



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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These Conference Proceedings combine materials of the conference – research papers and thesis reports of scientific workers. They examines tecnical and sociological issues of research issues. Some articles deal with theoretical and methodological approaches and principles of research questions of personality professionalization.

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Foreword

We thank all participants of our conference "Scientific research of the SCO countries: synergy and integration" for the interest shown, for your speeches and reports. Such a wide range of participants, representing all the countries that are members of the Shanghai Cooperation Organization, speaks about the necessity and importance of this event. The reports of the participants cover a wide range of topical scientific problems and our joint interaction will contribute to the further development of both theoretical and applied modern scientific research by scientists from different countries. The result of the conference was the participation of 71 authors from 7 countries (China, Russia, Uzbekistan, Kazakhstan, Azerbaijan, Tajikistan, Kyrgyzstan).

This conference was a result of the serious interest of the world academic community, the state authorities of China and the Chinese Communist Party to preserve and strengthen international cooperation in the field of science. We also thank our Russian partner Infinity Publishing House for assistance in organizing the conference, preparing and publishing the conference proceedings in Chinese Part and English Part.

I hope that the collection of this conference will be useful to a wide range of readers. It will help to consider issues, that would interest the public, under a new point of view. It will also allow to find contacts among scientists of common interests.

Fan Fukuan,

Chairman of the organizing committee of the conference

"Scientific research of the SCO countries: synergy and integration"

Full Professor, Doctor of Economic Sciences

前言

我们感谢所有参加本次会议的“上海合作组织国家的科学研究：协同作用和整合”，感谢您的演讲和报告。代表所有上海合作组织成员国的广泛参与者都谈到此次活动的必要性和重要性。参与者的报告涵盖了广泛的主题性科学问题，我们的联合互动将有助于不同国家的科学家进一步发展理论和应用的现代科学研究。会议结果是来自7个国家（中国，俄罗斯，乌兹别克斯坦，哈萨克斯坦，阿塞拜疆，塔吉克斯坦，吉尔吉斯斯坦）的83位作者的参与。

这次会议的召开，是学术界，中国国家权力机关和中国共产党对维护和加强科学领域国际合作的高度重视的结果。我们还要感谢我们的俄罗斯合作伙伴无限出版社协助组织会议，准备和发布中英文会议文集。

我希望会议的收集对广大读者有用，将有助于在新的观点下为读者提供有趣的问题，并且还将允许在共同利益的科学家中寻找联系。

范福宽，
教授，经济科学博士，中国科学院院士，会议组委会主席“上合组织国家科学研究：协同与融合”

实施提高彼尔姆地区禽业劳动生产率的国家项目的整合流程
**INTEGRATION PROCESSES IN THE IMPLEMENTATION OF THE
NATIONAL PROJECT TO INCREASE LABOR PRODUCTIVITY IN
THE POULTRY INDUSTRY OF THE PERM REGION**

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家禽企业最重要的社会和劳工指标是确保充分利用劳动力资源和提高劳动生产率，为员工创造正常的工作条件，提高报酬水平，实现员工的适当经济增长和生活质量。本文对“提高劳动生产率和支持就业”区域计划的结果进行了分析，并对彼尔姆地区的家禽业提供了支持。

关键词：劳动生产率，家禽养殖，区域计划，增长储备，就业支持。

Annotation. *The most important social and labor indicators in poultry enterprises are ensuring full employment of labor resources and high labor productivity, creating normal working conditions for staff and increasing the level of remuneration, achieving proper economic growth and quality of life for employees. The article presents an analysis of the results of the regional program "Improving labor productivity and supporting employment", as well as support for the poultry industry in the Perm region.*

Keywords: *labor productivity, poultry farming, regional program, growth reserves, employment support.*

The issue of labor productivity in the sectors of the national economy in Russia is given priority attention. In may 2018, The President of the Russian Federation adopted a Decree "on national goals and strategic objectives for the development of the Russian Federation for the period up to 2024". The priority direction of development was determined by the program "Improving labor productivity and supporting employment", which was later transformed into a national project. The

passport of the national project "labor Productivity and employment support" was approved by the Presidium of the Council under the President of the Russian Federation for strategic development and priority projects (Protocol No. 12 of September 24, 2018) [1].

The project is based on the successful experience of implementing the program "improving labor productivity and supporting employment" in 2017-2018, which was implemented at 200 enterprises in 16 regions of the Russian Federation. According to the results of the program in 2018, enterprises conducted a self – assessment, which revealed that 70% of them forecast an increase in labor productivity by 10% next year, an increase in revenue will be 13%, and an increase in the tax base on profits-20% [2].

In 2017, the Perm region became one of the 6 pilot regions participating in this program.

In accordance with the agreement on cooperation in the sphere of productivity of labor, concluded with the Ministry of economic development, the region developed and adopted by decree of the Government of the Perm region from 13.12.2017 No. 324-RP regional programme "Improving productivity and support employment", which identified the main participants in the program, directions for its implementation, sources of funding and targets [3].

As the current Governor of the Perm region Maxim Reshetnikov emphasized at that time: "Increasing labor productivity for Perm enterprises is an opportunity to improve their own production and reach a new level of product quality, and for the region it is a tool for developing economic potential and ensuring competition with other subjects of the Russian Federation. For the Kama region, the labor productivity program is a way to maintain the level of economic development and ensure financial stability. The region's enterprises are not new to improving the organization of production, implementing the latest information technologies, training personnel, and upgrading equipment. Everyone has their own experience."

The main stages of the program's implementation in 2018 are as follows:

- * audit of enterprises, creation and implementation of corporate programs;
- * advising businesses on obtaining loans from FRP for the implementation of corporate programs;
 - training of workers according to the orders of enterprises on the basis of secondary vocational education institutions and multifunctional centers of applied qualifications;
 - advanced training of employees in connection with the formation of modernized jobs or when they are released;
- * organization of activities of the regional competence center.

25 enterprises took part in the Program, among them the enterprises of JSC "PRODO Poultry farm Perm", JSC "Poultry farm Tchaikovsky", LLC "poultry

farm Mendeleevskaya" and others [4].

The poultry industry in the Perm region is meeting the main targets of the regional economically significant production development program for 2013-2021.

In 2019, poultry farms in the Perm region produced and sold 1 billion rubles. 163 million eggs and 42.4 thousand tons of poultry meat in live weight, including broiler meat-37.2 thousand tons. Quality indicators of poultry productivity in the industry, feed consumption per unit of production, and poultry safety are comparable to European standards and indicate a high degree of realization of the genetic potential of poultry. So on average, on the edge, 324.1 pieces of eggs were received for a laying hen, in LLC Mendeleevskaya and CJSC Chaikovskaya 340 and 330 pieces, respectively. Feed consumption per 1000 eggs was 1.37 TSN. Feed units (Mendeleevskaya -1.31, Chaikovskaya 1.37). The average daily increase in live weight of broilers at JSC "PRODO Poultry farm Perm" was 54.1 grams at a cost of 1.70 TSN. Feed units for an increase of 1 TSN. live weight. This is one of the best indicators in the country. Output the number of poultry on poultry farms on 01.01.2020 G. It amounted to 7 million. 41 thousand heads, including laying hens 3 million 584 thousand heads. The feed mills produced 270 thousand tons of compound feed, 23.3 thousand tons of sausages, smoked meat and semi-finished products, and produced 30 million tons. pieces of hatching eggs (28.2 million eggs were incubated from the parent herd, JSC "PRODO Poultry farm Perm"), 1 million 743 thousand heads of daily young were purchased, 734 tons of melange were produced (JSC Komsomolskaya poultry Farm), 312 tons of egg powder. Safety for adult " egg "poultry-95.9%, for young birds-99%, for" broiler" poultry-98%.

There is a continuous search and implementation of growth reserves, which are understood as real opportunities to increase labor productivity that are not yet used.

Reserves of growth of labour productivity at the enterprises can be described as follows:

- raising the technical level of production as a result of mechanization and automation of production; introduction of new types of equipment (grading equipment, feed mills, led light bulb, economical heating devices) and processes (including deep processing of products); improving the structural properties of the products; improve the quality of raw material and application of new constructive materials, the supply of which can carry out manufacturers of SCO;

- improving management and labor organization by increasing labor productivity and expanding service areas; simplifying the management structure; mechanization of accounting and computing work; improving the level of qualification of employees;

- structural changes in production due to changes in the specific weights of certain types of products; labor intensity of the production program; the specific

weight of new products;

- other (reduction of losses from marriage, cooperation, specialization, etc.) [5].

In 2019, poultry farms in the Perm region received investments for technical and technological re-equipment of more than 380 million rubles (table 1).

Table 1. Implementation of investment projects in the industry in 2019

| Poultry farm | The amount of the project, rubles | Accrued subsidies, rubles |
|-----------------------------------|-----------------------------------|---------------------------|
| JSC "PRODO PF Permskaya" | 183 456 497 | 42 530 860 |
| LLC "Mendeleevskaya poultry Farm" | 119 613 922 | 59 806 961 |
| JSC "Poultry factory Tchaikovsky" | 77 100 000 | 11 560 000 |
| JSC "Komsomolskaya poultry Farm" | - | - |
| | 380 170 782 | 113 897 821 |

As part of the regional economically significant program for the development of the poultry industry, the government of the Perm region has accrued subsidies for all forms of support for 113 million 900 thousand rubles. Participation in the evaluation Commission for approval of completed investment projects for the allocation of subsidies helped to avoid mistakes in obtaining state support. The funds were used to modernize production in order to increase labor productivity: CJSC "Tchaikovsky poultry Farm" is completing the construction of a poultry slaughtering shop, LLC "Mendeleevskaya poultry Farm" modernized 2 buildings for poultry (with equipment from "Big Dutchman"), replaced the egg sorting machine, JSC "PRODO PF Permskaya" launched a new building for fattening broilers, modernized the housing of the industrial herd.

As a result of The received state support in the form of subsidies, poultry farms have increased their production capacity and met the targets of the State program for the development of the industry, but the re – equipment of factories is slow, and the leading egg-producing company, Komsomolskaya, has stopped altogether over the past three years.

All poultry farms in the Perm region are located in settlements and are city-forming enterprises, since they employ a large part of the working population. The activities of poultry farms give the development of rural infrastructure, provide jobs, create conditions for small businesses, attract investment, improve the quality of life.

The activities of poultry enterprises of the region are coordinated by the Union of poultry Farmers of the Perm region. Its Founders take an active part in the work of public Councils under the Ministry of agriculture and the Public chamber under the Governor on the development, technical and technological re-equipment of the industry, providing State support in the implementation of investment projects,

meetings and conferences at the regional level, organize and conduct specialized seminars on promising and priority areas of work. For the first time in November 2018, an internship was organized for managers and specialists of poultry farms at advanced enterprises in China.

Thanks to the economic assistance Of the government of the Perm region, the support of the Union of poultry Farmers of the Perm region, joint work with leading scientists of domestic research institutes and specialized firms, poultry farms have implemented the targets of the State program. Thus, the program measures carried out on the basis of technical and technological re-equipment of the industry allowed to increase the number of poultry in the same areas by 1.5 times. Thanks to the modernization of the feed production shops, their cost price was reduced by 20%. The introduction of light modes and led lighting in poultry houses reduced power consumption by 4 times, and the replacement of equipment in buildings and automatic climate control reduced heating costs by 20%. Limited poultry feeding and deep processing of eggs and poultry meat were improved and implemented. State-of-the-art egg sorting equipment was purchased, and logistics support for manufactured products was introduced. As a result of joint efforts to apply the latest technologies, good results have been achieved in increasing labor productivity and their further development is planned [6].

At the same time, there is a tendency to decrease the profitability and profitability of poultry enterprises, caused by the outpacing of the growth rate of resources used in relation to the increase in prices for poultry products and a decrease in the purchasing power of the population. The disparity in prices for poultry products, the lack of the necessary volume of feed grain in the region and sharp jumps in grain prices in the summer period, put poultry farms on the verge of stopping production. As a result, cash gaps are formed, difficulties with repayment of long-term and short-term loans, with payment of leasing payments for equipment, and others. Poultry, especially the egg direction, in the period from may to September, operate at a loss. During this period, there is a shortage of working capital in poultry farms, and the balance of production strength decreases. These problems reduce labor productivity and the ability to implement the National project .

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解决亚洲国家提供农业机械过程中提供物流服务的问题

**SOLVING PROBLEMS IN PROVIDING LOGISTICS SERVICES IN THE
PROCESS OF SUPPLYING AGRICULTURAL MACHINERY FROM
ASIAN COUNTRIES**

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农业机械进出口是农业企业和农民在田间劳作的工具，具有自己的特点。现代运输和物流系统不断变得越来越复杂，越来越难以理解要注意什么；在中国购买商品的任何企业家都面临着将商品运送到俄罗斯的任务以及与此过程相关的所有困难。本文以LLC“银节点”为例，分析了中国与俄罗斯联邦之间货物交换中物流服务的发展。

关键词：农业机械农业企业进口贸易周转物流服务中国

Abstract. *Import-export of agricultural machinery, which is used by agricultural enterprises and farmers to work in the fields, has its own characteristics. Modern transport and logistics systems are constantly becoming more complex, and it is increasingly difficult to understand what to pay attention to; Any entrepreneur purchasing their goods in China, faced with the task of delivering it to Russia and all the difficulties associated with this process. This article analyzes the development of logistics services in the exchange of goods between China and the Russian Federation on the example of LLC "Silver node"*

Keywords: *agricultural machinery, agricultural enterprises, import, trade turnover, logistics services, China*

Over the past decade, Russian-Chinese economic ties have been actively developing, mutually beneficial cooperation between the two countries has been strengthened, and the volume of Chinese imports to Russia has been growing. For example, agricultural machinery from China, due to its quality, is becoming more and more popular not only in Russia, but also around the world. China began exporting agricultural machinery in the early 2000s, and in 2014 it managed to achieve positive growth in international trade in agricultural machinery. Initially, the main share of exports was represented by low-power tractors, now we see an

increase in the specific weight of machines that have an average of about 66 kW. [1]

Chinese manufacturers are constantly introducing innovative technologies into their production, which makes the equipment easier to use, more modern and not expensive. Chinese agricultural machinery is fully adapted to the Russian microclimate, which is of great importance for agriculture.

Due to the increased measures of state support for Russian agricultural producers, many agricultural enterprises are interested in supplying Chinese agricultural machinery and components, but they do not have their own resources and analytical tools to purchase. To do this, they are forced to turn to specialized companies engaged in wholesale and retail trade, providing services – namely, the selection of the most rational supplier – a Chinese manufacturer. One of these companies, which has developed and implemented a method of selecting a supplier in China, is Serebryannyj Uzel LLC, which helps wholesale companies purchasing goods of various categories in the rational choice of the supplier of the necessary goods [3].

LLC Serebryannyj Uzel specializes in transportation of cargo by road (regional transportation), and also carries out cargo transportation in the international direction (Asian countries – China and India). Based on the specifics of the company's activities, its product flow is divided into domestic (regional) transportation (freight forwarding services) and international transportation (China and India).

In 2019, the share of international traffic in the structure of goods traffic (in terms of revenue) increased significantly: if in 2018, the share of international traffic accounted for 54.2%, in 2019 - 61.5%. Mainly, transportation is carried out under import deals – import of goods produced by China and India to the territory of the Russian Federation. In turn, the basis of the Asian commodity flow is delivery under import contracts with Chinese producers, while the commodity flow from India is at the stage of initial formation.

Market conditions are quite favorable for the company in question. Serebryannyj Uzel LLC has a number of advantages that it uses quite effectively, as evidenced by the growth of the company's revenue. Logisticians and declarants of the company have access to many electronic resources that help to deliver agricultural equipment and provide related services in full. Electronic resources in this case include both Russian and foreign electronic exchanges. Despite the short period of work on the market, the company has a well-established base of contractors: customers of cargo transportation, carriers, insurance agents, agricultural enterprises and wholesale organizations. Having permanent contractual relationships with a large number of companies allows you to maintain stable revenue and profit volumes. It should also be said about the high level of transport and logistics service, which is ensured by the formation of clear job descriptions for each employee and continuous monitoring by the company's management.

As threats to the external environment, we can highlight such possible phenomena as growing competition in the freight forwarding market, increased taxes and fees for transport owners, and the introduction of new sanctions in connection with the coronavirus pandemic. In connection with the current political and epidemiological situation, a possible phenomenon such as the introduction of new sanctions and the expansion of the embargo is highlighted as a threat. If you ban the import of various goods from Asian countries, LLC Serebryannyj Uzel risks losing some of the cargo transportation that the company could perform under normal conditions.

There is no doubt that in these conditions, LLC Serebryannyj Uzel should pay special attention to the organization of goods flow with Asian countries, which is not fully rational today. The main problems in organizing the flow of goods with Asian countries are shown in figure 1.

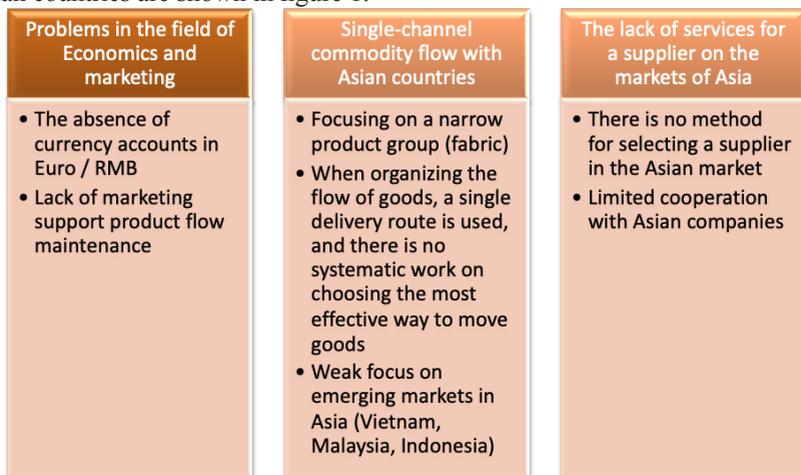


Figure 1 - problems of LLC Serebryannyj Uzel in the organization of commodity flow with Asian countries

Problems in the organization of goods flow with Asian countries in the analyzed company include:

1. Inefficient organization of economic support for international transport and logistics services. The company often has difficulties in paying for contractors' services and receiving funds from customers. For example, in OOO "Silver knot" open only one foreign currency account (in us dollars). The company in question does not have a currency account in euros due to the small number of counterparty customers who make payments in euros. However, requests for cargo transportation that are paid in euros also belong to high-margin transactions.

