells were cultivated according to standard methods [13]. For each experiment, a suspension of *E. coli* bacteria strain K-12 was defrosted and centrifuged in a Mini-Spin centrifuge (Eppendorf, Germany) at 6000 rpm (2073 g) for 7 minutes. Next, the supernatant was separated and 400  $\mu\text{L}$  of buffer solution was added to the sediment (4 mM  $\text{Na}_2\text{HPO}_4$ , 5.4 mM  $\text{KH}_2\text{PO}_4$ , 10 mM NaCl, pH7.0). The pH values of the effector solutions were previously adjusted to the pH value of the buffer applied in the following experiment.

The rate of cell lysis was measured by turbidimetry using the change in  $A_{650}$  absorption over time ( $-\text{d}A/\text{d}t$ ). The decrease in  $A_{650}$  absorption over time ( $V = -\text{d}A_{650}/\text{d}t$ ) is proportional to the decrease of bacterial cell concentration (colony-forming unit, CFU) over time ( $-\text{dCFU}/\text{d}t$ ) [14, 15]. Measurements were carried out on a UV-1800 dual-beam spectrophotometer («Shimadzu», Japan) at a wavelength of 650 nm and a temperature of 37 °C. Activity determination was carried out in a buffer solution consisting 4 mM  $\text{Na}_2\text{HPO}_4$ , 5.4 mM  $\text{KH}_2\text{PO}_4$ , 5 mM NaCl, pH 7.0. Application of a buffer solution with a low ionic strength (less than in physiological solution) is explained with the requirement to provide conditions for rapid osmotic cell rupture, which is necessary for the correct implementation of the turbidimetric analysis method. The initial optical absorption of the solution ( $A_{650}$ ) fell within the range of values 0.43–0.47 ( $\approx 3 \cdot 10^8$  CFU/mL). The initial rate of enzymatic lysis of *E. coli* cells linearly depends on the concentration of lysozyme, increasing in the range of 0.05–1.0  $\mu\text{g}/\text{mL}$  [14–16]. Lysozyme was added to a final concentration of 0.1  $\mu\text{g}/\text{mL}$  in the cuvette. After introducing bacterial cells into the reaction mixture before adding the enzyme, the background decrease in absorption was recorded for 3–4 minutes, which was then considered as a correction when calculating the rate of enzymatic lysis. The rate of background changes in  $A_{650}$  absorption did not exceed the average error in measuring the rate of lysis in the presence of the enzyme. The initial rate of enzymatic cell lysis was recorded

over 5 minutes. The errors of the obtained values were calculated by the Student method for a confidence interval of  $P = 0.95$ .

### Results and discussion.

It was recently discovered that the rate of *Escherichia coli* cell lysis by lysozyme under conditions of optimum activity (pH 8.5, ionic strength  $\sim 70$  mM) in the simultaneous presence of three free amino acids is several times higher than the rate of cell lysis in the presence of paired combinations of amino acids and up to 10 times higher than that in case of their separate presence [10]. Subsequently, in the present work we limited ourselves to considering ternary combinations of amino acids under conditions close to physiological, namely in a phosphate buffer with low ionic strength and neutral acidity. Similar acidity and osmolarity conditions are observed in human saliva [17].



**Figure 1.** Comparison of the bacteriolytic activity of chicken and human lysozymes in the presence of one, two and three amino acids. Glycine concentration is 1.5 mM. Other amino acids were added at concentrations of 5 mM. The buffer solution is 4 mM  $\text{Na}_2\text{HPO}_4$ , 5.4 mM  $\text{KH}_2\text{PO}_4$ , 5 mM NaCl, pH 7.0. Enzyme concentration is 0.1  $\mu\text{g}/\text{mL}$ .

Figure 1 presents the effect of ternary mixtures of amino acids on the rate of lysis of *E. coli* cells by chicken and human lysozymes. We chose the following amino acid concentrations because the highest rates of cell lysis were previously observed at these values of concentration [10]. To avoid examining too many

combinations of amino acids among negatively charged amino acids, we excluded aspartic acid, leaving only glutamic acid, since we have previously shown that both amino acids have a similar effect on cell lysis [10]. The choice of glutamate is due to the fact that, unlike aspartate, monosodium glutamate is a common flavor enhancer, and glutamate is much more widely represented in the organism. As we can see from mill. 1, triple combinations of amino acids significantly increase the rate of cell lysis under conditions of a neutral environment and low ionic strength of the buffer solution. The amino acids used in the experiment activate both chicken and human lysozyme. The most significant activation effects are observed for chicken lysozyme by simultaneous addition of 5 mM Lys, 5 mM His and 5 mM Arg (8,5-fold increase) and 5 mM Glu, 5 mM His and 5 mM Arg for human lysozyme (8-fold increase).

**Conclusion.** This study demonstrates the fundamental possibility of amino acids to activate lysozyme under conditions close to physiological. This reveals entirely new options for combating antibiotic-resistant bacteria. For example, a certain combination of free amino acids, safe for the body, which are currently used as dietary supplements, may significantly improve the functioning of an own immune system of the patient. When combined with traditional treatments for various bacterial infections, such as sepsis, these “nutritional supplements” can potentially increase a patient’s chances of a favorable prognosis. Furthermore, activating additives in preparations based on chicken lysozyme are very promising: for example, lozenges or solutions for mouth rinsing against stomatitis and sore throat, anti-combustion dressings and other medical products.

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食品香气对配方成分提取物的依赖性

**DEPENDENCE OF FOOD AROMA ON EXTRACTIVE  
SUBSTANCES OF FORMULATION INGREDIENTS**

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注解。本文介绍了炒菜提取物对砂锅菜口味范围影响的研究结果。据证实，当用 10–15% 植物油在 105–115 °C 下炒胡萝卜和洋葱 25–30 分钟时，在脂肪加热过程中会形成挥发性提取物；消除含硫氨基酸中的硫化氢，以及形成其他硫化合物 – 硫醇和二硫化物；物质的形成是由于焦糖化和类黑素形成过程占主导地位。

关键词：提取物、炒菜、蔬菜砂锅。

**Annotation.** *The article presents the results of a study of the influence of extractive substances of sautéed vegetables on the taste range of vegetable casseroles. It has been established that when carrots and onions are sautéed using 10-15% vegetable oil for 25-30 minutes at 105-115 °C, volatile extractive substances are formed during thermal heating of the fat; the elimination of hydrogen sulfide from sulfur-containing amino acids, as well as the formation of other sulfur compounds - mercaptans and disulfides; substances are formed due to the predominance of the process of caramelization and melanoid formation.*

**Keywords:** *extractives, sautéing, vegetable casseroles.*

Flavorful food is always in high demand among consumers. It is especially important to create a distinct bouquet of dishes for feeding children of primary school age.

Vegetable dishes have a taste range closer to neutral. Only fairly aromatic dishes from fried vegetables: French fries, chips, fried onion rings, etc., which are not recommended in school meals. Therefore, research conducted to identify production methods and compatibility of formulation components will make it possible to create the required food products for schoolchildren. This direction is relevant and promising.

Features of taste sensations are formed both in the process of formulating and during the technological process in the production of culinary products. However, there are also opposite factors that will reduce this process and reduce the resulting effect to a minimum.

Therefore, the purpose of the research was to identify the features of the technological process, which allows obtaining a pronounced flavor and aromatic range of products.

Fatty acid oxidation products also influence the formation of the smell of baked vegetables. Heat treatment of products causes not only denaturation changes in proteins, but also their destruction. Protein breakdown products formed during destruction also affect the formation of the flavor and aromatic complex of the product. Thus, the elimination of hydrogen sulfide from sulfur-containing amino acids is observed, as well as the formation of other sulfur compounds - mercaptans and disulfides (when poaching and baking potatoes, cabbage, rutabaga). Phosphorous hydrogen (phosphine) is formed as a result of the breakdown of phosphatides and phosphoproteins during heat treatment of potatoes, cabbage, etc. [1].

Among the main changes in carbohydrates that occur under the influence of technological factors are changes in appearance, color, taste, smell and physico-chemical parameters. The common feature among these changes is a change in color, i.e. non-enzymatic browning (or non-enzymatic browning). However, these processes are still associated with carbohydrate reactions.

Products of non-enzymatic browning are divided into products that are formed due to the predominance of the caramelization process, and products that are formed in the process of melanoid formation.

Low concentrations of acids, alkalis and some salts contained in cabbage, apples, zucchini, pumpkin and carrots catalytically accelerate the process of caramelization of carbohydrates when sautéing the listed vegetables, including carrots and onions.

The development of catalysis as a part of chemistry dates back to 1835, when Berzelius prepared a paper for the Swedish Academy of Sciences [2], which coordinated a number of observations made earlier in this field.

In this large and important group of catalytic reactions - those catalyzed by acids - the simple theory of hydrogen ions relies mainly on Arrhenius's experiments on the inversion of sucrose by weak acids in the presence of their salt [3]. It was

previously shown that increasing the acid concentration gave an increased rate of inversion, with the increase being approximately proportional to the increase in concentration. It has also been shown that equal concentrations of different acids have different catalytic activities, with mineral acids having the greatest activity. Similar results were obtained with the hydrolysis of esters. Arrhenius, combining these results, made observations of the electrical conductivity of acids, which led to the conclusion that the catalytic activity of acids occurs due to hydrogen ions. When working with acetic acid, he showed that the addition of sodium acetate to this mixture significantly reduced the activity and reduced its concentration in proportion to the decrease in ionization of the acid, as required by the law of mass action. This evidence strongly supported the hydrogen ion theory of catalysis as well as the dissociation theory.

Heating sugars to high temperatures causes them to undergo profound changes with the appearance of new dark-colored products during caramelization. However, all the relationships that occur in this case have not yet been sufficiently studied; the ongoing processes depend both on the composition of the sugars and on the conditions of their heating.

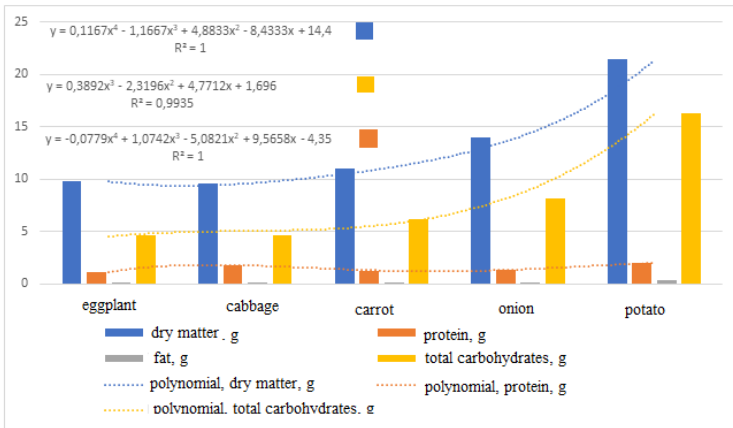
Low concentrations of acids, alkalis and some salts catalytically accelerate this process. When sucrose is heated at a temperature of 160-185°C, the monosaccharides glucose and fructose are formed. Fructose is the most sensitive to subsequent heating; its rate of change is 7 times greater than glucose. Therefore, with further heating, water is split off from fructose and fructosan is formed, and then water is split off from glucose and glucose anhydride glucosan is formed. With a further increase in temperature, both anhydrides combine to form isosaccharosan.

Simultaneously with the appearance of reversion products (isosaccharosane), anhydrides react with unchanged sugar and produce reversion products - dianhydrides, disaccharides and other compounds. Continued heating causes further dehydration (-H<sub>2</sub>O) and the appearance of the aldehyde oxymethylfurfural. Hydroxymethylfurfural decomposes into formic and levulinic acids, carbon oxides and dioxides, and other volatile substances. It easily enters into polymerization and condensation reactions, giving colored dyes and humic substances.

During the production of culinary and confectionery products using sugar, all of these changes can occur simultaneously, and the final product can be a mixture of substances.

The developed vegetable casseroles were enriched with the addition of sautéed vegetables and dry composite protein mixtures (Nutrinor). Comparative characteristics of the main nutritional substances and additives of the developed casserole are shown in Fig. 1. It was found that eggplants, cabbage, carrots, onions, and potatoes enrich the vegetable mixture as much as possible.





**Figure 1.** Comparative characteristics of the main nutrients of enriched casserole vegetables

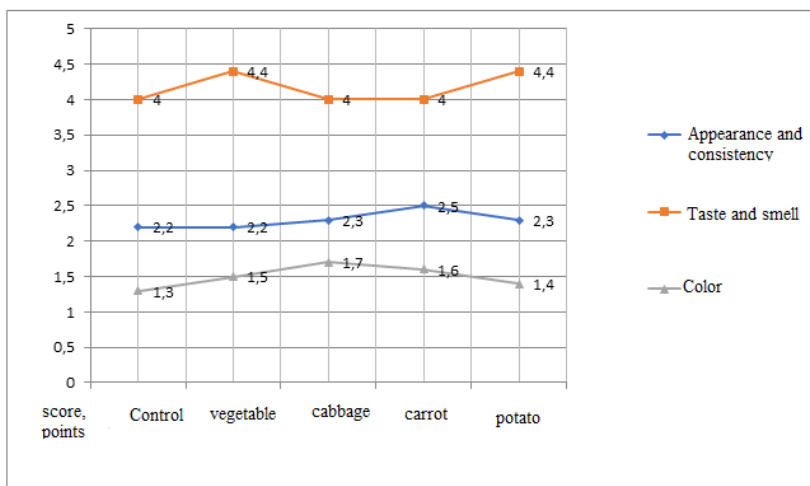
However, it is important in the technological process to obtain a pronounced flavor and aromatic range due to the carbohydrate complex of carrots and onions, which are formed during sauteing, as well as as a result of the synergistic effect of the extractives of the listed vegetables with the remaining components of the recipe (potatoes, eggplants, pumpkin).