Moreover, in China, there is a gradual de-dollarization and transition to the national currency and the Euro. The share of the European currency in 2018-2019 increased tenfold - from 0.7% in the first quarter of 2018 to 37.6% in the fourth quarter of 2019. Ruble payments accounted for 9.6% of payments against 6.8% for the same period in 2018, while other currencies, including the Chinese yuan, accounted for 7.1% against 4.7% [2].

2. Lack of marketing support in Asian markets. For the development of foreign economic activity, it is important to analyze the Asian markets of manufacturers of goods, as well as the Russian market of potential importers of Chinese-made agricultural machinery by various product groups. It is necessary to allocate funds for marketing research on both the Russian and Asian markets in order to increase the success of entering new commodity markets as an import organizer.

Today, experts note a tendency to relocate the capacity of some sectors from China (for example, the production of agricultural machinery, household electronic products, microelectronics and electronic computing equipment) to Vietnam and India. This trend is part of the overall process of moving production capacity from China to countries in South and Southeast Asia. Mainly, the issue of transferring capacity from China to other countries present in the Chinese market is being pushed by constantly increasing production costs. First of all, they are associated with an increase in the cost of labor: for example, in China, the average wage of a factory worker in 2018 (including social benefits) was 4 us dollars/hour, while in India-2 US dollars/hour, in Vietnam – 1.4 US dollars/hour, in Indonesia – 1 US dollar/hour [4]. The gradually increasing shortage of labor resources arose as a result of the demographic policy (one family - one child) that was implemented in China until recently.

Thus, it is necessary to study the import potential of the markets of Vietnam, India, Malaysia, and Indonesia. to do this, you need to study the geography of the Asian market, its nuances, requirements for customs clearance, and so on.

3. there is No service for selecting a supplier-importer of Asian-made goods for the Russian market. Already today, the logistics Department of Serebryannyj Uzel LLC receives applications from companies from other sectors of the economy. As you know, the basket of export specialization of the PRC is very diversified, it contains positions of almost all product groups. In the period 2008-2018, the number of 4-digit commodity items of the Harmonized system included in the basket of export specialization increased from 448 to 504 [5]. Today, China's export products are quite competitive and in demand among Russian consumers.

By implementing this service, Serebryannyj Uzel LLC will be able to become a company with integrated logistics, significantly increasing the efficiency of its own external economic activities. As you know, integrated logistics manages all the functions that include selecting the appropriate transport mode, suitable sup-

pliers, inventory control policies, and so on. Businesses that work with integrated logistics can provide a wider range of services. This allows the company's customers to make more efficient purchases of goods abroad, as well as save on delivery of goods.

4. Limited ways (organized routes) of cargo transportation from China, which is due to the lack of work of logisticians in the direction of: analysis of possible ways to organize the flow of goods from China; selection of the most effective way of goods movement based on a comparison of various possible ways to organize the flow of goods.

Since the cost of transportation from China takes a large share in logistics costs, logisticians of LLC Serebryannyj Uzel without conducting a thorough study of all options for cargo transportation in a specific direction in accordance with the customer's requirements risk choosing an option that is not rational, significantly increasing the cost of transportation for the customer.

All this leads to limited flows of Asian imports. However, it is the increase in import flows that should favorably affect the financial activities of the enterprise, since international cargo transportation is more profitable than domestic transportation. The development of new routes from China would allow the company in question to receive more orders.

5. Limited cooperation with Asian companies. It is very difficult to achieve a full-fledged and large-scale entry into the Asian market without a cooperative relationship with foreign companies, since this does not allow for the development of new technologies, ways of organizing logistics, etc. Cooperation makes it easier for Russian companies to enter the foreign market.

The state and trends in the development of commodity flow between Russia and China show that since China has been steadily holding the position of the main foreign trade partner of our country for several years with a trade volume exceeding 100 billion us dollars, the two governments are making mutual efforts to create infrastructure to support logistics and develop transport routes, as well as to solve common problems in the field of mutual trade exchange. Due to the fact that the share of international traffic in the structure of goods flow (in terms of revenue) has significantly increased, mainly due to import transactions – the import of goods produced by the PRC to the territory of the Russian Federation, there is a significant (more than 2 times) increase in the cost of international transportation.

Accordingly, based on all the above, we can sum up that it is necessary to improve the organization of goods flow with Asian countries. In order to improve the effectiveness of freight forwarding activities in the international (Asian) direction, logistics companies are recommended to use marketing, monitoring changes in the legislation of Russia and China, as well as the introduction of methods for selecting a supplier in the Asian market and developing a rational route for organ-

izing the flow of goods using the methods of single-criteria, multi-criteria analysis, network schedule and hierarchy analysis.

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大学作为服务经济的经济类别的社会责任
**SOCIAL RESPONSIBILITY OF UNIVERSITIES AS AN ECONOMIC
CATEGORY OF THE SERVICE ECONOMY**

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这项研究考察了经济发展的当前趋势。俄罗斯GDP的结构转型表明，该行业已过渡到后工业发展的新阶段，其中服务业扮演着特殊角色。在这种情况下，主要任务是发展人力资本和科学潜能，使大学成为知识领域发展的中心。反过来，教育机构的社会责任使得有可能确定利益相关者发展的优先领域。

关键字。 大学，服务业，教育体系，服务经济，可持续发展，人力资本，教育转型，社会责任，利益相关者。

Abstract. *This study examines current trends in economic development. The structural transformations of Russia's GDP indicate the transition to a new stage of post-industrial development, where the service sector plays a special role. In these conditions, the main task is to develop human capital and scientific potential, where universities become the center for the development of the intellectual sphere. In turn, the social responsibility of educational institutions makes it possible to identify priority areas for the development of stakeholders.*

Keywords. *University, service sector, education system, service economy, sustainable development, human capital, education transformation, social responsibility, stakeholders.*

The evolutionary processes of economic systems are characterized by constant changes associated with the transition to a new level of development. In modern discussions about the economic growth of Russia, the question of the dependence of the domestic economy on the raw materials sector is often encountered. However, in recent years, trends in the development of the economy have changed dramatically. This fact is evidenced by the redistribution of GDP between economic spheres. The growth in the number of enterprises in the service sector, whose activities are aimed at meeting the needs for creating favorable living conditions, increasing the intellectual level of the population and the quality of life, as well as

ensuring informative accessibility, characterizes the transition from an industrial to a post-industrial or service economy.

In modern literature, the main features of the service economy are distinguished, which include:

1. The increment of science into a productive force as the basis of modern social progress;
2. The driving force of progress - man and his ability to generate new knowledge;
3. Redistribution of sectors of the economy, which are characterized by transformation in industry [1].

Serving human needs is a very significant component of the economic development of society and its sustainability. According to the concept enshrined within the UN framework, sustainable development involves expanding economic opportunities, increasing the level of well-being of the population, which forms the most optimal way to improve the lives of people in the world community.

It is advisable to consider this concept in dynamics, where the object is the process, and the stability itself is identified as the end result. GDP is often used as a short-term indicator of sustainable development, however, today it is not advisable to consider only the dynamics of this indicator, it is necessary to study its structural changes, which reflect knowledge-intensive sectors of the economy and investment in the development of human capital [2]. Therefore, we will consider in the temporal aspect the quantitative change in Russia's GDP, shown in Figure 1, formed on the basis of Rosstat data. Thus, we note that for the period from 2014 to 2019, GDP grew by 49,932.1 billion rubles, which indicates a positive growth rate of economic development.

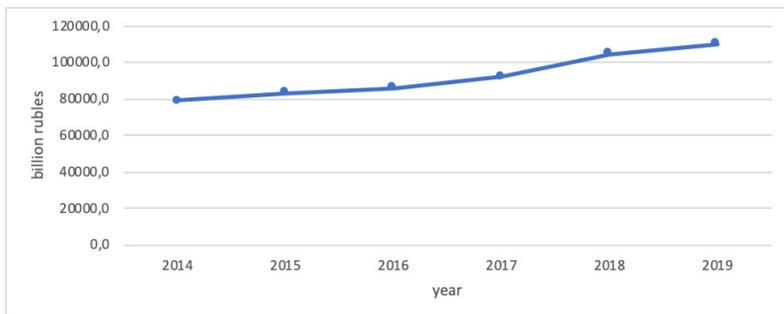


Figure 1 - RF GDP in current prices, billion rubles 2014-2019.

According to the above, it is necessary to analyze the structure of GDP in dynamics, which will allow considering quantitative changes in the sectors of

the Russian economy. Currently, there is a steady trend towards an increase in the share of income from the service sector in GDP, which corresponds to the transition to post-industrial development [3].

Based on the data of the World Trade Organization, more than 150 services are distinguished, formed into twelve sectors:

- 1) business services;
- 2) communication services;
- 3) construction and related engineering services;
- 4) distribution services;
- 5) educational services;
- 6) services related to environmental protection;
- 7) financial services;
- 8) services in the field of health care and social security;
- 9) travel and related services;
- 10) services for the organization of leisure, cultural and sports events;
- 11) transport services;
- 12) other services [4]

So, Figure 2 shows the structural changes in the RF GDP from 2014 to 2019, formed on the basis of Rosstat data.

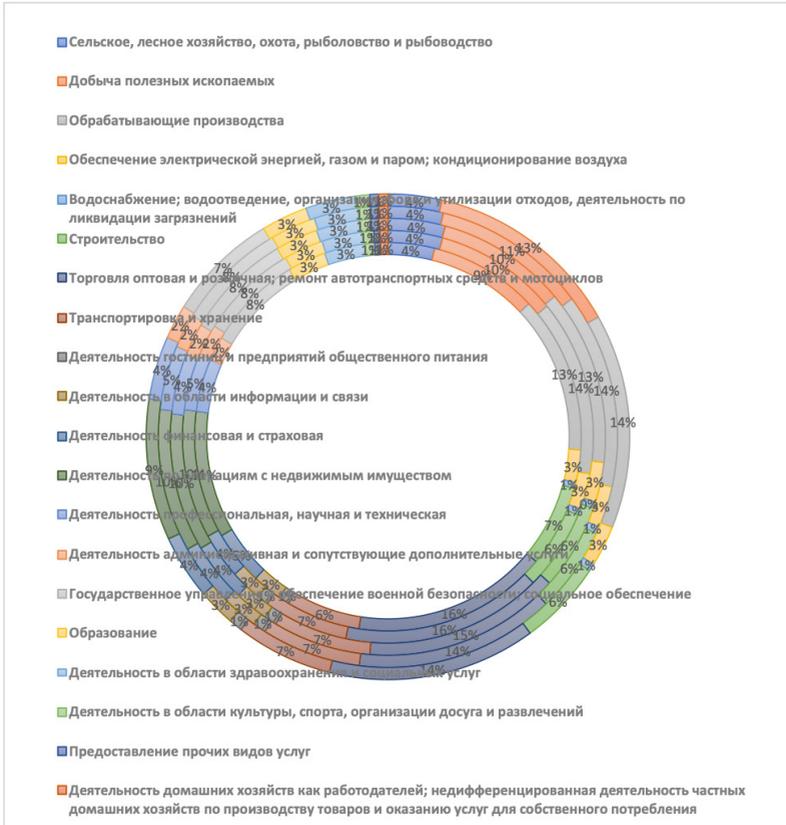


Figure 2 - Structural changes in RF GDP for 2011 to 2019

After analyzing the data shown in Figure 2 and identifying the share of services in the total GDP, according to the above classification, we conclude that the share of services in the Russian economy is unstable, however, based on global practice, the service market is the most dynamically developing structure of the economy and it is also inextricably linked to the manufacturing sector. It is also worth noting that, according to the average change in GDP in the context of services, it was 71.98%, which indicates the strengthening of the position of the Russian Federation in post-industrial development. The dynamics of GDP from the service sector is shown in Figure 3.



Figure 3 - GDP of the service sector in the RF from 2011 to 2019

Insignificant deviations of the GDP of the service sector from the base period are characterized by changes not only in the economy, but also in policy, which directly affects the state and stability of the country's economic system.

One of the key factors affecting the growth of the service sector is scientific, technical and educational activities, since the development of the innovative component to the greatest extent affects the distribution of labor resources, the creation of jobs and service areas. Thus, in order to meet the needs of society, it is necessary to continuously ensure the quality of services in the field of education and science, which will not only strengthen its position within the service economy, but also move to the next step of development - the information economy.

Today, the process of transformation of higher educational institutions forms new obligations in relation to society, which reflects the specifics of the country's socio-economic development and global trends in educational services. The fundamental role of the university in the 21st century - is the reproduction of human capital aimed at increasing the country's competitiveness, as well as the recreation of innovative attractiveness, which together determines the formation of a favorable investment climate [5].

Thus, universities, implementing educational and scientific areas, take into account the requests of stakeholders. Social responsibility is an important element of the service economy, which determines the vector of development of an educational organization. This phenomenon connects the needs of society and the capabilities of the enterprise providing services. In this case, SR is a tool for reconciling the interests of consumers and providers of educational services.

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劳资关系中的年龄歧视问题

THE PROBLEM OF AGE DISCRIMINATION IN LABOUR RELATIONS

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在人口危机的情况下，当观察到工作年龄人口的消极动态时，在人口老龄化的条件下，增加就业人数的潜在储备是退休前和退休年龄的人口。许多研究人员认为，由于存在与退休前和退休年龄有关的定型观念，正是这一人口群体最经常面临年龄歧视：难以适应迅速变化的工作条件，组织，技术和工艺条件，他们的知识和技能，精力和动力都“过时了”。

在提高退休年龄的同时，纽约州还制定了一系列措施，为老年人提供就业和再培训计划，并提高社会标准，以提高预期寿命并确保体面的老年。本文的作者分析了问题并提出了解决方案，包括通过修订法规。

关键词：歧视，年龄，拒绝录用，员工的业务素质，员工培训。

Annotation. *In the conditions of demographic crisis, when negative dynamics of the working age population is observed, in the conditions of aging of the population the potential reserve to increase the number of employed people is the population of preretirement and retirement age. According to many researchers, it is this population group that most often faces age discrimination due to the existence of stereotypes in relation to persons of pre-retirement and retirement age: the difficulty of adapting to rapidly changing working conditions, organizational, technical and technological conditions, the "obsolescence" of their knowledge and skills, low energy and motivation.*

In parallel with raising the retirement age, the State is developing a set of measures for employment and retraining programmes for older citizens and for raising social standards that will increase life expectancy and ensure a decent old age. The authors of the article analyze the problems and propose their solutions,

including by amending the legislation.

Keywords: *discrimination, age, refusal to hire, employee's business qualities, employee training.*

The principle of the prohibition of discrimination at work is fundamental and is¹ enshrined in international and national legislation. According to International Labour Organization Convention No. 111, the term "**discrimination**" means any distinction, *exclusion or preference* based on race, colour, sex, religion, political opinion, national origin or social origin which *results in the elimination or violation of equality of opportunity or treatment in employment and occupation*²;

According to Article 20 of the European Social Charter,³ in order to ensure the effective implementation of the right to equal opportunities and equal treatment in employment and occupation without discrimination on the basis of sex, the Parties undertake to recognize this right and take appropriate measures to ensure the implementation of this right in the following areas:

- (a) Access to employment, protection against dismissal and vocational reintegration;
- (b) Vocational guidance, training, retraining and reinsertion;
- (c) Working and employment conditions, including remuneration for work;
- (d) Professional career, including promotion.

The Labour Code of the Russian Federation more clearly defines the ban on age discrimination. Under article 3 of the Labour Code, no one may be restricted in his or her labour rights and freedoms or receive any advantages based on sex, race, colour, nationality, language, origin, property, family, social or official status, **age**, place of residence, attitude to religion, beliefs, membership or non-membership of a voluntary association or any social group, or on other circumstances unrelated to the business qualities of an employee.

Today, in the context of the economic crisis caused by the COVID-19 pandemic, it is the task of the state to ensure not only equality of workers in labour relations, but also to protect the most vulnerable categories, such as workers of pre-retirement age.

Paragraphs 24, 45 and 61 of the National Security Strategy of the Russian Federation, approved by Presidential Decree No. 537 of 12 May 2009, emphasize the need to improve the quality of life of Russian citizens by guaranteeing personal **security and high standards of living**, reducing social inequality, reducing informal

1 Art.2 of the International Labour Organization Declaration on Fundamental Principles and Rights at Work (adopted in Geneva on 18.06.1998)

2 International Labour Organization Convention No. 111 "Concerning Discrimination in Respect of Employment and Occupation". (Adopted in Geneva on 25.06.1958 by the 42nd session of the General Conference of ILO)

3 European Social Charter (Revised)" (adopted in Strasbourg on 03.05.1996). Ratified by the Federal Law No. 101-Φ3 of 03.05.2009.

employment and legalizing labour relations, and increasing investment in human capital development. Consequently, all citizens of our country must have equal opportunities to exercise their rights in various areas of life and not be subjected to degrading discrimination. Non-discrimination - is a prerequisite for improving the quality of human life. In modern conditions, the issues of equality and combating discrimination constitute one of the key areas of modern social policy.