It has been established that in the process of thermal culinary processing of potatoes, vegetables and fruits, non-cellulosic polysaccharides of cell walls, pectin substances and hemicelluloses, as well as the structural protein extensin undergo profound changes, resulting in the formation of products with different solubility. It is the degree of destruction of polysaccharides and the solubility of destruction products that determine the change in the mechanical strength of the cell walls of vegetables and fruits during thermal cooking. Changes in cellulose in this case are reduced mainly to its swelling.

Literary sources show structural features polysaccharides [4]. It is widely believed that the bioactivity of polysaccharides is influenced by their structural characteristics, such as chemical composition, molecular weight, type of glycosidic bond, and conformation. Differences in materials of origin, extraction procedures, and even drying technologies affect the physicochemical properties, structure, or conformation of polysaccharides, leading to differences in antioxidant activity, suggesting a possible relationship between them [5]. In particular, the correlation between the molecular weight and the activity of the generated radicals has been well substantiated [6, 7], and a similar observation for uronic acid content has also been reported in several papers [5, 8].

The developed vegetable products in finished form were controlled according to organoleptic quality indicators established by regulatory documents. When creating demand, the taste, smell and appearance of the product play a decisive role, while its chemical composition and nutritional value are taken into account only secondarily by most consumers. These properties are assessed organoleptically. The organoleptic properties of food products include appearance, color, consistency (texture), smell, taste. Qualitative and quantitative methods are used to determine the assessment. Organoleptic assessment of the quality of the developed enriched casseroles was carried out on a 10-point scale.

When developing a scale for organoleptic evaluation of highly prepared semi-finished vegetable casseroles, enriched with the main quality indicators, they were taste and smell (5 points), appearance and consistency (3 points), color (2 points). The results of the tasting evaluation of enriched casseroles are shown in Fig. 2.



**Figure 2.** Organoleptic evaluation of casseroles after 48 hours of storage

The obtained organoleptic evaluation data show that all developed culinary products did not have significant changes in the studied indicators during 48 hours of storage at a temperature of  $4 \pm 2^{\circ}\text{C}$ .

Thus, preliminary sautéing of carrots and onions makes it possible to obtain a more pronounced taste and aroma of vegetable casseroles [1, 9, 10-18].

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情绪智力系统的神经网络设计：问题与解决方案  
**NEURAL NETWORK DESIGN OF EMOTIONAL INTELLIGENCE  
SYSTEM: PROBLEMS AND SOLUTIONS**

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抽象的。该工作致力于情绪智力系统的神经网络设计方法、有问题的问题和解决方案。提出了基于 Python 编程语言 Keras 库的解决方案技术,该库提供与人工神经网络 (TensorFlow 平台的高级接口)、OpenCV 的交互。为了训练神经网络,使用了 Effectnet 数据集 (Kaggle 平台),包含 8 个类别的 28175 张图片。卷积神经网络模型

关键词: 神经网络架构、模型训练、类、缩放、TensorFlow、OpenCV、AffectNet、Kaggle。

**Abstract.** *The work is devoted to the methodology of neural network design of the emotional intelligence system, problematic issues and solutions. Solution technologies based on the Keras library of the Python programming language – a library that provides interaction with artificial neural networks (high-level interface of the TensorFlow platform), OpenCV are presented. To train the neural network, the Effectnet data set (Kaggle platform) was used, containing 28175 images in 8 categories. Convolutional neural network model*

**Keywords:** *neural network architecture, model training, class, scaling, TensorFlow, OpenCV, AffectNet, Kaggle.*

The synergy of interdisciplinary research in the field of artificial intelligence covers fundamental and applied scientific research, focuses on the development and operation of tools for recognizing and modeling artificial emotional intelligence based on neural network design methodology. Tools for processing cognitive information, modern brain research technologies are based on the mechanism of processing cognitive information of the human brain. Emotion recognition is an important research area in various fields. Human emotions have many manifestations; emotion recognition can be realized by analyzing facial expressions, speech, behavior or physiological signals [1-6].

Let’s consider a solution to the problem of recognizing a person’s emotions from his face. This problem is solved, like other image recognition problems, in several successive stages. First, the architecture of the neural network is specified according to the general approach to solving such problems ; then the model is trained on a certain data set, a class is specified for each image, to which it belongs (any emotion or neutral facial expression). After this, the initial information (photo of a person or group of people), which needs to be assessed from the point of view of the presented emotions, undergoes preliminary processing. In this case, the original image can be converted to monochrome (grayscale). Then a human face(s) is detected in the image and, in accordance with this, cropping is performed at the identified coordinates. The cut fragment is scaled (reduced to a standard size, the same as in the training set). Next, the transformed image is evaluated using a pre-trained neural network model.

Keras library of the Python programming language was used - a library that provides interaction with artificial neural networks (high-level interface of the TensorFlow platform). For image processing (reading data from files, searching and highlighting faces in photos, cropping, scaling), the OpenCV library was used.

Calculations were carried out using the following convolutional neural network model (Fig. 1). This diagram was obtained during model calculations. To develop the scheme, we used the function plot `_model` of the Keras library [7]. To connect to this database via VPN, you are required to register on this site.

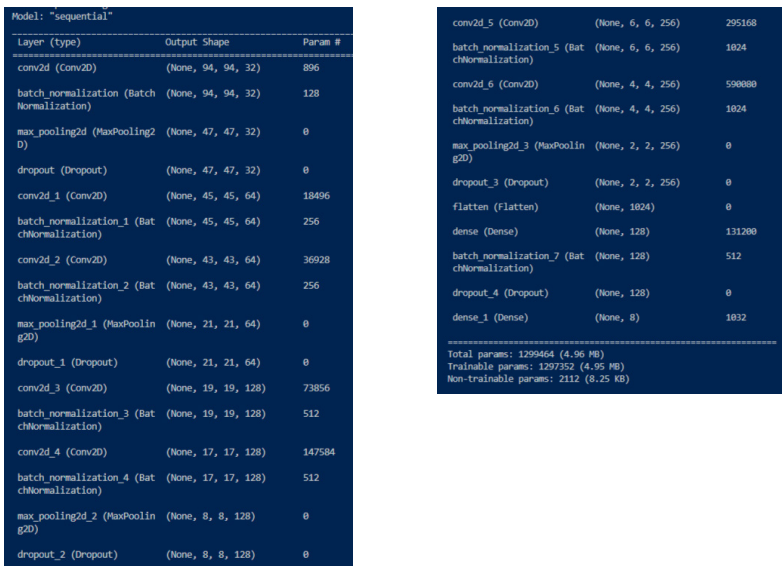
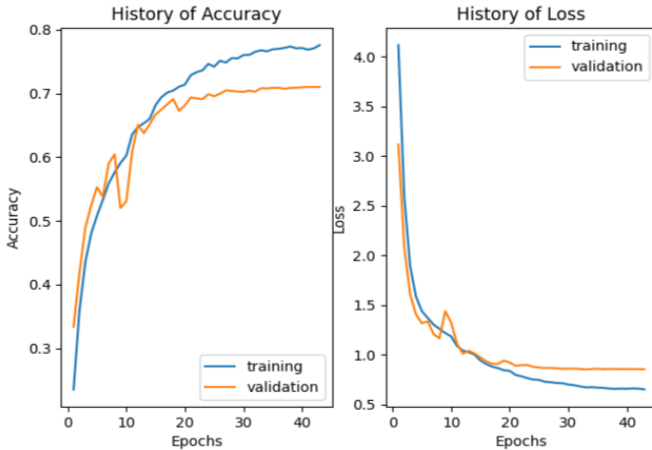


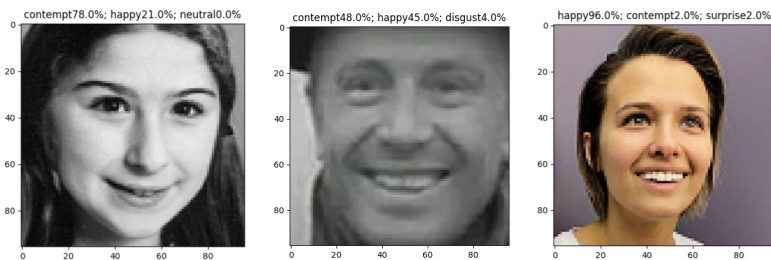
Figure 1. Model (fragment) of a convolutional neural network

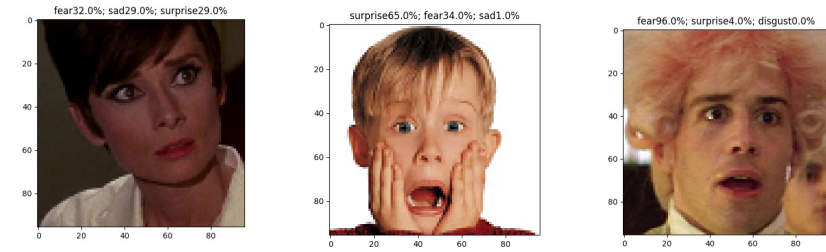
AffectNet dataset (Kaggle platform) was used, containing 28,175 images in 8 categories (anger, contempt, disgust, fear, joy, sadness, surprise and neutral face). The learning process is displayed in the following Figure 2. It shows the change during successive approximations (epochs) of parameters characterizing the success of learning: loss, accuracy. Graphical representation is provided by the corresponding function of the matplotlib library.



**Figure 2.** Convolutional neural network training process

As a result of the program algorithm, the set goals were achieved. Completed detection emotions : contempt, happy, fear, disgust, sad, neutral, surprise. Next, to assess the adequacy of the model, a prediction (evaluation) of the images was carried out using the calculated parameters of the neural network. The percentages next to the category name show the probability of detecting this emotion (Fig. 3).





*Figure 3. Result of the emotion detection program algorithm*

The results obtained require further study and adjustment of the model. On the one hand, there is a certain correspondence between human emotions in the considered images and the options determined by the model. But so far it is quite difficult to assess the quality of the results in numerical terms (the percentage of correctly identified emotions). You need to decide how to correctly count the number of correct answers - for several reasons.

First, what data to use for testing. There are two options: make a forecast based on arbitrary photographs or only on those where emotions are most clearly expressed. That is, depending on the choice of images for testing, different results may be obtained. Secondly, you need to decide whether to consider a result an error when the model shows the probable presence of several emotions, and the model shows the emotion expected by the tester, but puts it in second place. Third, some emotions are often shown on the face in this way. For example, both joy and contempt (disdain) are often accompanied by a smile, but in the second case the smile has a hint of ridicule; the emotions of fear and surprise also have common signs: wide open eyes, for example. And even a person sometimes finds it difficult to understand them without knowing the context of the situation in question. The neural network also often confuses emotions with similar manifestations. In what cases is such a result considered an error?

Sometimes errors occur when recognizing emotions accompanied by gestures. So, a person sometimes covers his mouth with his hand when he feels fear, but when he feels disgust, the same reaction occurs. Or covers his face with his hands. Is this a manifestation of shame (embarrassment)? Or sadness? In any case, the ways in which one can try to improve the resulting model are already clear.

1. You can check the database of images that is used to train the network, and discard those that are difficult for a person to determine emotions.
2. You can only select images with a certain head tilt and rotation angle.
3. As an option, in one of the training options, remove from the sample all images where part of the face is covered by a hand, and then compare the results.



4. It makes sense to carry out training on images reduced to grayscale. Perhaps this will have a good effect.
5. To speed up the learning process, you can change (reduce) the size of the images.
6. It might make sense to expand the list of categories into which images are divided. This is due to the fact that the lists of basic emotions differ in different sources (from 6 to 10). For example, the emotion “excitement-interest” is absent in the described data set. It can be considered close to surprise, but it can also be separated into a separate category. This requires further development of scientific research and experimental verification .