In the conditions of demographic crisis, when negative dynamics of the working age population is observed, in the conditions of aging of the population, the potential reserve to increase the number of employed people is the population of preretirement and retirement age. In connection with the adoption by the State Duma of amendments to pension legislation, Federal Law No. 350-ФЗ of 3 October 2018 "On the introduction of amendments to certain legislative acts of the Russian Federation on the appointment and payment of pensions" increased the retirement age for men and women by five years, which will be 60 and 65 years, respectively. The gradual increase in the retirement age begins on 1 January 2019. Thus, this is the same age group of people, since yesterday's pensioners are today's pre-retirees. Moreover, with approach of retirement age the majority of workers continue working activity that is connected with absence of establishment in the labor legislation of a limiting age for realization of labor activity, and also enough low size of pensions in connection with which citizens are compelled to continue working activity to prevent appreciable fall in quality of a labor life.

In the opinion of many researchers, this very group of the population most often faces age discrimination due to the existence of stereotypes regarding persons of preretirement and retirement age: the difficulty of adapting to the rapidly changing working process conditions, organizational, technical and technological conditions, "obsolescence" of their knowledge and skills, low energy and motivation.

In our opinion, their labour-legal insecurity arises, among other things, because the concept of "business qualities of an employee" is too broad in scope, which leaves many opportunities for the employer to refuse employment.

In accordance with article 64 of the Labour Code of the Russian Federation, unjustified refusal to conclude an employment contract is prohibited: any direct or indirect restriction of rights or the establishment of direct or indirect advantages in the conclusion of an employment contract depending on sex, race, colour, nationality, language, origin, property, family, social and official status, age, place of residence (including the presence or absence of registration at the place of residence or stay), attitude to religion, beliefs, belonging or non-membership.

In addition, the employer has the right to submit to the person applying for a vacant position or job and other requirements that are mandatory for the conclusion of an employment contract by virtue of a direct prescription of federal law, or that are necessary in addition to standard or typical professional and qualification

requirements due to the specifics of a particular job (e.g., knowledge of one or more foreign languages, ability to work on a computer).

In our opinion, a refusal to hire a person of pre-retirement and retirement age will in most cases be justified as it will be caused by circumstances related to the employee's business qualities, including the following reasons.

First of all, the question arises about the possibility to work in connection with the state of health of workers of this age, taking into account their physiological characteristics. During an employee's life, his or her health is affected by the processes of biological aging, working conditions and length of service in contact with a harmful production factor, the employee's general state of health and the presence of somatic diseases. Consequently, the older an employee is, the more likely it is that he or she will be able to work due to a worsening health condition, an increase in the number of somatic and occupational diseases and, accordingly, medical contraindications for certain types of work.

Secondly, in our opinion, a number of spheres of activity, professions will be inaccessible to these employees due to lack of required knowledge, skills and abilities, in particular, in the sphere of information technologies, because the modern society is an information society, today the process of informatization has acquired a global character, under the influence of which there are large-scale changes in all spheres of life and professional activity of people: production, economy, science, education, culture, healthcare, etc. That is why we believe that the "Special program and action plan for the organization of vocational training and additional vocational education of citizens of pre-retirement age up to 2024". (hereinafter - the Program) approved by the RF Government Decree No. 3025-r dated December 30, 2018 will not be effective and will not achieve its goal - to promote employment of pre-retirement citizens.

Under the Programme, the authorities of the constituent entities of the Russian Federation in the area of employment promotion and education, together with employers, will form, in accordance with Letter No. 16-2/10/P-770 of the Ministry of Labour and Social Protection of the Russian Federation of 1 February 2019 on the submission of model recommendations on the implementation of measures to organize vocational training and additional vocational training for citizens of preretirement age for the period up to 2024 and on the compilation of lists of the most popular and priority profiles.

Firstly, the lists include professions such as security guard, electrician, flow line operator, crane operator, track installer, fitter, hooker, etc. Obviously, these lists include the most popular professions in the regional markets, but it seems doubtful to us that having trained in these professions, citizens will actually be employed in these professions, since the opportunity to work in these professions is directly related to the state of health of workers. We believe that the given lists

are made without taking into account physiological features of persons of the specified age: the more the employee is older, the more sphere of application of his ability to work in connection with deterioration of a state of health, increase in number of somatic and professional diseases, and accordingly medical contraindications to realization of separate kinds of works, the employee can be admitted to their performance after passing preliminary medical examination. In addition, enrolment in training is made without taking into account the health condition of the potential employee: no health documents are provided.

Secondly, these lists include such professions as specialist in the development and design of Web-sites, the study of graphic packages, accounting and taxation, a specialist in procurement and others, assuming active and competent possession of computer programs.

The above raises doubts about the possibility of subsequent actual employment of pre-retirees in some of the training areas offered by the employment services. Undoubtedly, if a citizen is referred for training by his employer, the acquired knowledge and skills are more likely to be used by the employee in the labor activity. And if he was sent for retraining by the employment service, then there are doubts about the possibility of his actual employment in the profession he received, because in fact he was trained, the classes were attended, but new competencies and practical skills were most likely not acquired due to the short period of training and the fact that not all jobs are actually affected by digitalization and trainees often do not have basic, elementary computer skills, etc.

Thus, the Program of vocational training and additional vocational education for citizens of pre-retirement age approved by the Government will be effective under several conditions. Thus, training should be carried out taking into account the state of health (no restrictions for work in the profession, specialty), taking into account the real needs of specialists in the region in this industry in order to ensure the real possibility of employment after the completion of professional retraining of the pre-retirement. The result of professional retraining is that the retrained employee receives a new profession and is employed in the profession he or she has received. I believe that, in the first stages of the programme, the State should encourage employers to create new jobs, or create such jobs themselves, in the professions for which retraining is provided. We believe that a job quota for that category of workers will be effective. We propose setting quotas in each sub-region of the Russian Federation, taking into account the demographic situation, and setting quotas within 1-3% of the average number of employers. And also to provide them with tax benefits for employment of these employees against the quota. It is necessary to amend the Law of the Russian Federation of 19.04.1991 No. 1032-1 "On Employment of the Population in the Russian Federation" to provide for such a possibility. Before undergoing training, a preretirement should undergo

career guidance testing to determine his or her preferred area of work among the most demanded and priority professions on the regional labour markets for the given period of time, as well as taking into account the trends on the labour market for the next 5 years, and to possess the complex of competences necessary for effective work in the profession for which training is to be provided. We believe that these measures will increase the probability of employment of a pre-retired employee as a result of professional training.

Given the above, it is necessary to strengthen the protection of the rights of persons of pre-retirement age through the implementation of various state programs to support their employment. Since imposing increased obligations exclusively on the employer will lead to a breach of the delicate balance between the interests of employees and employers.

Based on the foregoing, it can be concluded that this category of workers is currently one of the most vulnerable categories of workers in the labor market, since they are often subjected to age discrimination. The current labor legislation does not provide any special guarantees for the protection of the labor rights of workers of pre-retirement and retirement age, and refusal to hire will in most cases be justified, since it will be made due to circumstances related to the business qualities of this employee, including, due to health status and lack of necessary knowledge and skills. We believe that in order to prevent age discrimination against employees of retirement and pre-retirement age, the state should implement not only a set of measures aimed at vocational training and additional vocational education, but also the preservation and restoration of public health, which is especially important in connection with the increase in the retirement age.

灵活就业形式在预防冠状病毒感染COVID-19中的应用
**APPLICATION OF FLEXIBLE FORMS OF EMPLOYMENT IN
CONDITIONS OF PREVENTION OF CORONAVIRUS INFECTION
COVID-19**

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本文探讨了在预防COVID-19冠状病毒感染的条件下采用灵活就业形式的可能性。作者分析了在COVID-19大流行蔓延的背景下规范家庭工人和远程工人工作的特征。

关键词：远程工作，冠状病毒，劳动法，灵活的就业形式，家庭工人

Abstract. *The article examines the possibility of using flexible forms of employment in the conditions of prevention of COVID-19 coronavirus infection. The author analyzes the features of regulating the work of homeworkers and remote workers in the context of the spread of the COVID-19 pandemic.*

Keywords: *remote work, coronavirus, labor law, flexible forms of employment, homeworkers*

Factors and trends that are emerging in the labor market due to the expansion of teleworking opportunities in various sectors of the economy were especially relevant in the context of the prevention of coronavirus infection COVID-19. The global COVID-19 pandemic has brought about a change in the nature of work in the context of a range of processes such as globalization, automation and digitalization. In today's environment, it can be noted that each industry has accelerated its own digital transformation. As a result, the demand for highly skilled remote workers will continue to grow.

As noted by experts, over the past two decades, the number of employees working from home has increased. Before the pandemic, only 7% of workers had access to flexible workspaces, or telecommuting. According to CNBC's All-American economic survey published on April 30, 2020, 42% of previously inexperienced workers currently work remotely and are projected to work regularly from home over the next two years. [1]

The introduction of restrictive measures led to the emergence and use of concepts such as "quarantine", "self-isolation", which do not have a legislative defi-

nition. A significant issue is the translation of these concepts into the language of labor legislation.

In the Russian Federation, the Ministry of Labor and Social Protection (hereinafter referred to as the Ministry of Labor of Russia), by letter of March 16, 2020 № 19-0/10/P-2261, developed Methodological Recommendations on the working regime of state authorities, local authorities and organizations with the participation of the state, which recommend to ensure the optimal mode of working (office) time and rest time for civil servants, municipal employees and workers. Providing, if possible, measures, including both a flexible schedule of arrival/departure at the workplace, to avoid the accumulation of workers in the body (organization).

Further, the Ministry of Labor of Russia, in a letter dated April 23, 2020 № 14-2/10/P-3710, recommended employers in the context of the spread of coronavirus infection to apply flexible work forms to all employers. First of all, these recommendations are intended for organizations of all forms of ownership, using flexible forms of employment, including remote forms of employment, in relation to employees (primarily citizens with children of preschool and school age), as well as transferring educational organizations to distance learning for the period of distribution on the territory of the Russian Federation of a new coronavirus infection (COVID-19).

In this regard, it seems necessary to define what the flexible modes of operation include. Based on the above recommendations, flexible work modes include various forms of work at home such as remote, telecommuting, home work.

In the Labor Code of the Russian Federation, chapters 49 (features of regulation of work of homeworkers) and 49.1 (features of regulation of work of teleworkers) are devoted to such works.

In accordance with Art. 312.1 teleworking means the performance of a labor function defined by an employment contract outside the location of the employer, its branch, representative office, other separate structural unit (including located in another locality), outside a stationary workplace, territory or facility, directly or indirectly under the control of the employer, subject to the use of public information and telecommunication networks, including the Internet, for the performance of this labor function and for the interaction between the employer and the employee on issues related to its implementation.

Based on the definition, a remote worker performs a job function outside the location of the employer, its branch, representative office, other separate structural unit (including those located in another area), outside a stationary workplace, territory or facility, directly or indirectly under the control of the employer. According to Art. 209 of the Labor Code of the Russian Federation, a workplace is a place where an employee must be or where he needs to arrive in connection with his work and which is directly or indirectly under the control of the employer. It

should be agreed that with regard to teleworkers, it is true that they have no workplace at all in the sense that it is understood by Art. 209 of the Labor Code of the Russian Federation. This means that teleworkers are practically not limited in the choice of not only the place, but also the way of performing the work function assigned to them. [2]

Due to the difficult epidemiological situation, the use of public information and telecommunication networks (including the Internet) to perform the labor function has become the only and key way of interacting with the employer in various sectors of the economy. It should be noted that limiting the activities of teleworkers only to computer homework is inappropriate, since in this case the circle of workers who can be involved in teleworking is significantly narrowed, and accordingly, the number of employers who could potentially enter into labor contracts with teleworkers will also decrease. Such a "narrow" approach does not allow employers to take full advantage of all the advantages of teleworking to the maximum extent: to maintain electronic document circulation, not to incur the cost of equipping a workplace, not to conduct a special assessment of the working conditions of teleworkers, the possibility of not registering separate structural divisions with tax authorities and etc.

It should be noted that Art. 312.4 of the Labor Code of the Russian Federation regulates the issue of the peculiarities of the working time and rest time of a remote worker, according to which the working time and rest time of a remote worker is established by him at his own discretion. In this regard, it seems significant to note that one of the distinctive features of a remote worker is that he is not included in the team of the employer and is not subject to the employer's internal labor regulations. Accordingly, if the employment contract with such an employee does not provide for any provisions governing his use of working time, then the telecommuter will organize his working time at his own discretion. In this regard, the employer does not have the ability to control the performance of the labor function by the employee.

It seems advisable to provide for the necessary minimum of mechanisms in the employment contract that will allow the employer to at least indirectly control the employee. These can be reports on movements, making records in special programs, video conferences, etc. [2] Attention should also be paid to the fact that a remote worker can perform a labor function not only outside the location of the employer, but also outside the region, the state in which the employer is located, in particular, a significant difference in time is possible. In this case, in the employment contract, it is possible to establish the boundaries within which the employer has the right to require the employee to be in touch (online), and other necessary conditions for the interaction, which, it seems, are significant and necessary in the current unfavorable environment associated with the spread of coronavirus

COVID-19 infections.

According to the head of the Expert Group on the Development of Public Institutions "Strategy 2020", teleworking is the latest trend in the labor market, which will allow in the future to globally change the principles of office work ". [3] As noted, this type of employment is beneficial both for employers, who can attract highly qualified specialists, saving on the maintenance of jobs, and for workers, especially for people with disabilities. Considerable economic and legal measures are needed to translate the relationship between teleworkers and employers. [4]

The legal regulation of the work of homeworkers is established by the Labor Code of the Russian Federation (Chapter 49). In accordance with Art. 310 of the Labor Code of the Russian Federation, homeworkers are considered to be persons who have entered into an employment contract for performing work at home from materials and using tools and mechanisms allocated by the employer or purchased by the homeworker at their own expense. A homeworker can carry out work stipulated by an employment contract with the participation of his family members. Family members can perform various functions: receive raw materials, materials from the employer and deliver them to the homeworker; transfer finished products to the employer, etc. [2] The actual admission of family members of a homeworker to the performance of labor duties, which are determined by the job function performed by him, cannot serve as a basis for recognizing the emergence of labor relations between a family member of a homeworker and the employer. By agreement between the employee and the employer, the mode of work "at home" can be established both when hiring and in the process of the employee's labor activity, which is determined by an additional agreement concluded in writing.

The concept of "home work" is enshrined in ILO Convention No. 177 "On Home Work" and is more capacious in content (the Russian Federation has not ratified this convention). In accordance with the Convention, "home work" is work that a person called a homeworker performs at his place of residence or in other premises of his choice, but not in the workplace of the employer, for remuneration, in order to produce goods or services as directed by the employer, regardless from who provides the equipment, materials or other resources used. The Convention states that persons with the status of employees do not become homeworkers by virtue of the mere fact that they occasionally work as employees at home, and not in their regular workplace.

As already noted, homeworkers are associated with doing work at home from materials and using tools and mechanisms provided by the employer or purchased by the homeworker at their own expense. The organization of work processes at home is allowed only for persons who have the necessary living conditions, as well as practical skills, or can be trained in these skills to perform certain jobs. A survey of the living conditions of citizens who have expressed a desire to work at

home is carried out by an employer using home work, with the participation (in some cases) of representatives of sanitary and fire supervision. [2].

For the effective use of homeworkers' labor, the employer needs to improve the forms of organization of homeworkers' work; introduce more advanced devices and mechanisms to increase labor productivity and the quality of their products; organize individual training and professional development at home for those workers who, for health reasons, cannot be directly present at work, and take other measures.

Experts in the field of labor law note that the provisions of labor legislation do not allow an employee to temporarily work remotely: the Labor Code provides for the possibility of concluding either a traditional employment contract (Article 57) or an employment contract for remote work (Chapter 49.1). The Labor Code of the Russian Federation does not regulate the so-called "temporary remote employment", since Art. 72.1 and 72.2 regulate only the issues of movement and temporary transfer of workers in cases, under which the pandemic and the "non-working days" regime do not fall. In particular, the contradictions between the organization of processes in the labor sphere during the epidemic and labor law are revealed [5]. It is worth agreeing with this.

In conclusion, it should be noted that in the current conditions associated with the spread of coronavirus infection COVID-19, the issue of improving labor legislation is being updated. So, in the long term, COVID-19 is becoming a catalyst for changes in labor and employment legislation.

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一些数据表明了接受佣金的准备工作（CC RF第290条）和贿赂（CC RF第291条）

SOME DATA CHARACTERIZING THE PREPARATION FOR THE COMMISSION OF RECEIVING (ART. 290 OF THE CC RF) AND GIVING A BRIBE (ART. 291 OF THE CC RF)

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该文章探讨了实施第7条所规定的犯罪行为所需的准备行动。 290和艺术。 291 CC RF, 以及造成这种犯罪的情况, 并详细描述了影响贿赂规模, 地点和形式的因素。 该研究的目的是对数据进行全面分析, 以表征接收和提供贿赂的准备工作。 本文使用的研究方法可以包括: 分析, 综合, 分类和形式化。 该研究的主要结果包括获得与这些犯罪有关的最完整和可靠的信息。

关键词: 行贿, 受贿, 勒索, 侵占罪, 贿赂发起人, 受贿者, 中介机构, 贿赂转移。

Abstract: *The article examines the preparatory actions necessary for the commission of a criminal act provided for in Art. 290 and Art. 291 CC RF, as well as the circumstances contributing to the commission of this crime, and describes in detail the factors affecting the size, place and form of a bribe. The aim of the study is a comprehensive analysis of data characterizing the preparation for the commission of receiving and giving a bribe. The research methods used in the article can be included: analysis, synthesis, classification and formalization. The main results of the research include obtaining the most complete and reliable information related to the commission of these crimes.*

Keywords: *giving a bribe, receiving a bribe, extortion, encroachment on a crime, the initiator of bribery, bribe-takers, intermediaries, transfer of a bribe.*

By to their purpose¹, preparatory actions are aimed at collecting versatile information, which is the starting point in creating the necessary conditions for committing encroachments (first of all, agreements, they account for 62% when 1 According to our data, 14% of cases of receiving and 22% of cases of giving a bribe was carried out without preparation.

receiving a bribe, when giving 60%)² provided for by Art. 290, 291 CC RF. Their duration, orientation, meaningfulness are conditioned, as the generalization of practice has shown, by a complex of different circumstances. The nature of such actions depends on the legal status, personal characteristics of the initiator of the bribery; the number of persons involved in the planned crime. As well as actions (inaction) aimed at settling for illegal remuneration; the presence or absence of the fact of extortion of a bribe (when receiving a bribe, extortion took place in 17% of cases, when giving - 5%); resources used for this (including the nature of the "remuneration", the amount of money).

In those cases when a phased bribe was planned, on an especially large scale, the preparatory actions were the most conspiratorial, voluminous, and time-consuming³. They are also distinguished by their thoroughness, richness and are inherent mainly in bribery-bribery and are almost not typical for bribe-gratitude, as a variety of the crimes under consideration.

If the initiator of the bribery is the briber (sometimes using the capabilities and connections of the intermediary)⁴, then in the process of preparation, he usually finds out:

- a) the legal status of an official, data on his superior management, subordinates, relations with them;
- b) the nature (scope) of his official powers, including those temporarily delegated, the rules of procedure;
- c) place of residence, living conditions, availability of vehicles, garage, country house or summer cottage;
- d) the presence of relatives, their place of residence, the nature of the relationship with the planned bribe taker, place of work;
- e) persons with whom he is in a relationship of trust;
- f) the upcoming participation in official events, travel on business trips, trips outside the region (recreation, fishing);
- g) household problems, in the resolution of which the bribe taker may be interested;
- h) hobbies, preferred places of free time;

2 The archival criminal cases on Art were studied using specially developed questionnaires. 290 and 291 CC RF, considered by the regional federal courts of the cities: Astrakhan, Kemerovo, Kursk, Moscow, Murmansk, Orel, Orenburg, Ryazan, Tambov, Ulyanovsk, Yaroslavl. And also the Volgograd, Moscow regions, the Republic of Chuvashia. The study period included 2008-2018. By Art. 290 CC RF, 109 criminal cases were processed, Art. 291 CC RF – 101 criminal cases.

3 A significant amount of a bribe is recognized as the amount of money, the cost of securities, other property, property services, and other property rights in excess of twenty-five thousand rubles. A large bribe - exceeding one hundred and fifty thousand rubles, an especially large bribe - exceeding one million rubles (Note 1 to Art. 290 CC RF as amended by Federal Law of 03.07.2016 № 324-FZ).

4 See.: Stepanenko R.A. Features of the methodology for the investigation of crimes related to mediation in bribery: diss. cand. ... jur. sci. - Ulan-Ude, 2015.

i) the ability to influence other officials (if his competence does not include the solution of a specific issue) in order to carry out actions (inaction) in which the bribe giver is interested and which will be conditioned by the bribe.

The data obtained is intended to establish contacts with the alleged bribe taker, his relatives, friends, work colleagues, to establish interest in certain proposals. They strive to establish off-duty relations with an official, to be together at a contact event, to get to know each other. Based on the communication situation, it is unobtrusive to initiate a specific topic for conversation (possibly with the help of other persons), so that it arouses the interest of the alleged bribe taker. If the conversation becomes active with the transition to other aspects, then the initiator can show his abilities in solving certain issues or tell how it was supposedly solved by others. During such conversations, bribe-givers can also indicate their problem, while the alleged bribe-taker is given hints about reward for solving a certain issue or is directly informed about it and at the same time the nature of the reaction is recorded. Sometimes this is done with the help of persons who are not mediators, but sincerely take part in the conversation and in this way, as it were, assist the briber in solving the issue of interest. Depending on the results, an agreement is reached on the place, time, subject of the bribe, methods of transferring and concealing it.

In the process of preparing for the commission of a crime, bribe givers often especially think over the very process of personal transfer of funds, bills of exchange, valuables, items, household appliances, tools, construction materials, and the implementation of certain services. To do this, they sometimes make special hiding places, place money in documents, books, folders, gift boxes, cases, special packaging, sew additional pockets to clothes, prepare vehicles, containers, pack a bribe under the guise of other items, or, conversely, restore packaging, used to store and move such items.

At the preparatory stage, bribe givers devote considerable attention to the search for intermediaries - persons who enjoy the special disposition of the bribe taker, his relatives, and close associates.

In practice, there have been cases when intermediaries (proxies)⁵ took upon themselves the solution of specific issues within the competence of an official and determined the amount of bribes or the types of services provided to the official. In such cases, the crime is committed “with the tacit consent” of the bribe taker.

Familiarization with the materials of criminal cases shows that mediators can mislead an official by not telling him the actual amount of money, the number and name of items, services that are the subject of a bribe, as well as the entire volume and nature of actions to be performed in exchange for a bribe.

⁵ See: Mardanov A.N. Interaction of the investigator and operational units in the process of revealing the facts of bribery in the presence of an intermediary, as well as the subsequent initiation and investigation of a criminal case // Bulletin of the St. Petersburg University of the Ministry of Internal Affairs of Russia. № 1 (65). 2015. P. 95-99.

In situations⁶, where the initiator of the crime is the bribe taker, he sometimes takes various measures to slow down the performance of actions (inaction) that the bribe giver or intermediary asks him, creating obstacles (sometimes artificial) for their implementation: the reasons for the impossibility of fulfilling specific requests are not specified.

In some cases, direct demands for the transfer of a bribe may be made, or such offers are made in a veiled form (negotiations are encrypted, SMS correspondence is carried out under the guise of business messages or in a coded manner). For negotiations, sending and receiving special SMS, mobile phones are used, as well as E-mail⁷.

Sometimes there is a slowness of actions to receive the subject of a bribe: the meeting is postponed to a later, indefinite period, without specifying the dates, time and place. Sometimes this is done specifically in order to monitor the behavior of a bribe-giver, an intermediary, the activities of certain officials of law enforcement agencies, people from their own environment. At the same time, the appearance can be created that the solution of an issue of interest to the bribe-giver depends on other officials, including those of higher rank, and the activity of this official is presented as assistance.

Upon reaching an agreement on a meeting, as follows from the materials of the studied criminal cases, the suspects and the accused think over measures to ensure its confidentiality; they look for special places for this, select a reasonable, plausible excuse to explain their meeting (for example: bribing at events in which both parties participate). As shown by the generalization of the investigative practice, in 19% of cases bribe taking took place in the presence of witnesses, and giving - in 18% (see Appendix № 1.2). This became the property of others and due to various other circumstances. Including such citizens passed, drove by, saw through the window, being at the workplace, at home, specially observed, showing a certain interest provoked by the behavior of one of the parties to bribery. This category of citizens in the course of the investigation, as a rule, gave evidence. The content of the above can be called the first of the situations contributing to the conduct of investigative actions at the preliminary and initial stages of the investigation.

Thus, if the above is translated into the content of investigative situations⁸,

6 See: Baev O. Ya. Methods for investigating bribery and commercial bribery (depending on investigative situations) / O. Ya. Baev, E.A. Pidusov // *Social and Humanitarian Sciences. Domestic and foreign literature: RJ. Ser. 4. State and law.* - 2011. - № 2. - P.150-152.

7 See: Yakovets E.N., Avdashkevich L.A., Tyuryaeva E.A. The use of information and analytical methods for the detection, disclosure and investigation of corruption crimes // *Legal state: theory and practice.* - 2013. - № 3. - P.127; Shurukhnov N.G. The use of electronic mail (E-MAIL) in the process of organizing and operating extremist communities: technology of search and seizure of computer messages during investigation // *Forensic readings on Baikal –2015.* - Irkutsk, 2015. - P. 113-118.

8 See: Khlus A.M. A situational approach to the investigation of bribery: problems and ways to solve them // *Bulletin of the Nizhny Novgorod University. N.I. Lobachevsky.* 2019. № 2. P. 138-145.

then there are two of them: with and without the presence of witnesses. At the first the amount of the bribe slightly exceeds 10,000 rubles. Its subjects are officials of healthcare institutions, educational organizations, traffic police officers, employees of internal affairs bodies. In such a situation, preparation may be absent altogether or be insignificant (finding out the possibilities of obtaining a certificate of incapacity for work). In the second (without the presence of witnesses), there are often components of conspiracy, thoroughness, receiving the subject of a bribe one-on-one, and at the same time, a certain circle of people knows about certain “channels” for receiving monetary “rewards”, there are special proxies who act as intermediaries, assist intermediaries. This alignment is characteristic of bribery of persons holding high official positions (lawsuits are evidence of this).

Bribe takers prepare vehicles in advance that can serve as both a mobile place for the transfer and receipt of the bribe item, and as a means of delivery, if it is bulky, and provide an opportunity to quickly leave the place predetermined for this, go unnoticed, not be fixed by possible portable and stationary video recorders. Often, the subjects also take measures to ensure monitoring of the place where the object of the bribe is handed over. Both parties pay attention to the exclusion of the use of video recording, both stationary and temporary (wearable).

At the stage of preparation for committing a crime, its participants try to think over the line of their behavior, which would exclude their involvement in giving and receiving a bribe. The content of the specified line of conduct may be thinking over a plausible alibi in case of a red-handed capture; preparation of special receipts for receiving money on credit, making a message about the loss or theft of a bank plastic card (with informing the bank by phone, SMS message (online bank), to which the funds were transferred.

引入解释性宾语的连词的使用使旧俄语语言的历史变化
**HISTORICAL CHANGES IN THE OLD RUSSIAN LANGUAGE IN
THE USE OF CONJUNCTIONS THAT INTRODUCE EXPLANATORY-
OBJECT SENTENCES**

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本文属于俄语历史语法领域，致力于研究解释性宾语中从属连词的演变过程。在研究过程中，有可能可以确定，为了在古俄语中引入解释性宾语，最常使用可追溯到相对疑问代词的语义从属连词。渐渐地，回溯到指示代词的大部分代词起源的语义连词被回溯到疑问相对代词的连词所取代。随着时间的流逝，引入解释性宾语的语义连词的数量减少为一个连词 *что*，从词源上升至相对代词，最能说明该宾语的客观性。由于失去了最初的词汇意义，该连词得以与情态粒子 *бы* 合并，从而形成了模态有色的连词 *чтобы*。这种连词开始充当表达从属结构的虚幻情态含义的手段，同时又是在现实与非现实中区分解释对象从属从句的语法手段。

关键字：古老的俄语，复杂的句子，从属连词。

Abstract. *This article belongs to the field of historical grammar of the Russian language and is devoted to the study of the evolutionary process of subordinate conjunctions in explanatory-object sentences. In the course of the study, it was possible to establish that for the introduction of explanatory-object clauses in the Old Russian language, semantic subordinate conjunctions that go back to relatively interrogative pronouns were most often used. Gradually, most of the semantic conjunctions of pronominal origin, going back to demonstrative pronouns, were supplanted by conjunctions going back to interrogative-relative pronouns. Over time, the number of semantic conjunctions introducing explanatory-object clauses was reduced to one conjunction что, etymologically ascending to the relative pronoun, which best indicated the objectivity of the clause. As a result of the loss of the original lexical meaning, this conjunction was able to merge with the modal particle бы, which led to the formation of a modally colored conjunction чтобы. This conjunction began to act as a means of expressing the unreal modal meaning of subordinate constructions and at the same time was a grammatical means of differentiating explanatory-object subordinate clauses in reality-irreality.*

Keywords: *Old Russian language, complex sentences, subordinate conjunctions.*

Complex sentences (hereinafter - CS) with explanatory-object subordinate clauses represent sentences of an undivided structure, and their subordinate clauses are real or imaginary *objects* (speech, thoughts, desires, etc.). Moreover, the reality or irreality of the object expressed by the subordinate construction is determined by the semantics of the governing verb, and the subordinate conjunction is the main means of expressing the modal plan of the subordinate clause. And if in target subordinate clauses, the content of which always represents the desired result (desired consequence), differentiation of the modal meaning in reality - irreality is impossible, then in explanatory-object constructions this differentiation is carried out through the semantics of the governing verb. However, first of all, the explanatory-object construction is an *object*, and within the framework of semi-predicative infinitive and participial turns, it is a complex addition in the accusative case, which answers one general question: *кого/что*. Consequently, for the introduction of explanatory-object clauses, semantic subordinate conjunctions that go back to relatively interrogative pronouns were much more suitable. And although the traditional means of introducing explanatory-object clauses (conjunctions *аа, ааа, ѱѱ*), remained in the Church Slavonic language, in the Old Russian language semantic conjunctions of pronominal origin were much more often used for this purpose, and the pronoun *что* subsequently became the most widespread a subordinate conjunction, introducing this type of subordinate constructions.

First of all, it should be said about the conjunction of adverbial origin *яко*. This conjunction, borrowed from the Church Slavonic language, was also used in the most ancient monuments of the Russian language, regardless of the place of their writing [2, p. 330], with the verbs of *expression, perception, thinking, feeling* [6, p. 307, 3, p. 542] and was combined mainly with the form of the indicative mood of the predicate verb. (Борис же прибегъ къ отцю своему въ Кыевъ, поведя ему, *яко* пришел на него Изяславъ ратью.) [6, p. 307]. Consequently, the semantic conjunction *яко* was used to introduce explanatory-object clauses with a real modal plan. *Яко* within the framework of the general trend of replacing adverbial conjunctions with pronominal conjunctions was gradually replaced by the conjunction *что*, although for a long time (until the XIX century) it remained in the clerical language [2, p. 330].

Semantic conjunction *оже* (and its variant *еже*), which arose from the demonstrative pronoun [4, p. 629], according to A.N. Stetsenko, was in the Russian language of the older period one of the most common polysemantic subordinate conjunctions. At first it was used quite widely, especially in the monuments of business writing and in the monuments of the annalistic narration, with the verbs

of *expression, perception, thinking and cognition* in combination with indicative forms. (Онъ же услышавъ, *оже* идутъ на нь, иде Торопыцю.) [6, p. 308]. Consequently, this conjunction introduced explanatory-object clauses with real modal meaning. This conjunction also did not take root in the Russian language, although it was a conjunction of pronominal origin. Probably, this can be considered as a result of another process in the history of the Russian language, as a result of which most of the semantic conjunctions of pronominal origin, going back to demonstrative pronouns, were replaced by conjunctions going back to interrogative-relative pronouns [7, p. 219]. Thus, in the subsequent history of the language, explanatory-object constructions with the *оже* conjunction gradually gave way to constructions with the *что* conjunction.

Semantic conjunction *что*, going back to the relative-interrogative pronoun [5, p. 1575], was in the Old Russian language the most universal means for use in explanatory-object subordinate constructions, since it could introduce subordinate clauses with both real and unreal modal meaning. In the first case, it was used after the verbs of *thinking, cognition, feeling, perception*, etc. and combined in a subordinate clause with the indicative mood of the predicate verb. (И Иван Васильевич сказал, *что* сю грамоту он *писал*.) [6, p. 304]. In the second case, the conjunction *что* was used after the verbs of *desire, expression of will, striving, fear, resistance*, and was combined in a subordinate clause with the subjunctive or infinitive with the modal particle *бы*. Within the framework of such constructions in the Russian language, it became possible to merge a subordinate conjunction with a modal particle of verbal origin and form a modally colored conjunction *чтобы*, which became a grammatical means of expressing an unreal modal plan in such subordinate clauses (И биша чоломъ, *чтобы* избавилъ Псковъ от гнева Витовтова.) [6, p. 310].

Explanatory-object subordinate constructions with the conjunction *что* are found in the monuments of the Old Russian language since the XIV century [6, p. 304]. According to L.A. Bulakhovsky, “along with the dominant in the meaning of the explanatory conjunction *что*, occasionally appears in Old Russian, as a similar product of the degeneration of the attributive pronoun, *кое*: Шлеш ли ся в том, *кое* их полудвором не владееш? (Jurid. Acts, 1571)» [2, p. 329]. However, this conjunction in the subsequent history of the development of language was lost, ousted from the explanatory-object constructions with the real modal plan by the conjunction *что*.

Explanatory-object subordinate constructions with unreal modal meaning, introduced by the conjunction *чтобы*, are first encountered in the monuments of the XV century [6, p. 309]. Thus, it can be assumed that in the Russian language the historical process of the structural transformation of CS (the displacement of “transitional type” constructions and clauses with modal conjunctions, as well as

the formation of a new universal subordinate conjunction based on the semantic conjunction of pronominal origin) in target CS began somewhat earlier (XIII century than in the explanatory-object CS. (If we compare with the Latin language, then similar transformations first affected the explanatory-object constructions, and later spread to the target ones.) The use of the explanatory-object CS with the conjunction *чтобы* in the language of the XVI century is significantly expanding. Moreover, according to A.N. Stetsenko, such constructions can be found both in the monuments of business writing and in the works of the book language. And in the language of the XVIII century, such CS are freely used in monuments of various genres [Stetsenko, p. 310]. According to T.I. Beregova, the activation of the process of formation and approval of a new system of conjunctions (in particular, conjunctions formed on the basis of conjunction *что*) should be attributed to the period of strengthening the language of the Great Russian people and to the initial period of the formation of the language of Russian science (XVI-XVIII centuries). In the XVIII century, conjunctions *что/чтобы* were already widespread and characterized as stylistically neutral [1, p. 12].