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基于大功率LED的水下无线光通信系统光辐射源实验研究  
**EXPERIMENTAL STUDY OF AN OPTICAL RADIATION SOURCE  
FOR AN UNDERWATER WIRELESS OPTICAL COMMUNICATION  
SYSTEM BASED ON A HIGH-POWER LED**

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注解。 本文介绍了基于波长为 525 nm 的高功率绿色 LED 设计的调制光辐射源的实验研究结果,用于水下无线光通信系统。

获得的结果证明了使用设计的调制光辐射源构建基于宽带和混沌振荡的水下无线光通信系统的可能性。

关键词: 水下通信、光通信、无线通信、移动物体通信、光辐射调制。

**Annotation.** *This paper presents the results of an experimental study of a source of modulated optical radiation designed on the basis of a high-power green LEDs with a wavelength of 525 nm for an underwater wireless optical communication system.*

*The results obtained demonstrate the possibility of using the designed source of modulated optical radiation to build an underwater wireless optical communication system based on broadband and chaotic oscillations.*

**Keywords:** *Underwater communication, Optical communication, Wireless communication, communication with moving objects, modulation of optical radiation.*

### **Introduction**

Optical wired communication [1-3] is currently attracting increasing interest not only from scientists, but also from specialists using modern underwater vehicles to solve applied problems [4].

The main advantages of optical underwater communication [5] are a high data transfer rate compared to the traditionally used acoustic [6, 7] methods of underwater communication, as well as a long connection range compared to electromagnetic methods [7, 8] of communication under water.

The main active elements that can be used to construct a source of modulated optical radiation are a laser and an LED [1-3].

The laser is capable of providing a high modulation rate and, accordingly, a high data transfer rate, but at the same time it has a narrow beam with low divergence when it propagates in the medium. At the same time, the LED, on the contrary, has a much wider radiation pattern, which can be changed by using appropriate optical lenses.

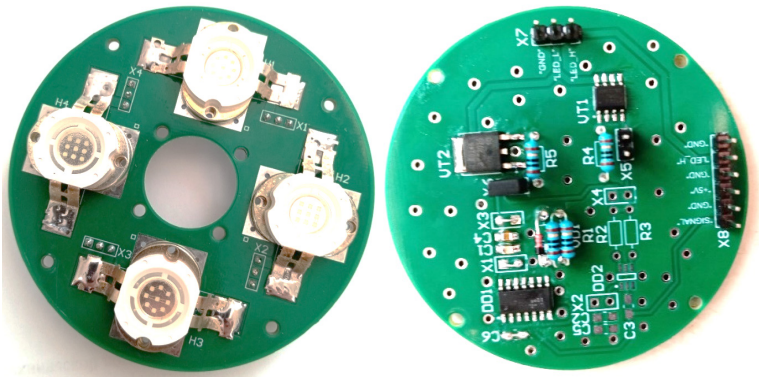
Both active elements can be effectively used to build underwater optical communication, but to ensure communication between moving objects, greater ease of operation is provided by using an LED, since a wide directional pattern eliminates the need to use a beam guidance system.

In accordance with the above, the task of developing sources of modulated optical oscillations for constructing a system of underwater wireless optical communication system is relevant and has applied significance.

At the same time, the possibility of constructing underwater wireless optical communication systems based on broadband and chaotic oscillations as a data carrier is of particular interest [5, 9-14].

#### **Description of the source of modulated optical radiation construction**

Figure 1 shows the appearance of the developed and manufactured optical radiation source and the driver providing intensity modulation of radiation.



*Figure 1. Appearance of the optical radiation source (left) and the optical radiation driver (modulator) (right)*

The main element used is the LED BL-HP15EP GC-10W with an optical radiation wavelength of 525 nm corresponding to the wavelength of the transparency window of the aqueous medium, having a power of 10 W and a luminous flux intensity of 500 lm at a rated current of about 1000 mA.

The design of the layout in the form of a round printed circuit board makes it possible to place it inside a strong sealed cylindrical body for immersion under water to the required depth, depending on the task.

The possibility of parallel or sequential switching on from 1 to 4 LEDs provides flexibility in adjusting the intensity of optical radiation and energy consumption depending on the task being solved, as well as adjusting to the parameters of the driver and power source used.

When using all four LEDs, the total power consumption is 40 watts, and the radiation intensity reaches 2000 lm. The use of standard lenses allows you to focus this luminous flux to the required values, up to several degrees.

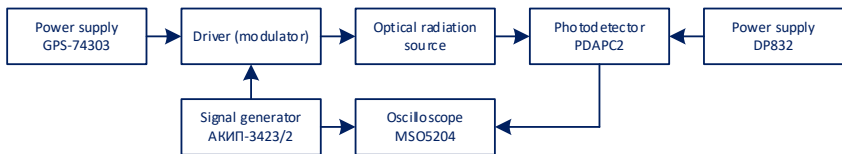
The Nexperia 74HC08D driver and INFINEON IRFR024NTRPBF field-effect transistor were used to modulate optical radiation by amplitude.

The АКПП-3423/2 generator is used as a signal source. A digital four-channel oscilloscope MSO5204 is used to visualize the results and carry out the necessary measurements.

A commercially available Thorlabs PDAPC2 silicon photodetector was used as an optical radiation receiver.

### Received results

The block diagram used for the experimental study is shown in Figure 2.



*Figure 2. The block diagram used for the experimental study*

During measurements:

- input information signal – a meander with a span of 5 V and an offset of 2.5 V;
- input signal frequency – varies from 1 kHz and more;
- LED power supply voltage (switched by the driver) – 8 V;
- the functioning of models “in the air” was analyzed in order to determine the potentially achievable parameters of the components of the system without the influence of the aquatic environment on the propagation of optical radiation.

Figures 3 and 4 show the measurement results of the signals at the driver input and the photodetector output at the input frequency of 100 kHz and 11 MHz, respectively.

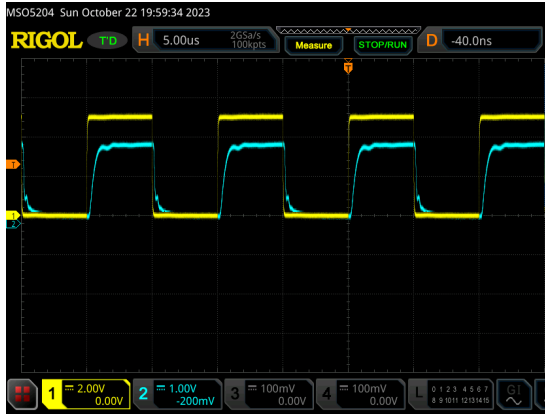


Figure 3. Measurement results of input (yellow) and output (blue) signals at an input frequency of 100 kHz

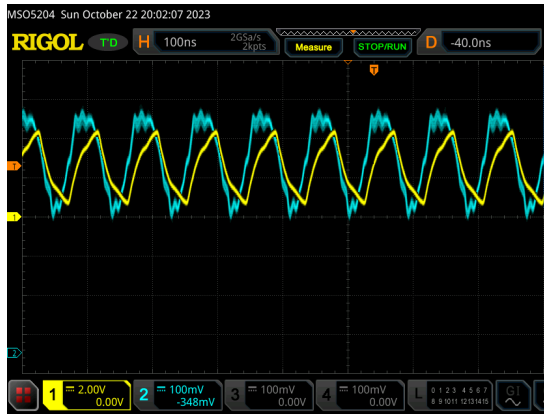


Figure 4. Measurement results of input (yellow) and output (blue) signals at an input frequency of 11 MHz

It follows from the results obtained:

- wireless signal transmission with a frequency of up to 1 MHz (pulse duration – 500 ns) is provided with a minimum level of signal distortion;
- with an increase in the frequency of the input signal to 11 MHz (pulse duration – 45 ns), a gradual decrease in the amplitude of the output signal from 1800 mV to 250 mV is observed, while the possibility of allocating an information signal remains;

- the subsequent increase in the frequency of the input signal leads to significant distortions in the shape of the output signal of the photodetector;
- the addition of series-connected LEDs leads to a proportional increase in the brightness of the optical radiation source and, accordingly, an increase in the amplitude of the photodetector output signal (subject to a corresponding increase in the supply voltage of the LED chain), while the frequency and time parameters of the optical radiation source remain the same, which allows combining LEDs into series-connected chains in order to increase the power of the optical source radiation.

### Conclusions

Thus, it can be seen from the results obtained that when using the 74HC08D driver (modulator), IRFR024NTRPBF field-effect transistor and an optical radiation source based on high-power LEDs BL-HP15EP GC-10W, the minimum allowable pulse duration forming an information sequence is about 45 ns, which corresponds to a telegraphy rate of about 22 Mbaud.

The wavelength of the optical radiation source of the order of 525 nm allows the developed device to be used in the construction of an underwater optical communication system, and a wide range of operating frequencies allows not only constant intensity radiation, but also broadband and chaotic signals to be used as information carriers in order to increase the noise immunity of the communication system and improve its performance.

The article is based on the research results, which was conducted in the framework of project MK-2283.2022.4 with the support of the Grant Council of the President of the Russian Federation.

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DOI 10.34660/INF.2023.66.63.229

自主传感器退化过程对无线传感器网络功能影响的研究  
**INVESTIGATION OF THE INFLUENCE OF DEGRADATION  
PROCESSES OF AUTONOMOUS SENSORS ON THE  
FUNCTIONING OF WIRELESS SENSOR NETWORK**

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抽象的。讨论工业自动化中以无线网络为重点的紧急保护系统中预留通信通道的实现。然后,该研究深入研究了紧急关闭 (ESD) 电路的退化分析,特别是无线网络中的传感器系统。引入 ESD 电路的 MooND 冗余结构,强调其在运行期间进行内置诊断的能力。该研究重点关注可检测故障背景下的退化过程及其对安全仪表系统 (SIS) 的影响。使用马尔可夫模型,从 2oo3D 到 2oo2D,最后到 1oo1D 探索退化序列,同时关注诊断覆盖率指标和故障率。它强调了通过退化平衡立即修复的需要与运行连续性来延长系统寿命的潜在可能性。

**关键词:** 紧急关闭系统 (ESD)、按需平均故障概率 (PFD<sub>avg</sub>)、预留、系统降级、安全完整性等级 (SIL)、诊断覆盖率 (DC)、无线传感器网络。

**Abstract.** *Discusses the implementation of reservation communication channels in emergency protection systems within industrial automation focusing on wireless networks. The study then delves into the degradation analysis of Emergency Shutdown (ESD) circuits, particularly for sensor systems in wireless networks. Introduces the MooND redundancy structure for ESD circuits, emphasizing its ability to conduct built-in diagnostics during operation. The study focuses on the degradation process in the context of detectable failures and their impact on the Safety Instrumented System (SIS). Using a Markov model the degradation sequence is explored from 2oo3D to 2oo2D and finally to 1oo1D with attention to diagnostic coverage metrics and failure rates. It highlights the potential extension of system lifetime through degradation balancing the need for immediate repairs with operational continuity.*

**Keywords:** *emergency shutdown system (ESD), probability of failure on demand average(PFD<sub>avg</sub>), reservation, system degradation, safety integrity level (SIL), diagnostic coverage(DC), wireless sensor network.*

### Introduction

At the moment, many companies are considering a backup communication channel to increase the reliability of emergency protection systems. As a backup channel, the most suitable is a wireless network. Today, the main contenders for the leading wireless standards for industrial automation are the WirelessHART and ISA100.11a protocols. Of these two standards, WirelessHART is the only wireless data transmission standard to date that is already in use in real-world applications and has positive feedback [1].

Many papers calculate various security metrics for 1oo1, 1oo2, and 2oo3 architectures of wired systems. However, the degradation of architectures has not been considered, in particular for sensor systems (wireless networks).

Among the various structures of redundancy of ESD circuits, MooND is distinguished. The peculiarity of these structures is that in the process of operation, when ESD performs N of M functionality, built-in diagnostics of its components is performed. During the operation of the ESD, detectable failures of individual modules or components of the ESD are possible. For redundant ESD are set requirements for the time (period) of their maintenance with subsequent restoration, with or without stopping the equipment and transfer of equipment (process), in a safe state, a command from the control panel of the dispatcher. And if diagnostics detects dangerous or safe failures of ESD, the alarm is activated and preparation for transfer to a safe state or equipment shutdown is performed.

In the process of detectable failures, degradation of the SIS occurs and develops. In spite of the fact that, the ESD circuit of the sensor network includes various components among the most important will be the smart sensors themselves. The study was conducted using Emerson sensors. For ESD systems, a safe failure will not lead to a shutdown of the process cycle, but only a degradation of the system [2]. This paper considers the degradation of the system:

2oo3D -> 2oo2D -> 1oo1D.

Based on the system specification, one of the states, the state with three detected dangerous channels, is abstract, since once two failed channels are detected, the system stops until at least one of them is out of repair.

### Calculating the impact of degradation processes on a wireless sensor network

#### 2oo3D redundancy scheme

The labeled graph of the model of sensor network functioning under the conditions of dangerous failures manifestation is presented in Figure 1.

The part of dangerous failures detected by automatic diagnostic tests is defined as diagnostic coverage (DC, diagnostic coverage), calculated by formula (1):

$$DC = \frac{\sum A_{DD}}{\sum A_{Dtotal}} \quad (1)$$

where  $\Sigma\lambda_{DD}$  – total intensity of detected dangerous failures;

$\Sigma\lambda_{Dtotal}$  – total cumulative dangerous failure rate.

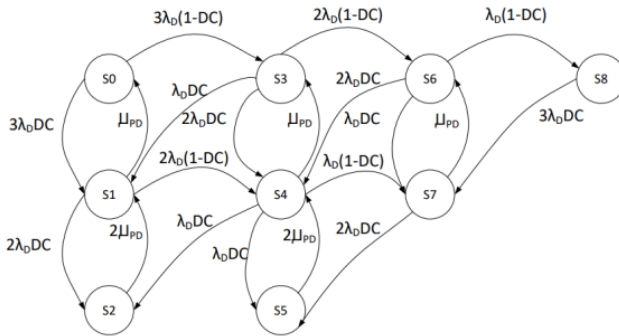
The following assumptions are used for the model:

- a) dangerous failures are recognized with detection probability equal to DC;
- b) failures not detected by diagnostics occur with a probability equal to the addition of the diagnostic coverage value to one (1 - DC).

During the restoration operations, a complete diagnostics of the channel is performed with elimination of all (detected and undetected) defects.

It also affects the length of recovery, respectively  $\mu_{PD}=1/(MRT+TD) < \mu_p$ . Where *MRT* – average duration of repair of one ESD channel.

We investigate a Markov model with recovery for the 2oo3D architecture (Figure 1).



**Figure 1.** Markov model 2oo3D with restoration work

- a) operable states: S0 (all channels are in good working order), S1 (one of the channels has manifested and detected a dangerous failure) and S3 (one of the channels has manifested but not detected a dangerous failure);

- b) Inoperable states: S2 (two channels exhibited and detected dangerous failures), S4 (one channel exhibited and detected a dangerous failure, the other channel exhibited but did not detect a dangerous failure) and S5 (two channels exhibited and detected dangerous failures, the third channel exhibited but did not detect a dangerous failure);

- c) states with undetected dangerous failures that the majority authority is unable to paralyze: S6 (two channels have manifested but not detected dangerous failures), S7 (one channel has manifested and detected a dangerous failure, two channels have manifested but not detected dangerous failures), S8 (three channels have manifested but not detected dangerous failures).

After detecting the manifestation of a dangerous failure, the inoperable channel is shut down and restored with intensity  $\mu p$ , this is modeled by the corresponding transitions  $S1 \rightarrow S0$ ,  $S2 \rightarrow S1$ ,  $S4 \rightarrow S3$ ,  $S5 \rightarrow S4$ ,  $S7 \rightarrow S6$ .

Based on Scheme 1, the average failure rate per request was obtained:

$$PFDav_{2003D}^g = 0,257 \times 10^{-4}$$

The model without absorbing states illustrates the asymptotic tendency of the functional safety index to a stationary value corresponding to SIL3.

**2oo2D redundancy scheme**

When a safe failure occurs, the system degenerates to 2oo2D. The Markov model for 2oo2D is presented in Fig. 2.

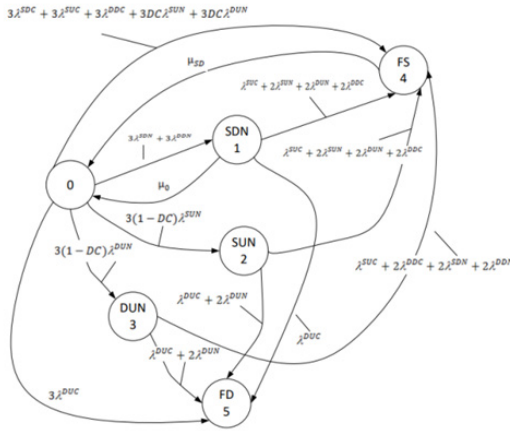


Figure 2. Markov model of a sensor network degraded to the level of 2oo2D

From Figure 2, let's list all the variables:

$$\begin{aligned} \lambda_{SDC} &= \beta \cdot \lambda_{SD} \\ \lambda_{SDN} &= (1 - \beta) \cdot \lambda_{SD} \\ \lambda_{SUC} &= \beta \cdot \lambda_{SU} \\ \lambda_{SUN} &= (1 - \beta) \cdot \lambda_{SU} \\ \lambda_{DDC} &= \beta \cdot \lambda_{DD} \\ \lambda_{DDN} &= (1 - \beta) \cdot \lambda_{DD} \\ \lambda_{DUC} &= \beta \cdot \lambda_{DU} \\ \lambda_{DUN} &= (1 - \beta) \cdot \lambda_{DU} \end{aligned}$$

where  $\lambda_{SDC}$  – safe failure detected;  
 $\lambda_{SDN}$  – safe undetected normal failure;  
 $\lambda_{SUC}$  – safe failure detected;  
 $\lambda_{SUN}$  – safe undetected normal failure;  
 $\lambda_{DDC}$  – dangerous detected failure;  
 $\lambda_{DDN}$  – dangerous detected normal failure;  
 $\lambda_{DUC}$  – dangerous undetected failure;  
 $\lambda_{DUN}$  – dangerous undetected normal failure

If the self-diagnostic program detects and generates an error, it can be corrected immediately. In order to be able to detect malfunctions in a timely manner, regular maintenance of the equipment must be performed. Regular maintenance is performed by technicians who manually check each part of the equipment to determine if they are working properly. Assuming that the manual inspection can detect all problems, two specific maintenance rates will then occur. One is the operational maintenance rate, which occurs when diagnostic programs detect and identify the occurrence of a failure, and the other is the regular maintenance rate, which occurs during periodic detection and maintenance, and includes testing time and repair time. Compared to the operational maintenance level, the regular maintenance level is lower.

On the basis of scheme 2 we obtained the average value of failure on request:

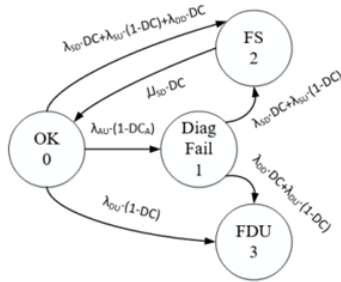
$$PFD_{avg_{2002D}} = 1,202 \times 10^{-4}$$

The model without absorbing states illustrates the asymptotic tendency of the functional safety index to a stationary value, corresponding to SIL2. Compared to 2003D, the safety completeness level has decreased.

### **1001D redundancy scheme**

If the 2002D system has not been repaired, then after a while the 1001D state will occur, which is the last, limiting limit of ESD's protection functions. Single-channel 1001 systems are unreliable and unsafe.

A description of the sensor network degraded to 1001D in Markov model notation is presented in Figure 3.



**Figure 3.** Markov model of a sensor network degraded to the level of 1oo1D

From Figure 3, let us list the Markov transitions:

1. DD, dangerous detected failures;
2. DU, dangerous undetected failures;
3. SD, safe failures detected;
4. SU, safe failures detected;
5. AU, safe failure of the diagnostic system.

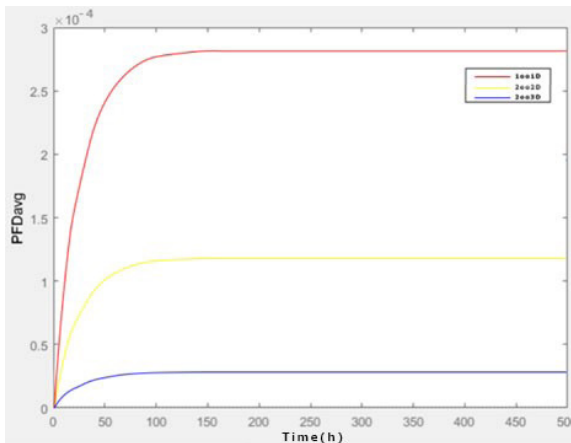
Based on Scheme 3, the average failure rate per request was obtained:

$$PFD_{avg,1oo1D} = 2,734 \times 10^{-4}$$

Compared to the 2oo2D scheme, the safety completeness level remained SIL2.

However, it is worth noting that in case of subsequent failures, the 1oo1D system has no place to degrade, so it can lead to a failure of the emergency system.

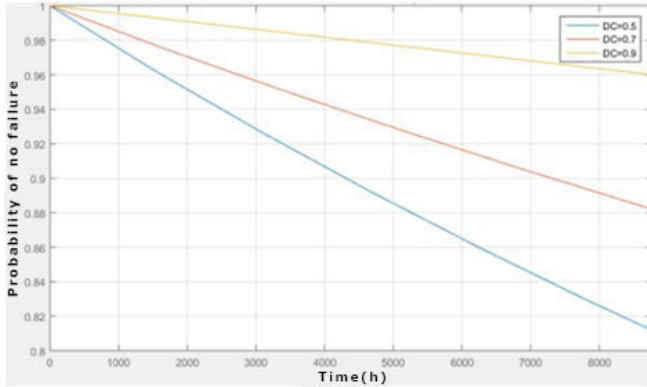
Below we plot the functional safety dependence of PFD<sub>avg</sub> for different redundancy architectures (Figure 4).



**Figure 4.** PFD<sub>avg</sub> dependence of different redundancy architectures at DC=1

As can be seen in the degradation process, the system reduces its safety integrity level from SIL3 to SIL2. It is therefore necessary to make repairs at the first failure to the 2oo2D scheme, where SIL3 maintenance is required.

Let us plot the probability of the system being in a serviceable state (0-state) in Matlab environment at DC = 0.5; 0.7; 0.9 (Figure 5).



**Figure 5.** Plots of the probability of the system being in a serviceable state taking into account system degradation at different DCs

The study period of the probability of finding the system in an operational state is presented on the graph for 1 year. Having analyzed the graph presented in Figure 5, let's make Table 1 with numerical values of probability.

**Table 1**

*Values of probability of the system being in serviceable condition after 1 year*

DC value	Probability of the system being in serviceable condition after one year of service	PFD <sub>avg</sub> after one year of service
0,9	0,96	0,04
0,7	0,882	0,118
0,5	0,812	0,188

As it can be seen from Table 1, with a large diagnostic coverage factor, the ESD in the degraded state can stay in the degraded state for a year with the probability of operability 0.96. If the DC depth is small, the system requires immediate shutdown and a set of rehabilitation works.

According to the study, it was found that if the diagnostic coverage is large enough, it is not necessary to immediately disconnect this controller from the network and perform a set of repair works on it. The probability of fail-safety will

be high enough for 6 months (1 year) of subsequent operation. This time interval may be sufficient for remedial work to be performed even with the problematic business logistics of the plant.

### **Conclusion**

The introduction of a second communication channel (sensor network) into emergency protection systems is crucial for process safety and stability. Due to the self-organization of sensor networks, a universal redundancy architecture can be developed. In this paper, the effect of degradation processes of autonomous sensors on the operation of 2oo3D wireless sensor network was analyzed. Through degradation, it is possible to extend the lifetime of the redundant system up to 6 months without repair. This is achieved by the fact that in case of a safe failure the system is not shut down in an emergency, but continues to operate at a reduced redundancy level up to 1oo1D. However, such processes lower the safety completeness level, in this paper from SIL3 to SIL2. It is also necessary to take into account the diagnostic systems, their level directly affects the lifetime of the entire ESD. Thus, when the diagnostic coverage is reduced from 1 to 0.5, the probability of failure-free operation decreases by 18%.

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使用机器学习预测工业设备故障的新方法  
**A NEW METHOD FOR PREDICTING INDUSTRIAL EQUIPMENT  
FAILURES USING MACHINE LEARNING**

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抽象的。本文介绍了工业设备故障预测分析的新方法。这项研究的相关性在于需要提前识别导致工业企业大型生产线运行效率下降或停机的故障。该研究考察了使用机器学习解决类似问题的现代方法，并详细描述了它们的优点和缺点。由于传感器读数与设备条件之间的复杂关系，假设预测模型应基于具有不同分类方法的三种算法之间的“软投票”：卷积神经网络、逻辑回归和支持向量机。

关键词：数学建模、数据挖掘、预测分析、机器学习、神经网络、工业设备、故障预测。

**Abstract.** *The article describes new approaches to predictive analytics of industrial equipment faults. The relevance of the study is due to the need to identify in advance faults that lead to a decrease in operating efficiency or downtime of large production lines of an industrial enterprise. The study examined modern approaches that use machine learning to solve similar problems, and described their advantages and disadvantages in detail. Due to the complex relationship between sensor readings and equipment conditions, it was hypothesized that the predictive model should be based on “soft voting” between three algorithms with different classification approaches: convolutional neural network, logistic regression and support vector machine.*

**Keywords:** *mathematical modeling, data mining, predictive analytics, machine learning, neural networks, industrial equipment, fault prediction.*

Currently, in Russia and in the world, the problem of periodic malfunctions of industrial equipment remains relevant, leading to a decrease in operating efficiency or downtime of large production lines, and consequently to high economic losses [1-3]. At the same time, automation of all branches of industrial production continues actively, which leads to the development of information technology systems of the enterprise. The consequence of this is the development of systems for collecting, storing and monitoring the condition of equipment in real time. At the same time, experts in the field of industrial information systems agree that accumulated large volumes of data can be used to predict failures long before they occur [4-7]. This requires the construction of a separate predictive analytics subsystem used for flexible planning of maintenance and repair.