In the XVII century, along with the explanatory-object clauses introduced by the conjunction *чтобы*, constructions introduced by the conjunction *будто* began to be used in the Russian language. (А говорят, *будто* они заодно с поляки посягают на них, черкас.) [6, p. 312]. "*Будто* (*будьто*), in origin – *будь* (with a close to submissive meaning of the imperative mood in the function of the 3rd person) and the pronoun *то*" [2, p. 330]. It is rather difficult to determine the place in our classification of semantic and modal subordinate conjunctions for this conjunction of verbal origin. It is obvious that this conjunction forms an irreal modal meaning in the subordinate clause for any semantics of the governing verb. Considering the origin of this conjunction from the form of the irreal (imperative) mood of the verb, it can be attributed to modal conjunctions, but one should not forget that before the transformation into a conjunction, the word *будь* had certain semantics. Bulakhovsky L.A. believes that the conjunction *будто* in the explanatory-object clauses sometimes very easily approaches in meaning to comparative conjunctions [2, p. 330]. In our opinion, the conjunction *будто* should be considered a conjunction of *subjective evaluation*, since it itself can act as a modal qualifier of an explanatory-object clause. This conjunction is not so much an expression of the category of optativity, but rather indicates the *doubt* of the subject of speech *in the existence* of what is said in the subordinate clause. In ancient Greek, for this purpose, the modal particle $\alpha[v]$, was put in the subordinate clause, and in Latin – conjunctive (subjunctive). According to A.N. Stetsenko, "additional subordinate clauses with the conjunction *будто* do not express the actual actions, but the alleged, possible or doubtful. These sentences were of limited use in the monuments of the Russian language" [6, p. 312].

Conclusions

Completing the coverage of the process of historical change in semantic conjunctions that introduce explanatory-object subordinate clauses, it should be remembered that some types of CS (including explanatory-object ones) could be formed on the basis of a simple sentence by introducing subordinate conjunctions into semi-predicative participial and infinitive turns of phrase and transforming these turns into subordinate structures. Moreover, participial phrases, as a rule, were transformed into subordinate clauses with a real modal plan, and infinitive phrases into subordinate clauses with an irreal modal meaning (according to the semantics of the governing verb). In the subordinate clauses formed in this way, the semantic conjunction was combined with the forms of the indicative mood of the predicate or infinitive verb, and the predicate form was the main means of expressing the modal meaning of the subordinate. A semantic subordinate conjunction could be introduced into the dependent part of a non-conjunction complex sentence or a multi-conjunction CS (along with a compositional conjunction), where the irreal modal plan of the construction was expressed through the form of the subjunctive mood of the predicate verb or infinitive in combination with the particle *бы*. Over time, the number of semantic conjunctions introducing explanatory-object clauses was reduced to one conjunction *что*, etymologically ascending to the relative pronoun, which best indicated the objectness of the clause. As a result of the loss of the original lexical meaning, this conjunction was able to merge with the modal particle *бы*, which led to the formation of a modally colored conjunction *чтобы*. This conjunction began to act as a means of expressing the irreal modal meaning of subordinate constructions and at the same time was a grammatical means of differentiating explanatory-object subordinate clauses in terms of reality-irreality.

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俄语外语学习中形成交际沟通桥梁的心理语言方法
**PSYCHOLINGUISTIC METHOD OF FORMING ASSOCIATIVE-
COMMUNICATIVE BRIDGES IN THE STUDY OF RUSSIAN AS A
FOREIGN LANGUAGE**

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本文涉及心理语言学领域，其中成功地使用了建立联想-交流桥梁的方法来教授正常儿童的母语以及在存在各种精神障碍的情况下与他人进行心理矫正的工作。失语症类型，自闭症谱系障碍等。学习外语时，此方法也有效。本文探讨了在俄语作为外语的研究中形成交际沟通桥梁的心理语言学方法。该方法基于游戏过程中关联链接的有意识形成，其目的是巩固新单词的含义。所提出的方法既可以用于教授母语，也可以与双语者一起使用（这有助于保留母语的基本词汇，并在掌握外语词汇时防止这些联系的中断）。该技术也可以成功地应用于高级俄语作为外语的学习中，这涉及将思维过程从一种语言重新编码为另一种语言。

关键字：交际和沟通的桥梁，学习外语，心理语言学。

Abstract. *This article relates to the field of psycholinguistics, where the method of forming associative-communicative bridges is successfully used for teaching the native language of both normal children and for psycho-corrective work with people in the presence of various mental disorders, for example, some types of aphasia, autism spectrum disorder and others. This method is also effective when learning a foreign language. This article examines the psycholinguistic method of forming associative-communicative bridges in the study of Russian as a foreign language. The method is based on the conscious formation of associative links during the game, the purpose of which is to consolidate the meanings of new words. The proposed methodology can be used both in teaching the native language and when working with bilinguals (this contributes to the preservation of the basic vocabulary of the native language and prevents the breakdown of these connections when mastering the vocabulary of a foreign language). This*

technique can also be successfully applied in the study of Russian as a foreign language at an advanced level, which involves re-coding the process of thinking from one language to another.

Keywords: *associative and communicative bridges, learning a foreign language, psycholinguistics.*

The communicative function of language is one of the most studied aspects in modern linguistics. The minimum unit of linguistic communication is a speech act or utterance.

The construction of external speech is preceded by an internal semantic plan, which in a person is built according to a certain scheme: the motive that generates thought - the formation of thought - mediation of thought in the inner word - selection of the meanings of external words - reproduction of external words by speech organs [3, p. 364; 4, p. 90]. Moreover, all the components of constructing an utterance can be schematically represented in the form of islands, which can be called *islands of communication*, and there is a kind of space between these islands. This space is overcome by an ordinary person with the help of a certain volitional unconscious effort. The stages of overcoming the space between the islands of communication can be called *communication bridges*. To carry out this volitional effort, *a spark* is needed - *an emotional outburst*. When learning his native language, a child builds *communicative bridges*, relying on the *imitation* of an adult's speech [1, p. 22].

It should be noted that each language is a system of systems that contains phonetic, lexical and grammatical levels. The formation of the vocabulary of the language of a particular person occurs on the border of the phonetic and lexical levels, since any word is a unity of the semantic triangle: sound shell-object-concept [2, p. 154]. However, this triangle is based on a binary system consisting of components opposite, like magnetic poles, but complementary to each other: thoughts-words and thoughts-images. At the same time, thought-images are the first to appear in the mind of a child during spontaneous teaching of the native language. The primary synthesis of human consciousness and thinking is built primarily on the basis of combining micropictures, microimages into new combinations. This is how new words and word combinations appear and become fixed. In Russian, you can sometimes see the process of its creation in a complex word, if the motivational basis of the word is not lost. For example, "подберезовик" – "гриб, растущий под березой" When the motivational basis of a word is restored poorly, this connection is restored only through etymological analysis. For example, the Russian word "обидеть" comes from the word "обвидеть", which means "to look around, not to notice". Similar structural relationships can be seen when analyzing many Chinese characters.

Often, to memorize words, both new words of the native language and foreign ones, we use thought-images based on associations. At the same time, many teachers of a foreign language admit that this method of mastering a new word and including it in the active vocabulary of the learner is more effective than just memorizing words from the dictionary. Associations, as a rule, arise in a person's mind on the basis of pictures, supported by an emotional outburst, and this, in turn, is the foundation for building communication bridges that are understandable to every native speaker. In each language, the set of associative links between words is different, in languages belonging to the same kindred group, it is more recognizable than in languages of different families. However, any associative connections are easier to assimilate and consolidate both on the conscious and on the subconscious level, since this action in its structure is close to the primary synthetic visual-figurative thinking of a person.

Psycholinguistics uses a similar method of forming associative-communicative bridges for teaching the native language of both normal children and for psychocorrectional work with people in the presence of various mental disorders, for example, some types of aphasia, autism spectrum disorder and others. Recently, it has been noted that this method is also effective in learning a foreign language. This article examines the psycholinguistic method of forming associative-communicative bridges in the study of Russian as a foreign language.

One of the main features of language is that thought processes are possible thanks to it. People cannot think outside of language. For example, when remembering something, pictures, fragments of events, states and emotions appear in the head, as well as words describing them. Everything is fused together.

Works of art communicate with a person in the language of images, often referring to metaphor, in other words, connecting concepts and phenomena based on their similarities. The first of the proposed language learning methods is easiest for children - it is an association game.

The main objectives of this practice are:

- to understand and feel how the metaphorical expressions of the Russian language are built,
- learn to be aware of associative connections;
- give the child the opportunity to believe in himself, to interest, motivate for further studies.

In many ways, it repeats a child's game in association, but somewhat more complicated. It is important to consciously build associative connections between given pairs of words, relying on your feelings and the logic of the language, from simple to more complex. For a person to whom Russian – is native language, many pairs of words associated with each other associatively are usually obvious.

For example. What image appears when two words are combined: tree – fam-

ily? It is important to look at words from the standpoint of a general cultural context.

Answer: the image of a tree with powerful roots and a branched crown, each branch is associated with one trunk, like families with their ancestors; if you start to reproduce graphically the pedigree, you get a drawing resembling a tree → family tree. Thus, the associative scheme will look like this:

tree → family tree → family

There are very simple associative rows: board - wheels = skate, they are obvious and do not require effort. Unlike more complex ones, which will help give a person an idea of the general cultural context. For example: mystery - smile = Mona Lisa Gioconda (a good reason to show an illustration of a famous painting and discuss why the woman's smile in this portrait is considered the most mysterious in the world). It is better to alternate complex associations with simple ones, it is important to immerse yourself in the context, even the simplest pairs of words help the brain "turn on" and begin to throw a "bridge" between concepts. Only one answer is not always possible, this is a game of associations, each of them can have their own. For example, for a pair bird-pedestrian the answer can be a penguin, an ostrich, and a chicken.

It should be noted that the more complex the association, the more words can be used: the "bridge" is not always set using two logical constructions, there may be more of them. The sooner logical associative connections are built, the less time it takes to select the necessary words in the process of live communication. Aerobatics will be a quick oral construction of connections between random objects and phenomena.

Another example to consolidate the understanding of the essence of technology. Verbal pair: dog - river. It will be a great temptation to make a simple sentence: "The dog is swimming in the river", but here there is a statement of fact, and there is no associative connection. So what can a dog do in a river? Swim. How does a dog swim? What is this type of swimming called? By asking a series of similar questions, one can easily arrive at the metaphorical phrase " dog paddle."

All associative pairs are divided into several groups:

1. describing natural and physical phenomena;
2. historical (allusions to historical figures and events - allow you to touch the linguistic and cultural and linguocultural information);
3. general cultural (ancient mythology, painting, culture).

The cards are arranged in alphabetical order and are detailed below in this chapter.

Algorithm for the formation of associative-communicative bridges

For the effective operation of this technique, a certain toolkit is required, namely, small cards on which associatively linked pairs of words are written.

1. Place the cards in front of the student and teacher.
2. Draw the cards one by one and select the answers that seem most appropriate.
3. Check the reference material (at the end of the article).
4. Put the cards with the correct answers on one side.
5. Put aside the cards with which you have difficulties.
6. The group of cards that caused difficulties must be analyzed together with the student to establish the missing associative links.
7. At the end of the game, you can summarize, the winner is the one with the most solved cards.

Be sure to articulate your thoughts and explain them. The answers may be different, the main thing is that they are justified and understood correctly.

After students have successfully mastered most of the flashcards, a more challenging level can be suggested. Students are encouraged to come up with their own associative pairs.

Rules for making associations:

1. Only two words should be connected by an associative connection, a larger number of words makes it difficult to guess.
2. The answer should not contain complex metaphors that go beyond the knowledge of the players (except for the associative links of the general cultural level, necessary for the general development of the players).
3. An associative pair can be recognized as valid if at least three people gave the same answer.

Possible answers

1. **Aroma – morning.** What kind of aroma is pouring from the kitchen of almost every home in the morning? Without which the majority of the adult population of our country cannot wake up? Answer: *coffee*.

2. **Aroma – thorns.** One of the simplest figurative rows. A flower emitting a delicate scent covered with thorns. Answer: *rose (rosehip)*.

3. **Protein – pantry.** It is enough to remember what squirrels love to eat, and what they store in the pantry for the winter. Answer: *nuts*.

4. **Gods – Mountain.** According to Greek mythology, the gods lived on the top of the mountain. Answer: *Olympus*.

5. **Beard – gifts.** A fairytale wizard is conceived here who brings gifts for

the New Year to children and some adults. Answer: *Father Frost*.

6. **Paper – reference point.** Almost from the moment paper was invented, people have applied signs on it, thanks to which it was possible to navigate the terrain. Answer: *map*.

7. **Bicycle – vision.** Here the phrase from the poem by Vladimir Mayakovsky is encrypted "At the top of the voice": "Professor, take off your bicycle glasses!" Answer: *glasses*.

8. **Grapes – barrel.** What is made from grapes in oak barrels? Answer: *wine (cognac)*.

9. **Air – motion.** It is enough to go outside to feel its light touch, and in bad weather it penetrates through and through. Answer: *wind*.

10. **Hair – snow.** With age, a person's hair color begins to change, white threads appear in them - *grizzle*.

11. **Crow – food.** A simple associative link, referring to the fable of I. A. Krylov: "Somewhere, God sent crow a piece of cheese" Answer: *cheese*.

12. **The coat of arms – a bird.** Very often, various heraldic animals are depicted on the coats of arms, one of the most popular can be seen on the coat of arms of the Russian Federation. Answer: *eagle*.

13. **Hump – caravan.** It is this animal that is also called the "ship of the desert", in its humps there is a reserve of moisture necessary for long journeys through the desert. Answer: *camel*.

14. **Horoscope – brothers.** One of the zodiac signs is encrypted here. Answer: *Gemini*.

15. **Graphite – line.** A more complex associative array, assuming the knowledge that the core of a simple pencil is nothing more than graphite. Answer: *pencil*.

16. **Rodent– cursor.** Once upon a time, at the sunset of the 90s, the first "mouse pads" appeared in the store, causing bewilderment among customers, then they began to joke about "slippers for cockroaches". Now the connection between the cursor and the computer *mouse* is obvious.

Conclusions

The method of forming associative-communicative bridges considered in the article is based on the main provisions of psycholinguistics. It can be used both when teaching the native language and when working with bilinguals (the technique helps to preserve the basic vocabulary of the native language and prevents the breakdown of these connections when mastering the vocabulary of a foreign language). This technique can also be successfully applied in the study of Russian as a foreign language at an advanced level, which involves re-coding the process of thinking from one language to another.

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中国在英语社区的文化融合导致的“PIDGIN ENGLISH”
"PIDGIN ENGLISH" AS A RESULT OF CULTURAL INTEGRATION OF
CHINA IN ENGLISH-SPEAKING COMMUNITY

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本文专门介绍英语独特的中文变体的发展和形成的历史。本文特别关注中式英语特征的系统化，并突出了中国英语的使用领域。这项研究的结果是从中国融入国际社会的文化和经济角度来查明中文版英语出现及其发展的原因。

关键词：中式英语，中国文化融合，中国经济融合，中英文，语言干扰

Abstract. *This article is devoted to the history of the development and formation of a unique Chinese variety of the English language. Particular attention in the article is paid to the systematization of the characteristics of Chinglish and highlighting the areas of use of the English language in China. The result of this study is to identify the reasons for the emergence of the Chinese version of the English language and its development from the point of view of the cultural and economic integration of China into the world community.*

Keywords: *chinglish, China's cultural integration, China's economic integration, Chinese and English, language interference.*

The history of the emergence of the Chinese variety of the English language begins in 1637. In the 17th century, the British Empire was particularly active in its trade and expansionist policies. Thus, due to the great enterprise of the British merchants, in 1637, English, along with British goods, arrived in Macau and Guangzhou (Canton). A stormy process of cultural exchange between foreign traders and the local population began. The task of building good relationships and finding a common language was in the interests of both the Chinese and English

sides. Thus, as a result of cooperation between the British and most of the Cantonese-speaking Chinese, “Pidgin English” was born.

Today, China and Great Britain are two developed economic powers with enormous potential for development and interaction. In 2011, China introduced restrictions on the export of rare earth metals, their prices on the world market more than quadrupled. For this reason, many foreign companies have decided to move their production to China.

As you know, China is rightfully considered the workshop of the world and many economic analysts believe that China is practically the only hope of the planet's economy to get out of the crisis. [6]. The main trend in the development of China's economy is attracting foreign investment, as a result of which we can state the fact that with the advancement of economic unification, the cultural integration of China with the rest of the world is also increasing. Thanks to this, the interference of Chinese and English languages is further increased.

The history of the development of culture in China has more than five centuries, therefore, the Chinese civilization is considered the cradle of culture of all countries of the Asia-Pacific region. Also due to its rich geographic diversity, a large number of man-made and natural monuments, China is the leading tourist destination among the world's population. According to statistics, China is visited by over 50 million tourists annually. [7].

The Chinese are paying more and more attention to learning English in order to communicate more effectively with tourists and with the rest of the English-speaking world. An increasing number of people in the Middle Kingdom speak English. With such a major cultural integration, the classical English language is undergoing major changes due to the active interference of the Chinese language as the native language of the Chinese-speaking population. As a result, the Chinese, trying to actively use the English language, without noticing it, created a fundamentally new kind of English, which received the name “Pidgin-English” or as it is commonly called “chinglish”.