Prediction methods based on classical machine learning are widely used in the field of diagnostics and prediction of equipment faults due to the good interpretability of training results, relatively low requirements for computing resources and a wide selection of approaches that provide versatile data analysis [8-9]. Although classical machine learning algorithms perform well in diagnosing and predicting faults, they are inferior to neural network algorithms in identifying complex relationships between the readings of a large number of sensors and the condition of equipment [10]. At the same time, the neural networks themselves tend to overtrain, which is especially critical when there is a small amount of fault data. A large number of studies have been carried out in which algorithms were developed based on machine learning methods, but in them, in the vast majority of cases, diagnostics are carried out only for one technical location (bearing, rotor, etc.), which indicates the complexity or impossibility of scaling such approaches. Also, in similar works, data sets with a large number of examples of faults are used for training and testing, thereby achieving high prediction accuracy (accuracy = 0.8–0.9). However, the occurrence of a fault is a fairly rare occurrence for industrial equipment, and therefore it is often not possible to accumulate an extensive library of faults, which is the main difficulty in diagnosing faulty operation in real production conditions.

Accordingly, in a predictive analytics system operating in real time, it is necessary to use both classical machine learning methods and neural network algorithms, thereby eliminating their shortcomings. To improve the accuracy of prediction, “soft voting” (SoftVoting) will be carried out between models in the ensemble.

Preprocessing of sensor readings will include the following steps:

- Removal of outliers - negative sensor readings were reset, as well as a reduction in the amplitude of values exceeding the average by more than a hundred times (since such values are not normal sensor readings and have a negative impact on learning).

- Reducing data to hourly intervals from ten-second intervals - readings in 10-second increments are redundant and not optimal for training a predictive algorithm due to the noisiness of the data and the large amount of memory required (it is necessary to store and work with a table containing 9,460,800 rows for each exhauster).

- Standardization and replacement of missing values - due to the different nature of sensor readings, their standardization was carried out.

- Adding new features - to obtain information about the deviation of sensor readings for the current hour from readings for the previous day, the difference between the average values for these periods was calculated.

It was decided to create a predictive model based on “soft voting” between three algorithms with different approaches to classification. The essence of this ensemble method is to select weights for each of the predictive algorithms that reflect the significance of the forecast. As a result, for each object the probability of belonging to the class is calculated using the following formula:

$$P_1 = w_a * p_{a1} + w_b * p_{b1} + w_c * p_{c1},$$

where  $P_1$  – final probability of an object belonging to class 1 (failure),  $p_{a1}, p_{b1}, p_{c1}$  – probabilities of an object belonging to class 1 predicted by three separate algorithms,  $w_a, w_b, w_c$  – weights assigned to the predictions of individual algorithms.

The following approaches will be used for voting: convolutional neural network, logistic regression and support vector machine. The choice of these methods is due to the low correlation of their predictions with each other and the relatively high quality of prediction for most of the analyzed technical locations.

During the work done, several architectures will be tested, with different numbers of convolutional and fully connected layers.

The quality metric will be the Jaccard index, calculated by the formula:

$$J = \frac{TP}{TP+FP+FN}$$

where  $J$  is the Jaccard index,  $TP$  is the true positive values from the confusion matrix,  $FP$  is the false positive,  $FN$  is the false negative.

For the test data set, prediction will be carried out in two stages: searching for anomalous operating modes using a trained isolating forest and classifying the identified anomalies into technical locations, in the event of a failure (classes 1-4), otherwise assigning them to normal operating modes (class 0). All periods of development of malfunctions that resulted in downtime are classified as anomalous intervals by an insulating forest, while for some of such periods the presence of equipment failure is not observed. This is probably due to the fact that many incipient defects are detected by employees during preventative maintenance and corrected before their development leads to critical failures. Based on the classification results of the identified anomalous modes, it can be seen that periods of

defect development are identified according to experimental data, however, there are local intervals defined as normal operation, which may be associated with a more dynamic development of faults in a given technical location.

The software will be developed in the high-level Python programming language using the Anaconda distribution, which includes a set of free libraries used for working with data and machine learning.

At the first stage of work, predictive models are trained separately for each technical location. As a result of training the neural network, the probabilities of failure at each moment in time will be obtained. To identify faults in different technical locations, decision thresholds are individually selected.

Thanks to the use of an ensemble approach, including a “soft voting” operation between models, for a number of technical locations it will be possible to significantly improve the quality of prediction on the test sample.

Thus, using the developed models, it is possible to study the operation of exhausters in real time, and the results of these studies can be used to plan optimal maintenance work.

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包换能器在水声发射器设计中的应用

## APPLICATION OF PACKET TRANSDUCERS IN THE DESIGN OF HYDROACOUSTIC EMITTERS

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注解。 本文描述了与真实水声换能器相对应的数值有限元模型。 主要关注电阻抗模量、换能器表面各点的位移以及发射器在距其表面 1 m 的水中产生的声压等机电特性。 将获得的依赖性与实验数据进行比较。 尽管简化了模型几何形状,但仍可以获得与实验结果的定性一致性。

关键词: 水声通道、换能器、建模。

**Annotation.** *The article describes a numerical finite element model that corresponds to a real hydroacoustic transducer. The main attention is paid to such electromechanical characteristics as the electrical impedance modulus, the displacement at various points on the surface of the transducer, as well as the acoustic pressure created by the emitter in water at a distance of 1 m from its surface. The obtained dependencies were compared with experimental data. Despite the simplification of the model geometry, it was possible to obtain qualitative agreement with the experimental results.*

**Keywords:** *hydroacoustic channel, transducer, modeling.*

**Introduction.** *The design and manufacture of hydroacoustic transducers is a labor-intensive and expensive process, and therefore, to facilitate design, mathematical modeling methods are currently actively used, including the finite element method [1-2].*

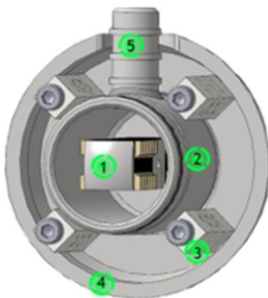
The purpose of the simulation is to optimize the parameters of the piezoelectric transducer so that the range of its operating frequencies, as well as the pressure it creates in this range, meets the requirements.

The paper describes the process of constructing a simplified model of a hydroacoustic emitter that has a package transducer as a piezomotor. A package transducer is a piezoceramic emitter consisting of several piezoceramic elements. Packet converters are currently used for a wide range of tasks, for example, for transmitting acoustic signals through structural elements of drilling equipment [3]. The most promising is considered to be an acoustic communication channel, in which acoustic signals are transmitted along the structural elements of the drill string [4]. However, to transmit signals over short distances, it is possible to use a hydroacoustic communication channel, for the implementation of which it is possible to use the hydroacoustic transducer under study.

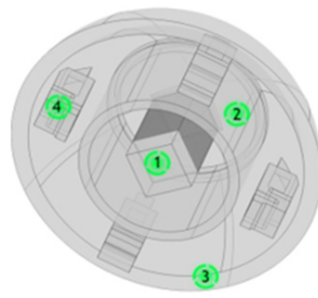
For this model, a calculation was made of the displacement in the air at a point located on the emitter body, as well as the pressure created by the transducer in water at a distance of 1 meter from its working surface. The simulation was carried out in the COMSOL Multiphysics software package. The model was verified based on previously obtained experimental data.

#### ***Model geometry***

The transducer is symmetrical with respect to rotation by 180 degrees, so the model in the Comsol Multiphysics environment represents half of it. To evaluate the required characteristics, not all elements from the real design model (Figure 1: 1 - piezoceramic package transducer, 2 - cylinder, 3 - screw and spring, 4 - steel sphere, 5 - fitting) were brought into the 3D model for calculation (Figure 2: 1 - piezoceramic packet transducer, 2 - cylinder, 3 - screw and spring, 4 - steel sphere). These simplifications should not affect the result of the calculations, since the missing elements do not significantly affect the shape and amplitude of the oscillations of the transducer. It is worth noting that the absence of these elements significantly reduces the calculation time.



**Picture 1.**



**Figure 2.**

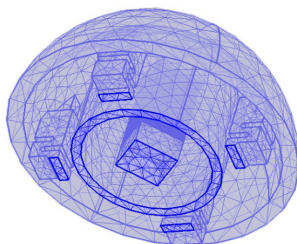
From a mechanical point of view, all interfaces between media in the model are free. The body material is set to stainless steel, the springs are hardened steel. The characteristic radius of the case is 46 mm. The main element of the model is a package converter of 48 elements with dimensions of 14.5x14.5x0.5 mm, made of TsTS-19 material. To take into account the influence of the missing half of the emitter, symmetry conditions are specified on the corresponding boundary surfaces.

Around the emitter in the model there is a medium, which is limited to a sphere with a radius of 10 cm. Water or air were specified as the medium. The model was built in such a way that it was possible to calculate the field outside a given sphere; for this, a layer was specified at the edges of the sphere in which large attenuation was introduced. This layer is needed to simulate infinite space; it eliminates the influence of reflected waves on the result of calculations.

### ***Meshing***

The mesh in finite element modeling is selected individually for each problem. To date, a large amount of experience in such modeling has been accumulated [5]. Based on this experience, 5 mesh elements per wavelength are usually sufficient to simulate acoustics problems.

To correctly model the vibrations of complex structures, it is necessary to refine the mesh near geometric inhomogeneities so that they are adequately represented after dividing into elements. For absorbing layers in the frequency domain, it is necessary to specify at least eight elements per layer thickness.



***Figure 3.***

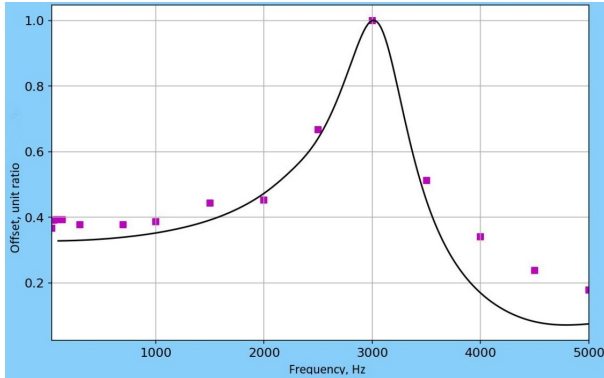
### ***Main results***

The study of the acoustic characteristics of the transducer was carried out in water and in air: in water the main characteristic was the acoustic pressure created by the emitter at a distance of 1 m from its surface, and in air - the displacement on the surface of the transducer. Figure 4 shows a graph of the dependence of the displacement on the working surface of the converter on the frequency of the electrical pump signal supplied to the packet converter. The purple markers correspond



to experimental data (measurements were carried out using a laser vibrometer), and the solid line corresponds to simulations.

There is good agreement between the resonant frequency in the experiment and in the simulation: it is 3 kHz. In general, the model describes well the nature of the dependence near resonance and at low frequencies, but there are some discrepancies in the region above 3.5 kHz.

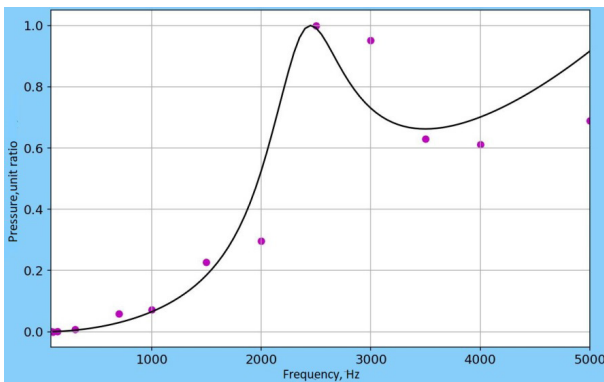


*Figure 4.*

Figure 5 shows a graph of acoustic pressure versus frequency at a distance of 1 meter from the surface of the transducer. The purple markers correspond to the experimental data, and the solid line corresponds to the simulation.

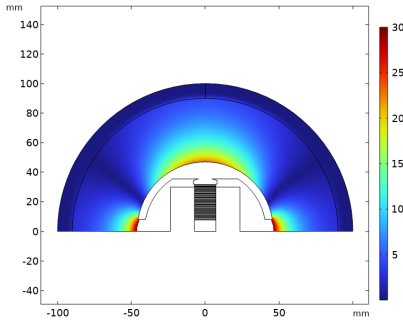
The resonant frequency in both the experiment and simulation is 2.5 kHz.

When moving into water, the resonant frequency decreases, which is caused by the appearance of added mass.

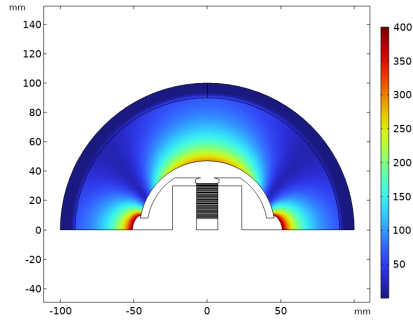


*Figure 5.*

The distribution of acoustic pressure in water at a frequency of 1000 Hz and at the resonance frequency (2500 Hz) is presented in Figures 6 and 7, respectively. The distributions have a similar appearance, but noticeably different characteristic amplitude of acoustic pressure.

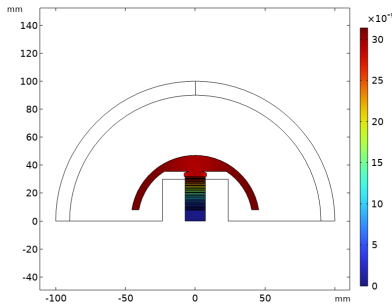


*Figure 6.*

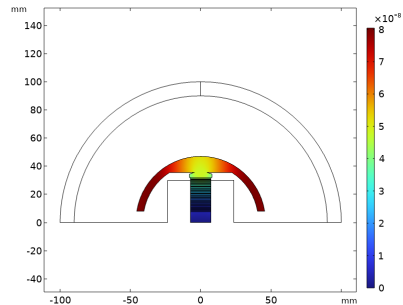


*Figure 7.*

The displacement amplitude distribution at a frequency of 1000 Hz, as well as at the resonance frequency (2500 Hz) is presented in Figures 8 and 9, respectively.



*Figure 8.*



*Figure 9.*

### **Conclusion**

As a result of the work, a model of a hydroacoustic transducer was built and studied, which quite accurately describes the nature of the dependence of the displacement on the surface of the transducer, as well as the pressure created by it in water depending on the frequency. The resonant frequency of the transducer under study was approximately 3 kHz in air and 2.5 kHz in water.

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不同年龄段纯种赛马母马的比赛表现  
**THE RACING PERFORMANCE OF MARES OF THE  
THOROUGHBRED RACEHORSES OF DIFFERENT AGES**

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注解。如今,从世界许多国家向俄罗斯进口马匹是困难的,甚至是不可能的。出现了关于建立自己的纯种马选择基地的问题。这需要分析在赛道上测试的母马的表现,这也是本文的主题。在我们的研究中,最好的比赛表现是3岁的母马,在1000米处跑出了1.01.5秒(58.5公里/小时);4岁及以上-1200米处1.15.8秒(58.4公里/小时)。随着距离的进一步拉长,3岁马的比赛成绩在2200m距离时下降至48.8公里/小时;老组的母马在3200m的高度时可以达到51.2 km/h。关键词:纯种马匹、测试、锐度、母马。

**Annotation.** *Today importing horses to Russia from many countries of the world is difficult and even impossible. The question arises about creation of own base for selection of the Thoroughbred horses. This requires analyzing the performance of mares tested at racetracks, which is the subject of this paper. The best racing performance in our research was shown by mares aged 3 years - 1.01.5 s (58.5 km/hour) at 1000 m; at the age of 4 and older - 1.15.8 s (58.4 km/hour) at 1200 meters. With further lengthening of the distance, the racing performance of horses of 3 years of age falls to 48.8 km/hour at a distance of 2200 m; in the group of older ages – 51 km/hour at 3200 m.*

**Keywords:** *thoroughbred riding breed of horses, tests, sharpness, mare.*

## **Introduction**

The horse breeding and its prosperity is an integral resource for the progress of society, which is impossible without breeding the Thoroughbred horse breed - it is one of the most valuable and oldest breeds bred by human. Horses of this breed are considered to improve many horse breeds both in Russia and abroad. Therefore, they are universally used in breeding work by horse breeders of the world. The main phenomenon is that without an infusion of the Thoroughbred horse blood, most sporting breeds are not able to exist - they will inevitably begin to degenerate. Since the times of the Russian Empire, the English Racehorse (as the British used to call them) were fully considered the best in the world - they were not inferior to foreign representatives neither in speed, nor in exterior. In the times of USSR horse breeding flourished no worse - there were several Soviet lines of this breed, whose representatives more than once showed the best world results of racing performance [1, 2, 6].

Almost all Soviet lines of the Thoroughbred horses have been lost to date. Russian breeders and horse owners favored animals bought in Europe or the USA for many years. The performance of the Thoroughbred riding horses is the main selection and practically the only feature in breeding work with the breed. Many researchers [1-3, 5, 7] pay attention to the study of workability in different aspects in horses of this breed. The performance of the Thoroughbred horses tested at the Central Moscow Hippodrome (CMH) in 2018/2019 was studied by such authors as P.T. Kochkarov, I.B. Tsyganok [4]. In the conditions of changing world order and political complexities, the European Union has banned the import of horses into the territory of Russian Federation. In this regard, the course of import substitution, namely, the breeding of own Russian lines and, perhaps, the revival of the only remaining Soviet Tagore line becomes relevant. Based on the above, the study of performance of the Thoroughbred horses tested in races is an integral part of domestic breeding. An important aspect in breeding work is the formation of a high-quality breeding nucleus. In this regard, the study of the performance of the Thoroughbred mares tested at racetracks in Russia seems to be very relevant.

## **Purpose of research**

The purpose of this study is to examine the performance of the Thoroughbred mares of different ages tested at the Central Moscow Hippodrome in 2020-2022.

## **Material and methods of research**

Studies on the performance of the Thoroughbred mares were conducted at the Central Moscow Hippodrome (CMH) in Moscow, which was considered the most prestigious in Russia until it's reconstruction in 2023. The object of the research were the Thoroughbred mares that raced in 2020-2022. The results of the animals' working capacity were taken from the test cards. The results of tests of mares that participated in races at least once during the specified period were studied. A

total of 137 mares were tested at CMH from 2020 to 2022. Some horses (the best horses) have raced for more than one year, and of course the animals were tested at different distances, so 230 cases were included in the study. We analyzed the racing performance of horses at 2, 3, 4 years old and older in minutes and seconds at distances of 1000, 1200, 1400, 1400, 1600, 1800, 1800, 2000, 2200, 2400 and 3200 meters. For convenience in comparing the racing performance, we converted it to speed expressed in km/h. Biometric processing of numerical indices was carried out using Excel program.

### **Research results and discussion**

Racing performance in the Thoroughbreds is not a fundamental indicator, as it is well known that the performance in races is taken into account more often by winners and medalists, not by performance. It is also not a secret that from mares that have produced mediocre results in terms of agility, decent offspring can be born. In spite of this, it is advisable to test mares in races, and the results of the tests are used to evaluate the progress of the breed as a whole. A carefully selected breeding stock of sharp mares largely determines the success of the breeder [1, 2]. Since the horses were raced on the same track, it is quite relevant to compare the racing performance of horses at different ages and at different distances. In 2020-2021 were tested horses, predominantly bought in Europe. Even such famous stud farms as LLC "Donskoy" were not an exception. For example, during this period, 20 mares born in the USA raced at CMH. The situation changes in 2022, the number of mares born in Russia increases. In addition, their fierceness results are generally not inferior to imported mares. In total, in 2022, 7 American mares, 1 British mare, 1 Italian mare participated in the CMH from foreign horses. The best result for 2-year-old mares in the 1200 m distance was demonstrated by a mare born in the USA - 1.14.0 sec. The Russian mare was behind her with a racing performance of 1.15.7 sec. Racing performance trait in 2-year-old mares tested at CMH is equalized (Cv to 3.7%). Racing performance (speed) decreased with increasing distance, significantly lower at 1600 m, 54.7 km/h (1.45.3 s); the best, 56.1 km/h (1.17.0 s) at 1200 meters (Table). In the 3-year-old age group, the best result was shown by a mare born at the Donskoy Horse Breeding Company - 1.40.5 sec at 1600 m. Two imported mares from Italy and the USA were second to her. Sharpness in this group is equalized - Cv within 3,6%, except for Cv - 10,1% at 1600 m distance. Obviously, the great variability at 1600 m is due to the fact that often mares are tested for the first time at 3 years old: the table shows that there were 13 mares at 2 years old and 31 at 3 years old. The best average quickness in our research was shown by mares for the short distance, 1000 m - 58,5 km/h (1.01,5 s), reliably less sharp were the mares for the long distance 2200 m - 48,8 km/h (2.42,3 s).

In the older age group, mares predominantly performed at 1800 m - 14 heads; fewer mares raced at 1200 m - 10 heads; from 2 to 6 heads performed at other distances. Only Russian mares raced. The best result was given by a mare born in the Eclipse stud farm - 1.45.1 sec. A higher average speed (sharpness), as in the 3-year-old group, was shown for the distance of 1200 meters 58.4 km/h (1.14.0 s). The trait is equalized (Cv to 3.2%). Mares of this group, as a rule, have already proved themselves in races at an earlier age and have a high enough racing class.

**Table**  
*Performance indicators of tested mares of different ages*

CMH for 2020-2022									
mares, 2 years old									
distance	1000	1200	1400	1600	1800	2000	2200	2400	
n, heads	-	30	24	13	-	-	-	-	
Speed, $\bar{M}$ , km/hour	-	56,1	55,9	54,7	-	-	-	-	
Performance (min.sec)	$\bar{M}$	-	1.17,0	1.30,2	1.45,3	-	-	-	
	Cv, %	-	3,7	2,7	2,1	-	-	-	
mares, 3 years old									
distance	1000	1200	1400	1600	1800	2000	2200	2400	
n, heads	4	3	4	31	37	16	2	27	
Speed, $\bar{M}$ , km/hour	58,5	57,0	57,7	54,5	55,7	54,4	48,8	53,3	
Performance (min.sec)	$\bar{M}$	1.01,5	1.15,8	1.27,4	1.45,6	1.56,4	2.12,3	2.42,3	2.42,2
	Cv, %	0,9	3,6	3,6	10,1	3,5	2,1	0	2,3
mares, 4 years old and older									
distance	1000	1200	1400	1600	1800	2000 2200	2400	3200	
n, heads	3	10	-	6	14	-	4	2	
Speed, $\bar{M}$ , km/hour	52,2	58,4		56,6	55,1		54,8	51,2	
Performance (min.sec)	$\bar{M}$	1.09,0	1.14,0	-	1.41,8	1.54,5	-	2.37,6	3.44,9
	Cv, %	1,3	2,4	-	2,2	3,2	-	0,9	2,0

The table shows that the largest number of mares (cases) were presented at 3 years of age - 124 head, and the smallest number was in the older group - 37 head. Young mares of 2 years old were exhibited for CMH tests in 67 cases. All 8 investigated distances from 1000 to 2400 m were raced by horses aged 3 years. Only 3 distances within 1600 m were presented in 2-year-old group. The older group did not participate in 3 distances at 1400, 2000 and 2200 m out of the 9 studied distances, the 3200 m distance is added in this group. Mares had uneven results at different distances and at different ages. We observe a progression of the racing performance (speed) at 1200 and 1600 meters in the older group (58.4; 56.6

km/h, respectively) compared to 2-year-old mares (56.1; 54.7 km/h). Comparing the results of the older group mares with the 3-year-old group, an improvement in all distances except 1000 and 1800 meters was found.

### Conclusion

The performance of horses born in Russia conditions became better - this is a positive factor for identifying promising animals that could establish their own genealogical groups in the Russian Thoroughbred horse breeding. The best racing performance (speed) in our research was shown by mares at the age of 3 years old - 1.01.5 s (58.5 km/hour) at the distance of 1000 m and at the age of 4 years old and older - 1.15.8 s (58.4 km/hour) at 1200 meters. With the lengthening of the distance, the racing performance of 3-year-old horses drops to 48.8 km/hour at 2200 m; for mares in the older group to 51.2 km/hour at 3200 m. 2-year-old mares also had a better racing performance at a shorter distance of 1200 m, 56.1 km/h (1.17.0 s) and the speed decreased at 1600 m, 54.7 km/h (1.45.3 s). It was found that with age there was a progress of racing performance (speed) at 1200 and 1600 meters in older mares (58.4; 56.6 km/h, respectively) compared to 2-year-old group (56.1; 54.7 km/h). When comparing the results of mares from the older group with those of 3-year-old group, an improvement was found for all distances except 1000 and 1800 meters.

**Authors' contribution:** the authors have made an equivalent contribution to the preparation of the publication and declare that there is no conflict of interest.

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气候与经济：同一枚硬币的两面

## CLIMATE AND ECONOMY: TWO SIDES OF THE SAME COIN

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注解。 文章讨论了当前全球气候变化问题，这是目前国际社会讨论最多的问题之一。 文章作者对 20 世纪下半叶和 21 世纪初各种气候变化的文献资料进行了分析，使我们能够识别环境 and 经济性质的问题。 基于气候变化的太阳理论，证实了自然原因导致的全球和区域环境和气候变化问题的相关性。 作者强调了与经济 and 地缘政治表现相关的研究的相关性。

关键词：气候、全球气候、气候变化、生态、太阳辐射、地球轨道参数、经济后果、气候变化的太阳理论、经济学。

**Annotation.** *The article discusses current issues of global climate change, which are currently one of the most discussed problems for the world community. The analysis of literary sources carried out by the authors of the article on various climate changes in the second half of the 20th and early 21st centuries allowed us to identify problems of an environmental and economic nature. The relevance of the problem of global and regional changes in the environment and climate due to natural causes is substantiated, based on the Solar Theory of Climate Change. The authors emphasize the relevance of research related to economic and geopolitical manifestations.*

**Keywords:** *climate, global climate, climate change, ecology, solar radiation, Earth's orbital parameters, economic consequences, solar theory of climate change, economics.*

### **Say a word about the poor climate...**

What role does the human factor play in climate change? How will global warming affect the Russian and world economies? What needs to be done to mitigate the effects of climate change and should it be done?