As noted by the famous Chinese linguist Ge Chuangui, “Pidgin English” made major changes to the classical grammar of the English language due to the fact that the classical English phrases did not make sense in the framework of the Chinese language and Chinese thinking. [2;56]. For example, the Chinese, as in their native language, do not change the verbs by tenses, so they just say “I tomorrow go”. “I yesterday come”. The auxiliary verbs ‘do’ and ‘did’ are also absent, and interrogative sentences are conveyed by intonation of words.

Similarly, the pronunciation of English words has undergone changes. The Chinese, communicating in English, use the Chinese phonetic alphabet, pronounce words with articulation characteristic of their native language. As a result, unstressed vowels are not reduced, for example, the word ‘harmony’ is pronounced

‘harmOny’, and instead of the classic English interdental sound [θ] you can hear [f], [v], [t] or even [d]. [1].

This transformation is driven by the uniqueness of the Chinese culture and the Chinese language. It is extremely difficult for native Chinese speakers to learn Western languages due to the fundamentally different culture of the West.

By and large, the main characteristics of the Chinese version of the English language can be systematized as follows [4]:

1) geographical: due to the thousand-year history of China and a large cultural heritage, together with various, unique geographical conditions, there are a large number of English expressions that came from the east. An example would be place names, such as: Beijing (北京), Shanghai (上海).

2) historical: the names of Chinese dynasties, historical figures who played an important role in the history of China, under the same conditions, can be considered an element of "Chinglish".

3) social and institutional: the exclusive general social culture of the inhabitants of the Middle Kingdom, the structure of the administrative and economic structure equally needs descriptive terms in English, such as, for example: cheng-guan - municipal government.

4) political: it is worth noting that the system of the political apparatus in China is significantly different from that of the West. As a result, it becomes necessary to develop new expressions that would reflect Chinese phenomena that are not found in the political systems of English-speaking countries.

5) ideological: the language of the ancient civilization of China has a large ideological and philosophical heritage, thus, in order to express deeply contextual meaning in English, in particular chengyu - stable phrases that have a figurative meaning, it is necessary to come up with English analogues that can cope with this task.

6) traditional: for more than five thousand years, a unique lifestyle and folklore reflecting the existence of the Chinese have been created in China. Based on the above, the Chinese variety of English should be able to correctly convey the customs of the Chinese people and describe events and phenomena that are found only in the Central Country (中国, as the Chinese themselves call their homeland).

Also PanTsz. S. identified several main areas of use of the English language in China. First of all, English is used in the media or various types of international cooperation for effective communication and political development. Legal and political activity is international in nature and forces politicians and lawyers to use English. As mentioned above, English is actively used in interpersonal communication. The use of the English language, in the same way, takes place in the creation of contact literature, which further contributes to the development and isolation of Chinglish from other varieties of the English language. [4].

It has been suggested that every 98 minutes a new word appears in English. Thus, approximately 10 thousand newly formed words appear in English every year, of which 5% are words of Chinese origin.

These statistics are due to the active expansion of the Chinese market by foreign brands, such as the one conducted by the British Empire in 1637. Thus, when foreign brands enter the Chinese market, it becomes necessary to give them a name that is euphonious for the Chinese consumer. The difficulty lies in the fact that due to the different perception of the world of people from the West and the East, it is very difficult to integrate or come up with a similar advertisement. Thus, entrepreneurs are forced to adjust their thinking in the Chinese way, which is a very problematic task.

As a result of solving a large number of such global and everyday problems, the Chinese language puts more and more pressure on English, thereby increasingly changing the grammatical structure of classical English.

In China, as in the rest of the world, English is more than just a foreign language, therefore, today, Chinese English is often spoken both by immigrants from China who spent time in English-speaking countries and by ordinary Chinese trying to reflect their thoughts in the language of Shakespeare [2;59].

Nowadays, “Pidgin-English” can be found almost everywhere, it is used on signs, in the names of stores, at airports, slogans and literature. [5;69],

However, it is worth noting that despite the wide cultural expansion of Western countries, China also has a reciprocal impact, which can be seen in the large spread of Chinese words and writing outside of the Middle Kingdom.

For example, the Chinese word *chengguan*, 城管, which translates as “municipal government,” has been cited more than 1 million times on Google, which, according to company rules, is much more than the minimum amount required for a new word. The well-known American print publication *The Wall Street Journal* used the Chinese word “*dame*” 大妈 (aunt) in its articles to denote the purchasing power of middle-aged Chinese women who at one time bought gold. [3]

There are theories which suggest that the use of this word indicates an escalation of the influence of China, namely the influence of the Chinese language on the world. The Chinese language is one of the most powerful engines of the globalization of the English language, asserts Payak, also noting that it will not stop exerting its influence on the languages of other countries in the 21st century [2;57]. Wei Chongxin, director of the Institute of Language and Culture in Beijing, believes that this phenomenon takes place due to the escalation of China's influence on the world, especially on the political, cultural and economic sphere [2;57].

This phenomenon is quite predictable, because when a large number of English-speaking people arrive in China, communicate with the Chinese or get acquainted with Chinese literature, there is an interference between the Chinese and

English languages [2;57].

Thus, the results of this study confirm the fact that due to the cultural interference of China with the rest of the English-speaking world, "Pidgin-English" is actively developing and draws on myriads of cultural phenomena from everything that happens exclusively in China, which makes it absolutely unique and not similar to other varieties of English.

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民族媒体作为解释性新闻的平台：功能特点
**ETHNO MEDIA AS A PLATFORM FOR EXPLANATORY
JOURNALISM: FUNCTIONAL FEATURES**

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在解释性新闻业发展的背景下，考虑了民族媒体的特征。确定了解释性新闻的基本原理及其对民族媒体功能特征变化的影响。民族文化本着文化对话的精神对受众意识形态基础形成的影响发生在文化间和种族间交流系统的变革中。这导致需要优化社交沟通，从而在开发新的呈现民族媒体信息格式的过程中找到表达方式。解释性新闻作为一种新的民族媒体形式，有助于建立受众与媒体之间的互动互动。

关键词：解释性新闻，民族媒体，格式，媒体文本，民族间交流，交流格式的优化。

***Abstract.** The features of ethnomedia in the context of the development of explanatory journalism are considered. The basic principles of explanatory journalism and its influence on the change in the functional characteristics of ethnomedia are determined. The influence of ethnomedia on the formation of the ideological foundations of the audience in the spirit of the dialogue of cultures occurs in the context of the transformation of the system of intercultural and interethnic communication. This leads to the need to optimize social communication, which finds expression in the development of new formats for presenting ethnomedia information. Explanatory journalism as a new ethnomedia format contributes to the establishment of interactive interaction between the audience and the media.*

***Keywords:** explanatory journalism, ethnomedia, format, media text, interethnic communication, optimization of communication formats.*

One of the central links of the modern media system is ethnomedia, which, actively responding to the key problems of our time, become the most important conductors of not only cultural codes, national stereotypes, but also influence the formation of the audience's worldview in the spirit of a dialogue of cultures and the harmonization of intercultural and interethnic relations. This is especially clearly manifested now, when the problems of interethnic relations come to one of the first

places in the world agenda, formed by the world media systems. Therefore, the study of the experience of ethnomedia, the transformation of their formats under the influence of technological challenges is an urgent problem facing the scientific and journalistic community. The purpose of this article was to identify the features of the functional landscape of ethnomedia based on the analysis of a whole range of ethnomedia, including the portals of the Assemblies of the Peoples of Russia.

One of the most important trends of our time is the trend towards the structuring and optimization of media content, which, according to researchers, leads to the transformation of not only the ways of presenting content, but also to a significant change in the genre system [1]. New effects of journalism appear, one of which is V.D. Mansurova calls meta-effects of network practices in journalism [1, p. 17]. The multiplatform nature of the modern media text and the media themselves, when the possibility of reconstructing the media text, its openness for encoding and decoding, makes it possible to create new texts as a result of the collective authorship of communicants. However, among the media projects of our time, the so-called "slow media" stands out, which, according to Benedikt Köhler, Sabria David, Jörg Blumtritt, contribute to sustainable development, focusing on solving one problem, which creates an attitude towards careful and deep consumption of their content, full concentration of the audience - focused attention of consumers [2].

The slow media format as a form of working with the audience can be applied to the characteristics of ethnomedia as their functional specialization. Considering that mass interethnic communication is impossible without media channels, it is important to emphasize that media and journalism satisfy the information needs of society, paying close attention to the problems of interethnic relations. The ethnomedia agenda is formed on the basis of the principle of discovering the other, which makes it possible to distinguish between individuals, social groups and form the cultural diversity of individual and collective identity. This principle also promotes exchange and communication between representatives of certain ethnic groups and nationalities. Ethnomedia are organizers of an active social dialogue with the aim of making final decisions on the issues under discussion on the basis of convergence of positions. Social dialogue is carried out within the framework of the ethnomedia system as the main media channels that provide specialized information containing information about the development, history, culture, and traditions of peoples living in Russia. Ethnomedia is also a complexly structured phenomenon based on the analysis of the place and significance of national consciousness (as the basis of the journalistic picture of the world) in the world, as well as the study of national relations and interethnic interaction in the activities of a journalist-ethno-researcher. [3, p. 142].

The activity of ethnomedia is based on the reflection of ethnicity in the media

using the mechanisms of formation of the ethnomedia space, which allows supporting the processes of preserving and developing ethnic identity both within the state and outside it. Functionally, ethnomedia is defined as media channels that implement regulatory or instrumental functions; self-government (implementation based on stable systems of interactions and social partnership (civil society institutions); control - as critical, taking into account the value of the factor of reference groups; integrative functions; spiritual and ideological functions. The term "ethnomedia" is rather conventional. This group of publications includes print (newspapers and magazines) and electronic publications (television, radio channels, Internet publications), designed to create information for one or more ethnic groups that unite different ethnic groups on a linguistic or religious basis. For example, the Finno-Ugric ethnic group is the target audience of the magazine and information portal "Finnougoria" within the framework of the Finno-Ugric Cultural Center of Russia, a branch of the federal state budgetary institution of culture "State Russian House of Folk Art named after V.D. Polenov" (<http://www.finnougoria.ru>). And the information agency "Info-Islam" covers the life of Muslims around the world and is one of the main information resources of the Muslim community of the Republic of Tatarstan (<http://www.info-islam.ru/>). Ethnomedia is the most important component of ethnojournalism, it forms an ethnomedia space that allows supporting the processes of preserving and developing ethnic identity both within the state and outside it. As researchers rightly note, ethnicity in the context of the development of ethnomedia is presented as a genome of culture with a focus on preserving the originality and uniqueness of peoples living in the territory of mass media distribution [4, p. 33]. Ethnomedia creates multicultural information flows, which are a means of harmonizing intercultural relations, stabilizing the interaction of various traditions and customs, and integrating different cultures. The specificity of ethnomedia allows us to speak of a special attitude towards new formats for presenting information that are developing in the media space on the basis of the introduction of information technologies.

Ethnomedia, as the analysis shows, is rather cautious about the transition from traditional forms of information presentation to innovative ones. However, changes in media consumption dictate their own rules for organizing the activities of ethnomedia portals. An example is the integrated interethnic media - ethnomedia, designed to solve a number of tasks, the most important of which is the harmonization of international and interethnic relations. One of the widely used new forms of presenting information is the format of explanatory journalism - a format for presenting a media text that contributes to the detailed presentation of material that is difficult to perceive in an accessible and understandable language for the audience. Among the technologies of explanatory journalism - visualization, infographics, "cards" - a question-and-answer form of presenting information,

which is used to summarize the questions asked and emphasize frequently asked questions. There is still no clear definition of explanatory journalism. What is it? What kind of journalism, format of information presentation, genre? You can find many definitions of explanatory journalism in the context of comparing it with the widely known explanatory and existing textual features noted by R.P. Clarke, who emphasizes the absence of unnecessary and unimportant information, the presence of one story, translation of terms into an understandable language, the use of analogies and comparisons, simple sentences, numbers and other data, visualization, chronology and lists of events [5]. One of the important criteria of explanatory journalism is the clarity and usefulness of what and how is said for the audience.

Explanatory journalism is defined, for example, by A.S. Senotrusova and L.V. Cherednichenko as a form of information presentation, which, according to the authors, has taken its place in the system of modern genres of journalism, which “allows the reader to engage in reading news, helps to realize the individual value of the information received and apply it in their lives” [6]. Perm journalist Sergei Yakupov believes that the audience also wants to understand certain phenomena, which becomes the task of explanatory journalism. S. Yakupov characterizes explanatory journalism as “deeper look on the processes that connect facts and phenomena.” It is characterized by an orientation towards the average consumer of content, brevity of the presentation of the material, taking into account the discrete perception of the Internet text, consistency in the presentation of information in order to avoid scattering the audience's attention, and for its maximum involvement, repetition of key thoughts, visualization, lists that structure information and allow to cover a fairly large amount of data, the format of the card - specific short answers to frequent requests from readers [7].

Thus, explanatory journalism is aimed at optimizing the syncretic forms of media texts, transforming the genre system and, as a result, changing the mechanisms for broadcasting content. These changes are also observed in ethnomedia, combining non-verbal and verbal content components designed to automate perception, as well as simplify the understanding of the text, make it laconic by including interactive and hypertextual components. Optimization of communication enhances the meaning of non-verbal elements of the media text, and also, according to Ya.I. Tyazhlova, the use of the most relevant forms of text organization [8]. Experts associate such an increased attention to explanatory journalism with the multimediaization of the media space and the increase in information flows, the orientation in which for the consumer is becoming more and more difficult. Ethnoinformation is one of those streams that requires close attention. Therefore, according to R.P. Clark, journalists strive to present complex material simply, clearly and in accordance with the needs of the audience [5].

The key factor in choosing an ethnic theme is its relevance, versatility, replicability by mass media and increased interest from the audience. Ethnic issues are a complex system of topics that, each in itself, can become the subject of reflection in the format of explanatory journalism. This policy underlies this type of ethnomedia as the portals of the Assemblies of the Peoples of Russia (<http://xn--80aaadglf1chnmbxga3u.xn--p1ai/>). It is this policy that was adopted by the Portal of the Assembly and the House of Friendship of the Peoples of the Republic of Tatarstan (<http://addnt.ru/>), which is an expanded media platform that reflects the main issues of ethnic relations in the republic. Multi-platform, multimedia and cross-platform are becoming predictors of the portal's explanatory journalism. The material of the portal allows the consumer to immediately immerse himself in ethnodiscourse at different depths: using hyperlinks, infographics, cards and lists. In the format of explanatory journalism, such sections of the portal have been created as "Ethnographic Map of Tatarstan", "Festive Circle of the Peoples of Tatarstan", "National Question and Answer", etc. Considering that the media texts of the portal are designed not only for the prepared, but to a greater extent for the unprepared consumer, they are provided with visual materials, examples from popular culture that a wide audience is familiar with, sidebars, etc.

However, the analysis of ethnomedia revealed insufficient attention to such increasingly popular media text formats as lists and tops, which are in high demand among the audience, and to some extent serve as landmarks in the world of ethno.

Thus, the influence of new technologies that are being introduced everywhere in the practice of ethnomedia cannot but influence the transformation of media text formats, which are the main carrier of ethno information. This is being actualized by the globalization of the media space, the modification of the mechanisms of information perception, as a consequence - the abundance of forms of information dissemination and the increase in the degree of its interactivity. Optimization of information transfer leads to transformation of formats and genres of information presentation and changes in publications policy. In ethnomedia, there is a development of specific forms of text, which include texts of explanatory journalism. This allows you to structure ethno content and optimize ethno communication.

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颂歌的象征意义（来自“斯拉夫神话的象征历史”）
**THE SYMBOLISM OF CAROLS (FROM THE "HISTORY OF THE
SYMBOLS OF SLAVIC MYTHOLOGY")**

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这项工作是对斯拉夫文化象征意义的一般研究的一部分。在这份报告中，作者继续使用作者档案中的远征材料（从1980年代至今）在俄罗斯各个地区记录下来，揭示了主题。

关键字：俄罗斯民俗，符号，颂歌。

Abstract. *This work is part of a general study on the symbolism of Slavic culture. In the presented report, the author continues to reveal this topic, using expeditionary materials from the author's archive, recorded from the 1980s to the present time in various regions of Russia.*

Keywords: *Russian folklore, symbols, carols.*

In previous reports on the symbolism of mythological structures, the author, revealing the topic, pointed out that the entire ancient culture is a kind of cipher, without which it is impossible to fully understand the meaning of the ethnic texts that have come down to us. This code was formed in the process of fixing the numerous rhythms of the Cosmos, by marking the dominant activity of the behavior of various subjects of nature (animals, birds, etc.) in a given period of time. Migrating in space and time, despite the inevitable distortions and changes, the cipher has come down to us in an almost complete form. From the point of view of this figurative symbolism, let us consider fragments of some Christmas carols (kolyadki)¹.

1.

— ... Oh you, kleshechka, / — Kocherezhechka, / — Where have you been?
/—Herded horses.

— And where are the horses? / — They stand behind the gate. /

¹ Ancient pagan merry songs that were sung on the eve of Christmas

— And where is the gate? / — It was blown away by water.
 — And where is the water? / — The bulls drank it. /
 — And where are the bulls? / — For the mountains they left.
 — And where are the mountains? / — The worms have carved them. /
 — And where are the worms? / — The geese pecked them out.
 — And where are the geese? / — They went into the reeds. /
 — And where is the reed? / — Girls broke it.
 — And where are the girls? / — Went married. /
 — And where are the husbands? / — Went to war.
 — And where is the war? / — In the middle of the yard.
 — And where is that yard? / — On seven pillars, / On seven versts!
 Around the yard / iron fence.
 As on each stick in the fence / One pearl! ... (GMV).

2.