Our natural tendency to believe anecdotal evidence and reject science makes it extremely difficult for people to make good choices about climate change right now.

The wide variability in global warming scenarios and their consequences is mainly due to the high degree of uncertainty associated with this problem. Even without accounting for uncertainty in technological innovation, climate and environmental policy, many variables in climate change models depend on researchers' assumptions. For example, to determine the volume of future greenhouse gas (GHG) emissions, forecasts of economic and demographic development for the next 100 years are used, which, given their huge time horizon, are very abstract. Views on the relationship between greenhouse gas emissions levels and the climate's response to them can also vary according to assumptions made and new data, which in turn affects the quantitative assessment of the damages caused by global warming. Much remains unclear regarding future climate processes, given their nonlinearity and the likelihood of the existence of critical points of no return [1].

Predicting an economy's response to climate change can also vary depending on the elements considered and the type of model used.

According to calculations for the period of active industrialization from 1959 to 2021, the content of anthropogenic CO<sub>2</sub> (excluding volcanic activity) was no more than 4.1% of the total carbon dioxide content in the atmosphere.

The contribution of anthropogenic CO<sub>2</sub> to warming for the period from 1959 to 2021 is 0.0004 degrees, with a total warming of 0.81 degrees. In connection with the results obtained, the conclusions of the Intergovernmental Panel on Climate Change (hereinafter IPCC) about the leading role of the anthropogenic factor in climate warming do not seem convincing. There can be no talk of any defining anthropogenic warming.

There is no doctrine of global warming; there is a branch of physics called atmospheric physics. The subject of its study is the observed climate changes at different scales (time), the physical description of their mechanisms and the modeling of these changes for the purpose of possible forecasting.

From the Cretaceous to the Eocene, 35-100 million years ago, fairly high temperatures were accompanied by a decrease in carbon dioxide concentration, and 250-320 million years ago, the concentration of carbon dioxide was half that of today, but the temperature was 10°C higher. It is quite obvious that on geological time scales carbon dioxide cannot be considered the main factor in the formation of the Earth's climate. Moreover, experimental data also show that there is no correlation between changes in carbon dioxide concentrations and surface air temperature on any time scale. The most interesting thing is that the IPCC "experts" simply do not notice these long-established and generally accepted data.

The Earth's climate is subject to long-term changes due to changes in orbit, distance from the Earth to the Sun, precession of rotation and a number of other factors. All this is summarized in the theory of Milankovitch cycles. But this happens on time scales from tens to hundreds of thousands of years, and on such scales these factors are really the main ones; for example, large glaciations are associated with this.

It is important to note that the IPCC does not conduct research, but only critically summarizes publications in the peer-reviewed scientific literature. This is how assessment reports from this organization appear, presenting generalizations of climate research over the past 6–7 years. There is nothing in these reports that has not been published in the peer-reviewed scientific literature.

At Moscow State University named after M.V. Lomonosov, based on calculations of solar radiation with high spatial and temporal resolution and analysis of their results, convincing scientific evidence has been obtained that modern global climate change is determined by natural causes. It is known that the change of seasons is associated with the fact that the Earth's axis of rotation changes its tilt. The angle of inclination is currently decreasing. The consequence of this is an increase in the intensity of transfer (movement) of radiation heat from the equatorial region to the polar regions.

The observed climate warming is associated with this. An increase in carbon dioxide content is not a cause, but a consequence of climate warming. As the temperature of the surface layer of the ocean increases, the solubility of CO<sub>2</sub> in water decreases, and therefore its content in the atmosphere increases. Therefore, the concept of a green energy transition does not have climate implications, but has environmental and mainly economic and political implications. Taking into account the new knowledge gained about the causes of climate change, it follows that it is necessary to revise the existing climate concept, which is beneficial only for the countries of the collective West.

Due to the fact that climate change is associated with natural causes and is not related to human activity, it is useless to fight these changes. They can be adapted in advance based on reliable forecasts based on the real causes of climate change. At the same time, environmental problems associated with pollution of the atmosphere, water and land resources (which are mainly caused by human activity) and not directly related to climate change can and should be solved. Separating climate problems from environmental ones will make it possible to more effectively adapt to some and solve others.

The initiatives of the collective West are directed, first of all, against Russia, which ranks 1st in the world in proven gas reserves, 2nd in coal reserves and 8th in oil reserves. Europe does not have such energy reserves and the collective West insists on transferring our economy to green energy under the flimsy pretext of combating climate change. But the climate changes regardless of people.

The global climate policy framework is currently being shaped by the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Climate Agreement. The goal of the UNFCCC is to “stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.” At the same time, it is not clear what “dangerous anthropogenic impact” is, especially in comparison with temperature fluctuations in the past.

The emergence of new knowledge about the causes of climate change creates opportunities for a technological breakthrough and can ensure Russia’s global priority in the field of climate on the basis developed at Moscow State University named after M.V. Lomonosov solar theory of climate change.

The solar theory of climate change is also a new climate weapon aimed at combating false climate ideas imposed by the West.

### **Carbon windmills**

It is clear that the decarbonizing program promoted by globalists and based on manic “concern” about global warming has completely different goals than warming itself.

The fact that carbon dioxide is not the main climate-forming factor is evidenced by the entire multimillion-year history of the development of life on our planet. For example, 250–320 million years ago, during the Carboniferous period, the concentration of carbon dioxide was half as high as it is now, but the average temperature was 10 °C higher. While 150–200 million years ago the CO<sub>2</sub> content was almost an order of magnitude higher than now - 0.3%, and 400–600 million years ago - even 0.6%, while there was no global warming then, on the contrary, almost the entire planet was covered with ice.

The total mass of carbon dioxide in the earth’s atmosphere today is 3.03 trillion tons (about 0.038% of the total mass of the planet’s atmosphere), of which 550 billion tons are annually dissolved in sea water and converted into living matter as a result of photosynthesis. That is, on average, all atmospheric CO<sub>2</sub> participates in the planetary carbon cycle once every 5–6 years.

About 300 billion tons of carbon dioxide are consumed annually to create organic matter, i.e., about 10% of the amount of CO<sub>2</sub> contained in the atmosphere. Then almost all of this mass of carbon dioxide returns back to the atmosphere and hydrosphere as a result of the oxidation of organisms and their metabolic products that have completed their earthly lives.

It should be noted that the carbon cycle as a result of the creation of organic matter in the earth’s biosphere is completely closed.

Of the total mass of organic carbon annually absorbed by plants, only a small part passes into the lithosphere and leaves this cycle.

Studies have shown that for efficient photosynthesis, the current level of carbon dioxide in the earth’s atmosphere is 2–3 times lower than optimal. This is, in

particular, evidenced by data on CO<sub>2</sub> levels - in commercial greenhouses indicate optimal yield at its value of 0.1–0.12% or more. Based on this, we can conclude: the lack of carbon dioxide in the earth's biosphere from the point of view of all living matter (and not the “globalist man”, who is very limited in biosphere knowledge - one of the trillion species of living organisms) amounts to hundreds of billions, if not trillions of tons.

The increase in atmospheric carbon dioxide concentrations is actually caused less by industry and transport and more by CO<sub>2</sub> being released back from ocean and land sediments thanks to rising average temperatures on the planet (not the other way around). At the same time, it improves crop yields, promotes the growth of forests and grassland plants, as well as fish, crustaceans, mollusks, algae and corals in the ocean.

Therefore, the modern annual the global level of industrial CO<sub>2</sub> emissions (about 30 billion tons per year, i.e. 4-5% of its annual intake from natural sources) will have an impact on the greenhouse effect of a maximum of 1% of the above-mentioned 22% of the impact of carbon dioxide on the climate, or in total – only 0.22% [2].

According to the target scenario of the low-carbon development strategy of Russia, approved by Order No. 3052-r of October 29, 2021, the Russian economy should achieve carbon neutrality by 2060. To achieve this, among other things, the developers propose reducing greenhouse gas emissions by about 1% of GDP in 2022–2030 and to 1.5–2% of GDP in 2031–2050 by preserving and increasing the absorption capacity of forests and other ecosystems. At the same time, the developers themselves do not understand at all how they will increase the absorption capacity of natural carbon dioxide sinks - the Siberian taiga, deciduous forests in different regions, our reservoirs - both internal and external.

The document states that 1,200 million tons of CO<sub>2</sub> equivalents will be neutralized through forests and 900 million tons through improved technology by 2060. The real potential of forest-climate projects (hereinafter referred to as LCP) is significantly lower than what is shown in the Strategy for Low-Carbon Development of the Russian Federation (hereinafter referred to as SNUD), scientists from the Institute of Geography of the Russian Academy of Sciences believe. According to the SNUR, the absorption of greenhouse gases by forests needs to be increased from 535 million tons of CO<sub>2</sub> to 1200 million tons of CO<sub>2</sub> by 2050, i.e. by 665 million tons due to LCP. At the same time, the authors of this strategy do not specify how they will “force” our forests to absorb carbon more than twice as efficiently as they do now. Scientists at the Institute of Geography of the Russian Academy of Sciences estimate the potential of climate projects at 200 million tons of CO<sub>2</sub> equivalent. Thus, the state's focus on forest climate projects for the implementation of the green energy transition is ineffective and - this is the main

thing - completely incomprehensible. Outlawed anthropogenic CO<sub>2</sub> is completely safe for the biosphere and is not only excessive, but does not even compensate for the carbon deficiency in the earth's atmosphere. Carbon dioxide is natural, anthropogenic, has never been and cannot be an atmospheric pollutant. Moreover, without it, life on Earth would be impossible.

“Planting one trillion trees is wrong,” expressed her opinion Anastasia Makariva, Ph.D. physics and mathematics Sciences, Department of Theoretical Physics, St. Petersburg Institute of Nuclear Physics (PNPI) National Research Center “Kurchatov Institute”. Setting a numerical or territorial target “is lying to the people.” Instead, the goal should be to restore ecosystem functionality. Just as mature trees with intact soil store much more carbon than young tree stands, mature native forests are much more effective at regulating water and climate, she said.

Efforts by local communities to protect against floods and droughts by returning land to wetlands and floodplains, restoring native plants starting in wetter areas, and imitating natural succession have the potential—by storing carbon, regulating temperature, and the water cycle—also to mitigate the effects of climate change changes in temperature and water.

#### **Carrot and stick method**

The Paris Agreement calls for keeping “average temperature increases well below 2°C above pre-industrial levels and efforts to limit temperature rise to 1.5°C”. Why? The answer lies on the surface - to develop our own economy and restrain the development of the economies of other countries. Hiding behind the fig leaf of concern for the environment, the EU is systematically engaged in redistributing the market.

If we talk about the fight against CO<sub>2</sub> emissions, talk about saving fuel, and then everyone who makes the most noise about this consumes the most energy. The United States consumes 9 tons of fuel oil equivalents per person per year. Europe is half the size. Russia began to consume 3 tons, although in the Soviet era even the entire Soviet Union spent per capita like Europe - more than 4 tons per person per year. But now we have destroyed our industry, mechanical engineering, many industries that consume energy have decreased significantly - this is a disaster, of course, but energy consumption has decreased. And in the coastal regions of China, 400-500 million Chinese live in terms of energy consumption as in Europe, i.e., in terms of carbon dioxide emissions, another Europe has appeared on Earth, or three Russias. India and Southeast Asia are growing. But, one way or another, 25% of the Earth's population consumes 90% of energy, i.e., these 25% are responsible for the emission of carbon dioxide into the atmosphere.

While solar energy is not economically justified, but in Germany already a fifth of energy is obtained from renewable sources, primarily the sun and wind - thanks to cross-financing, i.e. they pay much more for electricity to support renewable

sources. Only very rich developed countries are capable of this. But at the same time, it is important to emphasize that obtaining energy from wind energy is a very environmentally unfriendly method: there is nothing living in tens of square kilometers around the “windmill”. Also, a very serious environmental problem arises when disposing of solar panels, which have a limited service life. With all this, we must not forget that the production of both solar panels and wind generators requires electricity, which must be taken from somewhere.

Due to the fact that climate change is associated with natural causes and is not related to human activity, it is useless to fight these changes. They can be adapted in advance based on reliable forecasts based on the real causes of climate change.

### **Economic consequences of climate change**

The impact of climate change can be measured as economic cost [5]. This is particularly well suited for market impacts, that is, impacts that involve market transactions and directly affect GDP.

Given the specific nature of economic forecasting methods, estimates of the effects of global warming during the 21st century have varied widely. It is important to understand that assessing the impact of climate change on the economy is burdened with very large uncertainties.