As Caroling went /On Christmas Eve /***Around Ivanov Yard,***
How's Ivanov Yard/ On seven pillars, /On seven versts,
 Chiseled pillars/Gilded,
 How's it, on these pillars /***By a needle,*** / ***By a pin,***
It does not go at our door, /But waits in the window:
 Kalitka-molitka, /Spare us some sochashok!
Kalitka is a pie, a bun. It is sung by teenagers (ILV).

What is this "kleshechka" or "klyshechka", which is asked: where was it? This clearly describes the course of an object along the firmament, taking into account its twelve main zones, according to the number of questions and answers: 1 horses, 2 gates, 3 water, 4 bulls, 5 mountains, 6 worms, 7 geese, 8 reeds, 9 girls, 10 husbands, 11 war, 12 yard. But which one? And why did this object receive such a name: "hurl", "poker", based on what calendar features or other reasons? Referring to the dictionary of astronomers by Maria Eduardovna Ruth, we find that the constellation Ursa Major was called the "club" and "poker" or "kichiga" in the northern regions of Russia. «**Kichiga. Ursa Major.** The name is recorded in the northern Russian dialects - in the Arkhangelsk region, in the Pechora and the Urals, in the Tyumen and Tomsk regions. What is *Kichiga*? This word has several meanings. Most often ***this is the name of one of the most ancient types of threshers: they cut down a strong, but not very thick trunk tagesher from the root in the forest and it receive get something like a hurl (informants often explain what a Kichiga is through such a comparison).*** With this "stick" they threshed grain or hammered the heads of flax" [Ruth 2010].

By this constellation, as well as by the Sun, time and space were determined. "*Kichigas were, she shows, like a ladle. There are five of them in one place, one*

like a handle. **In the summer, we lived by the Sun, in the winter - by the Kichigas** (Sverdlovsk Region, Tugulym region)". "Kichigas were as ladles, by it we determine the area (Sverdlovsk Region, Shalinsky region)" [Ruth 2010 № 2]. Further, the author points out: "... Kichigas are important for orientation in time and space (it is no coincidence that in the Russian dialects of Buryatia a person who knows how to navigate by the stars is called *kichizhnik*)» [Ruth 2010 № 3]. "... *At midnight she stands in summer. Some call it Elk, some Kichizhka, some Midnighter* (Arkhangelskaya Region, Pinezhsky Region)» [Ruth 2010 № 4]. "*The dipper has lowered its tail – the dawn is near...* (Vologda Region, Kirillovsky region)» [Ruth 2010 № 5].

In the "Dictionary of Astronomers" we find confirmation that the constellation Ursa Major had many names: Wolf, Humpbacked Gelding, Funny Horse, Bunny, Spoon, Elk, Bear, Cook, Salt-cellar, Duck ... Most likely, one of the main reasons for this abundance of names lies in the constantly changing arrangement of the stars (for a year - 12 basic provisions). It is no coincidence that the constellation was called *Polunoshnitsa*, since it was *midnight* that was determined by the location of the constellation in a certain month (and, by changing its position, the approaching dawn). And the coming month was also determined by the Constellation Ursa Major and by other natural factors. For example, if at midnight the constellation with its "tail" pointed to *Summer*, that is, to the south (at 6 o'clock, if the sky is considered as a dial), then the month of December has come, and if it shifted by "5 o'clock," it means January has come etc. ... Moreover, as mentioned above, the constellation, together with the entire celestial sphere (in the diurnal microcycle and in the annual macrocycle) revolved around the Pole Star. Often in magical practices, the number 12 is still used, it is sacred not by chance, but because of its exodus from the calendar structures. One of these factors is the position in the sky of the never-setting constellation Ursa Major. Ursa Major, together with the entire Heavenly sphere, makes a full revolution around the Pole Star in a day (plus 1 degree, which gives a shift of 30 degrees every month). Thus, the month (one twelfth of a year), according to the system of correspondences, was identical to the ancient hour, lasting 120 minutes (one twelfth of a day), and in a day, therefore, there were 12 hours. This twelve-hour rhythm still exists in healing practices (and not only among the Slavs). "Every night the stars appear in the sky four minutes earlier than the previous one. If you observe the stars for many nights in a row, then this is not striking, but meanwhile, in a month, minutes turn into two hours. For example, the stars, which are directly above the horizon in the evenings in May, are already much higher in June at the same time" [Vogel 2008].

Thus, in carols, the course of the Ursa Major constellation is described from January to December, together with the entire Heavenly sphere, making a full revolution around the North Pole of the World (counterclockwise, which is projected

onto the Earth as a clockwise course).

Since the "klyushechke-kocherozhechke" was addressed at the time of Carol (that is, on the night of December 22-23) with the question "where was", then the answer means the period of the year starting from December 22, from the point of the winter solstice. Answer: "Herded horses" - symbolizes the month of January (more precisely, the time from the winter solstice - December 22 to January 22, when the sun is in the constellation Capricorn). In fairy tales, the Main character grazes the Horses at Baba Yaga for three days (the moment of the winter solstice), after which he gains victorious power with the Magic Horse. In another version of fairy tales, the protagonist serves a magic horse, guarding his father's grave for three nights ... The peasants always grazed horses at night (this is what they called "night"), which isomorphically corresponds to the time of winter. Ursa Major in January shows its "tail" to the place, if the sphere of the sky is compared with the dial of the clock, - "from 5 to 4 o'clock", (and "from 6 to 5 o'clock" is the time of December, more precisely from November 22 to the point of the winter solstice - December 22, when the Sun passes the Sagittarius zodiac sign). But this is in our time! And in ancient times, two and a half thousand years ago, the Solstices occurred when the Sun entered the constellations: Aquarius, Taurus, Leo and Scorpio. Therefore, this cross of time was called the "Fixed Cross". The sign of Aquarius is symbolized by two different streams !!! of heterogeneous water. One stream of water is Alive, and the other is Dead! One stream is flowing spring (or summer) water, soaking the earth, giving Life to everything. And the other water is snow, ice, this is dead winter water, which is present in nature, but does not give life. From the sign of Aquarius comes the symbolism of living and dead water, since it, like any border zone, carries a load: both dead and living nature; both Winter and Summer! An analogue to this is Baba Yaga, who has one leg alive and the other bone. Also the Milky Way, connecting the Summer and Winter zones of the Zodiac: described as the Magic River, in which one wave is icy and the other is fiery, or: the river itself is milk (food for babies), and the banks are jelly (memorial food), etc. ...).

So, the ancient calculus of the calendar according to the symbolism of Carol.

1. "Herd horses" = January, the constellation Ursa Major points with its "tail" to a place in the sky "from 5 to 4 o'clock" (more precisely from December 22 to January 22). Therefore, at the time of the winter solstice, they dressed up as: a bear, gypsies, the dead ... and a Horse, thereby showing the coming of January and the New Year, and at Christmas fortune-telling they turned to the horse to find out if the girl would get married this year: "Black horse, stamp your foot, throw a bridle!" (PMP). Sun in the constellation Aquarius.

2. "Stands behind the gates" = February, the constellation Ursa Major points with its "tail" to a place in the sky "from 4 to 3 o'clock." February-bokogrey is the

gate of Spring. "February winter the horn broke". "Father February has come - the man has outgrown the winter" [Budur 2007]. February is also called "low water", as it is between winter and spring. 3rd February - "Bolt the gate." Lapel Whispering Day. Sun in the constellation Pisces.

3. "Blown away by water" = March, the constellation Ursa Major points with its "tail" to a place in the sky "from 3 to 2 hours". March is the time of snow melting. "February is strong with a blizzard, and March with a drop", March – проталник, зимобор, капелужник. "If the chicken gets drunk on Evdokia, then the lamb will hang on Yegoriy" [Nekrylova 1991]. Sun in the constellation Aries.

4. "Bulls drunk" = April, the constellation Ursa Major points with its "tail" to a place in the sky "from 2 to 1 o'clock." In the wild, calves appear at tours, elks, deer. "March with water, April with grass, and May with flowers", "The sun rolls down the April hill into summer" [Nekrylova 1991, № 2]. Sun in the constellation Taurus.

5. "Gone for the mountains" = May, the constellation Ursa Major points with its "tail" to a place in the sky "from 1 to 12 o'clock". The first pasture of livestock in the field. "St. George begins the red spring on the red hill ..." [Nekrylova 1991 No. 3]. Sun in the constellation Gemini.

6. "The worms have carved" = June, the constellation Ursa Major points with its "tail" to a place in the sky "from 12 to 11 o'clock." One of the names for June is "worm", since at this time the peasants collected special dye worms, which were especially numerous at that time [Budur 2007 № 2]. Sun in the constellation Cancer.

7. "The geese pecked out" = July, the constellation Ursa Major points with its "tail" to a place in the sky "from 11 to 10 o'clock." Geese begin to gain weight (and in June (Nikita the gosyatnik is the patron saint of goslings) they are still small chicks). Sun in the constellation Leo.

8. "Gone into the reed" = August, the constellation Ursa Major points with its "tail" to a place in the sky "from 10 to 9 o'clock". (Probably - the growth of a reed. It is interesting that in the runic system of the Scandinavian and Germanic tribes (if we draw a parallel) the fifteenth rune Algiz, which falls in the first half of August, also denotes sedge or reed). Sun in the constellation Virgo.

9. "The girls broke it" = September, the constellation Ursa Major points with its "tail" to a place in the sky "from 9 to 8 o'clock." The height of field work, harvesting (women reaped rye with sickles). (Probably reed picking). The Ukrainian name is "Veresen". On September 11th we met Indian summer. Sun in the constellation Libra.

10. "Married" = October, the constellation Ursa Major points with its "tail" to a place in the sky "from 8 to 7 o'clock". October wedding. It's time for autumn weddings. Sun in the constellation Scorpio.

11. "Went to war" = November, the constellation Ursa Major points with its "tail" to a place in the sky "from 7 to 6 o'clock". Time of the beginning of "dying" of nature. Sun in the constellation Sagittarius.

12. "In the middle of the yard" = top "Oh you klyshechka" December, the constellation Ursa Major points with its "tail" to a place in the sky "from 6 to 5 o'clock." Winter is a time for gatherings, work at home. December 9th consecration of the Church of St. George the Victorious. Sun in the constellation Capricorn.

This is how the circle that Ursa Major described in a year was closed. But in Carol there is a continuation, a description of the struggle between Winter and Summer - a war in the middle of the Court.

That is why the "War in the Middle of the Court" takes place because the Court corresponds to December, the time preceding the point of the Winter Solstice, and which is the beginning of the struggle between Winter and Summer. In fabulous versions, the point of the winter solstice is described as "The Battle on the Kalinov Bridge". Kalina is one of the few berries of winter, and in popular beliefs, many qualities are attributed to it that protect against evil spirits (and if the disease is considered as an evil spirit, then everything falls into place). A bridge is a transitional space from one world to another (in this case: from the world of the dead to the world of the living). In fairy tales, it symbolizes the time of transition from a decrease in daylight hours to the time of its increase. The wedding ceremony (and songs), also symbolizing the transitional stage of a person's life, also features the plot of the transfer of the bride (from its space-time passive - "sleep") by the groom (into his world of assets - "wakefulness" and life) across the bridge.

13. "On seven hills, on seven pillars" = this means the constellation Ursa Minor. Therefore, the song begins with a question addressed to Kichiga: "Where have you been?" or it says "We went and looked for the Holy Carol". That is, it "wandered" was "lost", and then "found" - "In Ivan's yard", indicating the place of the Winter Solstice.

Thus, the Carol describes that: at a given moment in time, Kichiga-Carol at midnight with its "tail" (or "pen") points to the "6 o'clock" of the sky, which corresponds to the month of December. Moreover, "Dvor" symbolically corresponds to a special location in the sky, namely, this constellation of the Ursa Minor, as the bearer of the main, main Star - Polaris, since it shows the center, the North Pole of the World and "never leaves its place." Everything "revolves" around it. And the "Yard" of the owner, corresponding at the moment to the Constellation Ursa Minor, is also described - the Center of the Universe. Therefore, the most important combat action takes place on this Court, since when a turn occurs, the position of the central, never setting, and, therefore, always visible, the Constellation of the Ursa Minor, changes - a solstice occurs, Summer wins over Winter. (Therefore, ritual actions were arranged at the solstice points: fist fights, games ...).

And if the Master's Court corresponds to the Center of the Universe - it is invulnerable, it is eternal, it is the basis - the King of everything. Hence, from the transfer of celestial stellar symbolism to earth, comes the mythological characterization of the location of the "Eternal City" - Rome **on the seven hills**, which passed first to the Tsar City - Constantinople, and then to the "Third Rome" - Moscow.

14. "Around the Court of Iron Tyn,/ As there is a pearl on each stamen" - this describes the Zodiacal constellations surrounding the Ursa Minor and revolving around it, which are at the same time its absolute amulet. Therefore, the versions of Carols say: "*As on each stamen/(or in this version, "Like these on the stamens") One pin, one needle* "... that is, a magical defense against the negativity of the "other" world is described. And therefore, not knowing how to pass through such a protection into the house, the carols, as representatives of a different world space and time, sing: "*We are not going ourselves, / We are waiting at the window ... /*" or (in the southern regions) they ask the owners for permission to "enter the hut." In conspiracy structures, you can also find echoes of the aforementioned protection, naturally in a variable form: "Around my yard / The stone mountain is steep, / Thorn, pear fires burn ..." (GES).

Also, the carols themselves walk around the courtyard, representing Kichiga - the constellation Ursa Major, probably initially with a festive ornate hook, depicting the never-setting constellation Ursa Major ("How carol walked ..."), revolving around Ursa Minor (Master's Courtyard). A similar, for example, is still preserved in Western Ukraine, walking during matchmaking, with a decorated staff, which was called "koshtur" or "kushtur", by which the villagers determined that matchmakers were coming (KIG). "... When they went to invite to a wedding, they also took, but only men" (GMK). In the Kuban, children (usually a brother and sister) kept a disguised "kilok" and "sold" the bride (KPI). In fairy tales, the "rolling pin" or "hurl" also occupies a dominant position, everything begins with it or everything ends with it. (The fairy tale "The fox-deceiver" begins with the words: "The fox walked along the path, found a rolling pin ..."; and the fairy tale "Mena" ends with the words: "... the club" at the gate "is ..."). (Later, the Christianized version of the "New Year's walk" received a new reading of the action - "walking with a star", and even later – Father frost with a magic staff.) *notes 1, 2.

Let us also consider the symbolism of the carols of our time, with solstice points passed into the constellations Capricorn, Aries, Cancer and Libra.

1. "Klyoshechka" (constellation Capricorn) began to correspond to January.
2. "Horses" (constellation Aquarius) began to correspond to February.
3. "Gate" (constellation Pisces) began to correspond to March. The people remarked: on March 6, on Timothy-spring, spring is at the gate.
4. "Water" (constellation Aries) began to correspond to April. One of the names

for April, "play the ravines", speaks of streams of melting snow. According to popular superstitions: April 21 "Rodion - Roaring Waters", icebreaker.

5. "Bulls" (constellation Taurus) began to correspond to May. According to popular belief: May 15 "The nightingale began to sing - the water began to decline."

6. "Mountains" (constellation Gemini) began to correspond to June.

7. "Worms" (constellation Cancer) began to correspond to July. One of the old Russian names is "worm", from "scarlet" that is "red", "beautiful".

8. "Geese" (constellation Leo) began to correspond to August.

9. "Reed" (constellation Virgo) began to correspond to September.

10. "Maidens" (constellation Libra) began to correspond to October.

11. "Husbands" (constellation Scorpio) began to correspond to November.

12. "War" (constellation Sagittarius) began to correspond to December.

This symbolism indicates the existence of carols in the northern regions, where the heat came much later than in the southern regions, respectively, the landmark dominated by the stars, and not by the sun. The north also denotes the beginning of the song "Tausen" (the name of the transitional season, as well as "autumn", "spring", and the transitional space from yard to hut is "canopy" ...).

Thus, it becomes clear that the constellation Ursa Minor with a static Pole Star symbolizes a passive, immovable feminine principle, and the constellation Ursa Major, constantly revolving around the Minor, corresponds to the male active, eternally mobile element of air (which received the symbol of a wand, a staff (hence the image of a magic sticks)).

The name "Ursa Major" became firmly established, most likely due to the dominant point of the winter solstice, when the New Sun is born and the New Solar Year begins, and at this time the bears have cubs in the den.

In carol it is sung that the hurl - is "Birch". Indeed, kichiga was made precisely from soft, flexible birch ("her butt"). Undoubtedly, the color of the tree bark (white as a shroud) also plays a role here, as a representative of the otherworldly, "spiritual" space and time. It is no coincidence that in funeral hairstyles, when describing the soul's falling into the "other world", a white birch is mentioned, which grows "with branches down, and with roots up" (the symbol of the Pole Star as the World Tree) (HAV). *3.

The mention of birch in Carol suggests that it is an older totem tree of northern latitudes than the southern oak. This fact indicates that among different peoples living at different periods of time in different climatic conditions, and, as a result, in different cultural layers, at different historical times, the symbols of the North Star as an indicator of the Center of the World were different "World Trees" (or plants): Birch, Oak, Spruce, Ash, etc., which has survived to this day.

Carolers, depicting the world of spirits, the world of ancestors, the mirror-like other world:

- a) dressed up as the dead;
- b) or dressed in clothes of the opposite sex;
- c) sang and danced, depicting the world of the dead with unusual, musical rhymed, rhythmic speech and rhythmic swirling movements;
- d) or "danced with a doll through the window" (RKV and YaOF), a stuffed animal - a symbol of the guardian ancestor, an inanimate creature;
- e) or even performed the ceremony in silence, thereby showing an inaudible "other world".