Separate initiatives are being promoted to detail the provisions of the Paris Agreement (for example, for the implementation of climate projects under Article 6). Important for the oil and gas industry are initiatives such as the Global Methane Commitment, announced by developed countries led by the US and EU in 2021 and uniting more than 100 countries in an effort to collectively reduce methane emissions by at least 30% by 2030 relative to 2020 (Russia to didn't join him). Methane is the second most important anthropogenic greenhouse gas after carbon dioxide, and the oil and gas industry is among its main sources. It is noteworthy that the Oil and Gas Climate Initiative, organized by the largest oil and gas companies (there are no Russian ones among them), also sets goals for its participants to reduce methane emissions - up to their minimization by 2030.

The most serious consequences for the industry may come from initiatives by developed countries to phase out support and use of fossil fuels.

Suppliers of Russian goods with a large carbon footprint will pay at least €1.1 billion a year to the EU budget when the authorities of European countries begin to fully collect the cross-border “carbon tax” officially proposed by the European Commission on July 14. For Russia, the carbon tax will actually be equivalent to an additional ad valorem duty of 16% of the value of goods - €1.1 billion from €7 billion (Table 1). You will have to pay the most for iron and steel export from Russia - €655 million, nitrogen fertilizers - €398 million. They have larger supply volumes in tons and high carbon intensity. This follows from RBC's calculations using a methodology confirmed by the Ministry of Economic Development. The



Office is responsible for consultations with the EU on the carbon tax. At the same time, everyone somehow “forgot” that the Paris Agreement, the consequence of which is the so-called carbon tax, does not give the countries that signed it the right to introduce any taxes, duties, etc. The introduction of such a tax is a direct violation of trade rules determined by the World Trade Organization (WTO).

**Table 1.**  
*Imports from Russia to the EU potentially subject to carbon tax<sup>1</sup>*

Types of imported products	Number of products, million tons	Amount of potential carbon tax (forecast), € million
Fertilizers	5.07	1066.4
Electricity		196.3
Iron and steel	10.17	3963.7
Aluminum	1.02	1760.9
Cement	0.014	0.8
Total, € bln: 6.99		

Total exports of carbon-intensive products to Europe amount to about \$180 billion per year, and the cross-border tax, according to estimates Boston Consulting Group, - about \$30 per ton of emissions. For Russian exporters, losses will amount to about \$3-5 billion per year. Annual losses of oil exporters can reach \$2.5 billion, metallurgical companies - about \$1 billion. The levy can also hit the profitability of fertilizers [4].

**Table 2.**  
*Amount of carbon tax by country, € million.<sup>2</sup>*

Products Countries	Iron and steel	Fertilizers	Aluminum	Cement	Total
Russia	655.1	397.8	74.8	0.6	1128.3
Türkiye	325.7	65.0		104.2	494.9
Ukraine	315.1	85.0			400.1
Great Britain	209.7	80.4			290.1
China	163.2	48.9			212.1
South Korea	176.5	4.8		-	181.3
India	163.4	9.9			173.3
Brazil	57.7	0.2		-	57.9
USA	33.7	-			33.7

### Climate impacts of economic change.

<sup>1</sup> Source: RBC calculations. European Commission, Eurostat. Data for 2020

<sup>2</sup> Source: RBC calculations. European Commission, Eurostat

There is a view that economic growth and climate action are incompatible: efforts to combat climate change will inevitably harm economic growth. Therefore, society will have to decide: to continue economic growth and accept increasing climate risks, or to reduce climate risks but accept slower economic growth. And the anthropogenic influence on climate change is not proven.

The principles of climate change economics address two key issues: achieving “better growth” (improving quality of life, ensuring sustainable economic development, and reducing poverty); achieving a “better climate” (reducing GHG emissions). It must be emphasized that one of the principles of sustainable development, introduced in 2004 by former UN Secretary-General Kofi Annan, relates to ecology, but not to climate change. They - climate change - have been drawn to the concept of sustainable development literally by the ear.

Volatility in world prices, driven by market conditions and political instability, makes economic forecasting difficult. All uncertainties in the results of the analysis and forecast of climate change and the resulting possible losses must be compared with the risk posed by the refusal of officials to make changes to the Climate Doctrine of the Russian Federation.

No one has proven and will not be able to prove that an increase in the average global temperature is generally “bad” for humanity; no one has proven and will not be able to prove that an increased content of carbon dioxide in the atmosphere is also “bad” for humanity as a whole.

Forests are a fundamental element defining the Earth’s climate system, driven by winds, they create rain through a “biotic pump”, and they control soil erosion and the health of entire ecosystems. Not only that, but forests actually cool the Earth and are an important element in our current attempt to avoid catastrophic runaway global warming. But we need to understand these mechanisms; otherwise, we remain stuck in the harsh judgment that led, for example, to Bill Gates’ recent declaration that trees are useless for climate control.

Using neural prediction methods to estimate the time course of carbon dioxide emissions has a number of important advantages. Carbon dioxide emissions are influenced by various factors such as economic conditions, technological innovation, climatic conditions and others.

If we evaluate the obtained forecast average annual values of total greenhouse gas emissions (in CO<sub>2</sub> equivalent) in Russia for the period from 2005 to 2036, including emissions from energy and industrial activities, several conclusions can be drawn.

Total greenhouse gas emissions in Russia show some variability across years. In the first half of the period (from 2005 to 2010), there was a moderate increase in emissions. From 2011 there is a more noticeable increase until 2020, after which emissions remain approximately the same. In 2019 and 2018, greenhouse gas emissions reach their maximum values – 1933.25 and 1919.92 million tons of

CO<sub>2</sub> equivalents, respectively. From 2020 to 2023 there has been a slight decline in emissions due to the lingering effects of economic stagnation due to the COVID-19 pandemic, but by 2024 their levels will begin to rise again.

Between 2030 and 2036 a moderate reduction in emissions is projected in Russia.

The CO<sub>2</sub> emissions accounting system proposed by European regulators was created in the interests of Western capital and does not take into account Russia's decarbonizing capabilities, according to Vyacheslav Rozhnov, academician of the Russian Academy of Sciences and director of the A.N. Severtsov Institute of Ecology and Evolution. "For instance, our forests, seas, and chernozem [black soil] have significant carbon absorption capacity. Our unique ecosystems essentially serve as a donor for the entire Eurasian continent, absorbing carbon in volumes that significantly exceed our country's industrial emissions. Therefore, the discussion with European partners should also include the question of compensating Russia for the costs associated with the preservation and development of natural ecosystems," he said. It is not Russia that should pay a carbon tax, but EU countries should pay Russia for the fact that our forests absorb their carbon dioxide

The scenario forecasts proposed by the IPCC lead to uncertainty, since it is not known which of the proposed scenarios will happen in reality.

Neural networks make it possible to make forecasts over various time horizons, from short-term to long-term, and to model complex nonlinear relationships between variables and predict non-obvious trends, which is important for planning effective measures to reduce CO<sub>2</sub> emissions and adapt to climate change.

The average share of greenhouse gas emissions for the period from 2005 to 2036 will be approximately: USA: 22.09%, China: 14.94%, EU: 13.5%, Russia: 3.2%.

The results obtained can be explained by the following factors. The US share of emissions is higher than China's because the US is one of the largest economies in the world with a high level of industrial development and technology using coal and oil to produce energy. China is seeking to increase its share of renewable energy sources. The US has a higher share of industry in its economy than China. Based on a realistic estimate, the US, with its more developed and energy-intensive economy still has higher total emissions.

**Fais ce que dois, advienne, que pourra - Do what you must, and be what will be.**

The government must approve the priorities of both energy and environmental policies. While we introduce new market mechanisms, tariff regulation mechanisms, and environmental standards every year, it is impossible to reliably predict the effect of carbon regulation either in terms of emissions reduction or in terms of socio-economic effects.

A carbon tax should not be seen as a mandatory and fundamental method of climate policy - most countries in the world do without it. Instead of a tax, quota trading systems or softer measures (systems of “white certificates”, targeted agreements, etc.) can be used.

If we talk about reducing emissions in general, and not just greenhouse gases, then in July 2014 N 219-FZ was adopted, according to which enterprises must introduce cost-effective technologies that minimize the generation of waste and emissions, and since December 2014, national standards have been approved “Best available technology.” The BAT reference book is one of the main documents, the purpose of which is to introduce the best available technologies and establish appropriate standards, including those on emissions for a specific industry. Today, there are 51 BAT ITS operating in the country. The entire process of transition to the best available technologies (BAT), according to authorities, will take from 7 to 14 years and will ultimately reduce the environmental impact on the country by 75-80%. Let us emphasize that there will be a reduction in the environmental impact, but not on anything related to climate change.

A carbon tax is not Harry Potter’s magic wand, but rather Ron Weasley’s broken wand, which will not circumvent potential foreign import restrictions on goods with high carbon footprints—energy decarbonizing, even in green countries like Germany, takes decades.

In order to avoid additional burden on business, which will ricochet on the same S (social impact from ESG), it is necessary to adhere to the principle of redistribution of the tax burden (revenue neutrality).

When introducing a carbon tax, the authorities reduce the rates on other taxes so that, on the one hand, the total tax revenue of the budget remains unchanged, and on the other hand, there is no increase in the total tax burden for those enterprises that do everything necessary to reduce greenhouse gas emissions. A similar principle is common in foreign countries: it was implemented in British Columbia and France, and partially in Switzerland and Denmark. The same principle corresponds to the position of the Russian President regarding a moratorium on increasing the fiscal burden. Otherwise, domestic business will not receive an incentive to increase efficiency, but will receive another “quiltrent” that it may no longer be able to bear.

The world’s largest investors are increasingly aggressively imposing decarbonizing principles on the banking sector. Financial institutions are trying to balance recognizing the need for green technologies while also investing in oil and gas.

In April 2021, 35 investors from the Institutional Investors Group on Climate Change (IIGCC), including the American Federated Hermes Inc. EOS and Pacific Investment Management Co. have called on the world’s largest banks to phase

out financing of companies involved in fossil fuel production, redirecting those resources to achieve the goals of the Paris climate agreement. It is quite possible that over time, other IIGCC members will support such an initiative<sup>3</sup>.

The main motivation of funds and other structures promoting various “green” technologies and calling for a rejection of traditional energy, apparently seems rather banal and is related to the desire to earn, said Igor Dodonov, an analyst at Finam Investment Company.

The world’s largest investors have benefited enormously from the green turn, which has boosted the sectors of electric vehicles, wind turbines, solar panels, batteries, interconnected energy systems, etc. Let us emphasize again - to produce all of this, electricity is required, which must be taken from somewhere.

For banks and funds that are part of “green” companies and projects as large shareholders, it is undoubtedly beneficial for the “play” to be played as long as possible and preferably without intermissions.

As a result, the world’s largest investors, pursuing their goals of capital accumulation, create favorable conditions for financing RES projects and companies that intend to “reduce CO2 emissions” (at the same time, the entire life cycle of “green” RES, its environmental load is not considered unprofitable) . Another question is that the aggressive imposition of “green” technologies has not yet led to a significant increase in the energy security of countries (in some cases, even the opposite), nor has it led to a reduction in the cost of electricity for households and enterprises. At the same time, if the policies of the largest banks do not radically change in the coming years, oil and gas companies will find it increasingly difficult to attract investors, which, in fact, will gradually change the development of the technological structure of the global energy sector.

It is necessary to say a few words about the new “play” of the EU, which is developing a package of documents on the accelerated militarization of the EU economy, and proposes to make the production of ammunition and weapons one of the priority areas of economic development along with green energy. At the same time, as part of the same package of documents, the European Commission (hereinafter EC) will present an initiative to launch the production of artillery ammunition, in which EU institutions and community countries will invest €1.5 billion.

The EC proposes to provide EU countries that invest significant sums in the development of the military industry with exemptions from the budget deficit and public debt levels adopted in the community, which will allow states to more ac-

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<sup>3</sup> Reference. In total, the IIGCC has 270 members managing assets around the world totaling €35 trillion (as of the end of 2020). This association includes pension funds, organizations developing renewable energy projects, and even church foundations. The IIGCC also includes the world’s largest investors, for example, BlackRock, which owns assets worth \$8.7 trillion, or Fidelity International.

tively attract funds for military construction. Currently, such exemptions can only be granted for green energy or clean production projects.

The most short-term goal of these decisions is to increase the production of 155 mm artillery ammunition, mortar mines, and various types of surface-to-surface and surface-to-air missiles.

Let us recall that Russian suppliers of iron, steel, aluminum, and fertilizers will pay at least €1.1 billion per year in cross-border carbon tax when the authorities of European countries begin to collect it in full. Thus, Russia will pay for the production of weapons that will be supplied to Ukraine and used against our population. Do we need it?

### **Conclusion**

The adoption of a new climate concept based on the solar theory of climate may become the basis for attracting to the side of Russia many supporters of the truth and, above all, from among the countries with reserves of fossil energy resources (Saudi Arabia, Iran, Iraq, Kuwait, UAE, Turkmenistan, Venezuela, etc.).

Reliable forecasting of climate change and associated consequences is necessary for the effective implementation of strategic plans for the country's socio-economic development and is possible only on the basis of knowledge of the real causes of climate change.

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