Hence, from such a memorial aspect, there is a ban on excessive fun.

In the carol, the performers' belonging to the otherworldly space is also confirmed by the very words of the song: "... It does not go at our door,/ But waits in the window" ... but they cannot pass because "... On these stitches/ On a needle./ On a pin ... ", that is, there is a magical protection from representatives of the "dead world", and therefore they are served in a special small "cooler" window. (Later, the carollers began to ask the owners for permission to enter the house. This rule extended to driving the Goat, to praise Christ, etc. ... "Let us/ Honest gentlemen/ Goat a hut?" (GAA).

By the way, the ritual oven served to carols - a snail - a bun in the form of a spiral, a symbol of the eternal spiral movement of time. There is a variant when, after the words "Around the courtyard, bonfires are burning,/ Around the bonfires, people are standing,/ People are standing - caroling," the singing of the carols began again. (This is where the boring verse starts.)

The connection of the carols with the world of spirits is also confirmed by the fact that the carols themselves are nothing more than the commemoration of the past year (analogous to that - the merrymaking and eating on Shrovetide ritual memorial "moon" food - pancakes, which also "roll up" in two or four times, like the night light of the sleeping and the dead). Therefore, there is a listing, equal commemoration, of all twelve months according to their main characteristics-qualities in the year ("They stand behind the gates" = February-bokogrey - the gates of Spring. "Blown away by water" = March - the time of snow melting, etc.... .

Summing up, I would like to say that the ancient culture that has come down to our time is full of wonderful mysteries and secrets that await their study. And we must certainly preserve and pass on to subsequent generations everything that our ancestors have preserved and passed on to us, so that we, connecting to the harmony of the sky, live happily ever after.

Notes

1.* It is important to note that when at the wedding a felled small tree ("beauty" or "giltsa") was stuck by the "boyar" into the wedding loaf, and the girls with songs decorated this tree with garlands and flowers, then this ornamented loaf with a tree in the middle undoubtedly depicted a picture the world, the starry sky with the World Tree - the Pole Star in the center. It is interesting that the female genital organ, virginity (symbolized by a decorated wedding tree - "beauty") is also popularly called "middle", "heart".

The oven (in which the loaf is baked) is also a symbol of the center of the Universe, as it stands in the middle of the House space. Hence the expression "to dance from the stove", that is, "to start from the center = from the beginning."

2.* The carols indicate that the Court is located seven, eight, or twelve miles away. This speaks of a destroyed tradition that absorbs various magic numbers.

3.* So, gradually, from the counterclockwise rotation of the celestial sphere projected onto the earth as a clockwise rotation (this is clearly demonstrated if you look at a rotating object, first from below, and then from above, you will see the same movement as: counterclockwise, and clockwise), the definition of the world of the dead as a space mirroring the world of the living was formed. Therefore:

a) a birch in funeral hairstyles is referred to as a tree growing with its roots up and with its crown down;

b) in conspiracies there are such words: "Until then, illness and trouble will not wake up,/ **Until the Holy Island turns over from head to feet ...**" (SAS).

c) in Bryansk Region, still descendants of buffoons, they dress dolls (a symbol of ancestors, the kingdom of the dead) on their feet, and show a puppet theater, standing on their hands, upside down.

List of informants

1. GMV – Gradova Marfa Vladimirovna, born in 1903, peasant. Originally from the Novgorod Region. Visiting Moscow. Recorded by V.V. Zaporozhets in Moscow in 1995.

2. ILV – Ivanova Lidia Vasilievna, born in 1923, peasant. Originally from Pskov Region. Visiting Moscow. Recorded by V.V. Zaporozhets in Moscow in 1994.

3. PMP – Pakhomova Maria Petrovna, born in 1917, peasant. Originally from the Old Village. (Fragment of Christmas divination). Recorded by V.V. Zaporozhets in Yaroslavl Region., Poshekhonsky region, Zubarevo village in 2000 (Published in the journal "Folk Art" № 6, 2001., P 15 – 16. Article "Black horse, stamp your hoof!").

4. GES – Gaiduk Evdokia Stepanovna, born in 1924, Cossack. Local. (Fragment of a spell from thieves). Recorded by Zaporozhets V.V. Krasnodar Krai, village Dinskaya in 1994

5. KIG – Krasilich Ivan Grigorievich, born in 1957, construction worker. Originally from Ivano-Frankivsk Region., Bogorodchansky region, Rakovets village. Working in Moscow. (A fragment of the wedding ceremony). Recorded by V.V. Zaporozhets in Moscow in 1998.

6. GMK – Gaiduk Maria Kirillovna, born in 1978, wife of a priest. Originally from Lvov Region., Skolsky region, Zadelskoe village. In Moscow since 2002 (Fragment of a wedding ceremony). Recorded by V.V. Zaporozhets in Moscow in 2012.

7. KPI – Kukovskaya Polina Ivanovna, born in 1930, Cossack. Local. (A fragment of the wedding ceremony). Recorded by V.V. Zaporozhets in Krasnodar Krai, the village of Dinskaya in 1994.

8. HAV – Khlebtsova Anna Vasilievna, born in 1920, peasant. Local. (Mention of funeral lamentation). Recorded by V.V. Zaporozhets in Vladimir Region., Sudogodsky region, Gonobilovo village in 1998.

9. SAS – Savelieva Anastasia Sergeevna, born in 1958 Originally from Moscow Region., Serpukhov. Hereditary healer. (Fragment of the spell). Recorded by V.V. Zaporozhets in Moscow in 1999.

10. RKV and YaOF – Rumyantseva Claudia Vladimirovna, born in 1921, peasant woman. Local. (A fragment of "walking to Carol") Recorded by V. V. Zaporozhets in Tverskaya Region., Kimrsky region, Kriva village in 2000. And Olga Fedorovna Yankina,

born in 1926, peasant. Local. Recorded by V.V. Zaporozhets in Moscow Region., Taldom region, Dubrovka village in 2000 (Published in the magazine "Living antiquity" № 4, 2002, P. 30 – 41. Article "Materials from the borderlands of Moscow and Tver Regions".).

11. GAA – Grigoriev Alexey Andreevich, born in 1912, Cossack. Local. (Fragment of "Driving the Goat"). Recorded by V.V. Zaporozhets in the Krasnodar Territory, in the village of Dinskaya in 2004.

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警官职业变形研究及其评价。

THE STUDY ON PROFESSIONAL DEFORMATIONS OF POLICE OFFICERS AND ITS EVALUATION

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介绍

这项研究的目的是建立一个评估和确定警官道德和职业变形机制的模型。该模型表现为不同心理机制之间的相互联系，例如“职业倦怠”，“脱离接触”和“反身性”。

方法：本研究基于经验方法，包括定量和定性方法。首先，由80名具有不同专业经验的女性警官组成的小组参加了调查，例如Karpov的自反性调查，MBI倦怠调查和MD-8调查。其次，通过SPSS-22分析数据集，作为独立样本的比较相关性。

结果：根据结果，取决于警察专业经验的持续时间，其变形程度不同：情绪疲惫 ($p < 0,000$)，反身性 ($p < 0.01$) 和道德脱离 ($p < 0.038$)。根据参加者的专业经验，将其分为4组。研究表明，变形的关键因素在所有组中都是不同的。例如，对于具有不到5年专业经验的专业人员，分离和反思是关键因素，而对于拥有10年以上经验的更成熟的同事，关键因素是成就和疲惫。

关键词：道德疏离，职业倦怠，心理机制，反身性。

Abstract

Introduction

The aim of this study is to justify a model of evaluation and identification of mechanisms of ethical and professional deformation of police officers. The model is showed as an interconnection among different psychological mechanism, such as “professional burnout”, “disengagement” and “reflexivity”.

Methodology: *This study is based on empirical methods, that includes both quantitative and qualitative methods. First of all, the group of 80 female police officers with different level of professional experience participated in surveys, such as the Karpov's reflexivity survey, the MBI burnout survey and the MD-8*

survey. Secondary, the set of data was analyzed via SPSS-22 as a comparative correlation of independent samples.

Results: According to results, there is a different level of deformation that depends on the duration of professional experience in police: emotional exhaustion ($p < 0,000$), reflexivity ($p < 0,01$) and moral disengagement ($p < 0,038$). All participants were divided into 4 groups based on their professional experience. The research has shown that the key factor of the deformation is different in all groups. For example, for professionals with less than 5 years of professional experience disengagement and reflexivity are key factors, while for their more mature colleagues with 10+ years key factors are achievements and exhaustion.

Keywords: moral disengagement, professional burnout, psychological mechanisms, reflexivity.

Introduction

According to the Soviet researcher Kikot', professional deformation of police officers is a change of personal qualities and professional opportunities to the negative side, as a result of professional experience.¹ This concept can be considered as a set of profession loss crisis and the increase of susceptibility towards external destructive factors.

This study aims to justify and to test the model of identification and evaluation of psychological mechanisms of professional and moral deformation (PMD). Also, it aims to investigate the structure of psychological mechanisms of PMD based on years of professional experience.

The hypothesis of this study is based on the idea that the combination of psychological mechanisms of PMD of personality depends on years of professional experience. Those mechanisms include moral disengagement, professional burnout and reflexivity.

Theory

The model of PMD is based on different concepts, such as "professional burnout", "moral disengagement", "reflexivity", "conditions for professional experience of psychologist, professional career way of psychologists, that can be included under umbrella term "psychological mechanisms".

Analysis of psychological mechanisms could measure and forecast development of the PMD. Thus, it provides an opportunity to apply this theoretical concept for organization's needs: police officers will have a clear career trajectory while managers of police will be able to put a proper target for every employee.

For this study, I will use the concept of professional burnout that was implemented by Kikot' V. dr. (1981) *Professional'naya etika i sluzhebnyj etiket: uchebnik dlya studentov vuzov, obuchayushchihnya po special'nostyam, YUrisprudenciya*, «Pravohranitel'naya deyatelnost'». 2012

mented by American researchers Maslach and Jackson in 1981.² Thus, professional burnout is a situation of total regress in terms of professional development because it affects all aspects of labor activity. There are three key terms that can help us to understand the concept of burnout: emotional exhaustion, depersonalization and the reduction of personal achievements. According to Maslach, emotional exhaustion is a decreasing of emotion dynamics and indifference to job and its results.³ Depersonalization can be considered as a change of relations with colleagues, for example, it can be a tendency to break rules or an intention to judge colleagues. Finally, reduction of personal achievements is a depreciation of own achievements and work opportunities that can lead to the lack of confidence.⁴

The theory of moral disengagement was created by American psychologist Albert Bandura:

“The theory of moral disengagement resolves the conflict between virtue and harm through the variety of psychosocial mechanisms that enable virtuous individuals to be-have in harmful ways but still retain a self-view as virtuous.”⁵

According to Bandura, there are eight mechanisms of moral evasion: moral justification, euphemistic labeling, advantageous comparison, displacement of responsibility, diffusion of responsibility, distorting the consequences, dehumanization and victim blaming.⁶

Reflectivity is a psychological feature that can be considered as a part of reflexivity in general. According to Kikot', reflexivity is a mechanism that can determine trajectory of PMD. The actualization of reflectivity happens during reflection that can be defined as an ability to self-understanding of an individual's mental state and its analysis. Thus, reflectivity includes mechanisms of identification and empathy.⁷

Methodology

The basis of this study is an empirical research that was conducted at The Moscow University of the Ministry of Internal Affairs of Russia in 2019 and 2020. All participants of the research included police psychologists and 50 students from the refresher course. Then, participants were divided into 4 groups based on their professional experience: students with less than 5 years of experience (40 people), professionals with 5-10 years (20 people), 10-15 years (17 people) and 15+ years (13 people) accordingly, The most of the participants were females (95%).

The empirical research included interviews, psychological tests, analysis of

2 Maslach, C., & Jackson, S. E. (1981). *Maslach burnout inventory*. Consulting Psychologists Press.45

3 Ibid, 50.

4 Maslach, C., & Jackson, S. E. (1981). *Maslach burnout inventory*. Consulting Psychologists Press. 60

5 Bandura, A. (2015). *Moral Disengagement How People Do Harm and Live with Themselves*. New York: Macmillan Learning. 26

6 Ibid, 180

7 Kikot' (2012), 98.

documents and observation. For instance, tests included Karpov’s methodology on diagnostics of the reflectivity, the MBI burnout survey and the MD-8 moral disengagement scale. Then data were analyzed with the usage of qualitative methods, such as statistics and factorial analysis. For example, for identification of availability of statistical differences the Student t-criteria and Kraskuls H-criteria were used. Criteria such as moral disengagement, depersonalization, professional achievements and reflexivity were considered as dependent variables. At the same time, we considered the independent variable as duration of professional experience.

Results

Comparative analysis showed that a difference between factors depends on the duration of professional experience. Moreover, some factors such as emotional exhaustion ($p < 0,000$) and reflexivity ($p < 0,01$) have a bigger difference compared to others, for example, to moral disengagement ($p < 0.038$). We argue that the changes in emotional exhaustion and reflexivity can be explained as a result of the development of a career path that leads to the accumulation of exhaustion and reflexivity potentials. At the same time, the factor of moral disengagement can become an indicator of the sustainability of professional and moral potential of psychologists in case if goals of the organizations would consider as more important rather than professional goals of each employee.

Table 1: Results of identification of psychological mechanisms of PMD among policy psychologists (n = 80 people), 2019-2020, Moscow.

| Groups/number of participants | Moral Disengagement | | Emotional Exhaustion | | Depersonalization | | Professional achievements | | Reflexivity | |
|-------------------------------|---------------------|------|----------------------|------|-------------------|------|---------------------------|------|-------------|------|
| | M | δ | M | δ | M | δ | M | δ | M | δ |
| Less than 5 years/ 40 people | 5,13 | 1,31 | 5,43 | 1,33 | 4,93 | 1,13 | 5,58 | 1,88 | 4,83 | 1,63 |
| 5 -10 years / 20 people | 5,4 | 1,6 | 3,75 | 1,22 | 4,55 | 1,31 | 4,85 | 0,89 | 5,05 | 2,17 |
| 10-15 years/ 17 people | 4,2 | 1,24 | 3,4 | 1,28 | 3 | 0,8 | 4,2 | 1,04 | 3,6 | 0,72 |
| 15+ years/ 13 people | 5,27 | 1,57 | 3,8 | 1,3 | 3,2 | 2 | 4 | 0,9 | 5,7 | 0,38 |

The second step of the research was an analysis of changes in the PMD. It showed three key outcomes.

First of all, there is a general U-shaped trend of changes in all indicators of all working psychologists is not depends on the duration of professional experience. This trend is similar to the Dunning-Kruger effect which is based on the idea that

people with low ability at a task overestimate their ability. For example, indicators of fresh graduates can be visualized as a line. Thus, it can be considered as a start of upcoming changes in professional development among police psychologists. This is an optimistic start without any negative forecasting.

Secondary, the study showed that each group has a special factor with the biggest impact. The importance of the factor depends on T-criteria or an F-test. For instance, the youngest group has the highest level of emotional exhaustion ($p < 0,01$), that is related to the end of studies. At the same time, there is a high level of depersonalization ($p < 0,01$), that could be explained as an intensive process of changes of identity from students to young professionals. The high level of professional achievements ($p < 0,01$) shows how studies are important for participants.

However, the second group showed a combination of high-level moral disengagement ($p < 0,01$) with a high level of reflexivity ($p < 0,01$). It can be explained as a result of the self-reflection of the profession that leads to the exclusion of some professional aspects. Furthermore, this group has the lowest level of emotional exhaustion and depersonalization. At this stage, professionals have a higher level of professional identity that reaches a plateau and it can be justified by the high level of professional achievements at this group.

The fourth group with 15+ years of professional experience have a set of a high level of moral disengagement ($p < 0,05$) and the high level of reflexivity ($p < 0,05$). This combination shows how the ability to understand the psyche of other people. As a result, reflexivity increases identification and empathy. Psychological mechanisms of moral disengagement help to unite inner moral values and alleviates the process of involvement in different unethical situations. Thus. The level of professional stress can be decreased.

The next stage of the study was a correlational and factorial analysis that aimed to find a key mechanism of PMD for each group. For the first group, moral disengagement and reflexivity are key factors. The moral disengagement relates to emotional exhaustion ($r = .872$ at the level of 0,1) and depersonalization ($r = .351$ at the level of 0,05). Achievements relate to reflexivity ($r = -.315$ at the level of 0,05). For the second group, achievements and emotional exhaustion are key factors. Moreover, achievements have a negative correlation with moral engagement ($r = -.518$ at the level 0,05), while reflexivity has a negative correlation with emotional exhaustion ($r = .64$ at the level 0,05). The results in the third group showed that the depersonalization is the key factor that influenced on the PMD. Depersonalization correlates with emotional exhaustion ($r = .747$), while the exhaustion correlated to achievements ($r = .665$ at the level 0,05).

For the last group of professionals with 15+ years of experience reflexivity and exhausted are key mechanisms in the development of the PMD. At the same time, the reflexivity has a positive connection with depersonalization ($r=.674$ at the level 0,05) and negative correlation with professional achievements. ($r=-.655$, at the level 0,05).

Conclusion

Overall, there are 3 key factors that influence on changes of PMDs of police officers: moral disengagement, professional burnout and reflexivity on professional development. At different stages of professional development different combinations of factors can dominate. Thus, the duration of professional experience is a key factor that influences on changes of behavior of of police officers.

Overall, the results of this study can be useful for evaluation of PMDs among police psychologists. The methodology showed the high level of validity, ability to forecast behavior of policy officers and can become a tool for screening of mental health of employees.

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梗死后心肌破裂的早期预后新机会
**NEW OPPORTUNITIES FOR EARLY PROGNOSIS OF
POSTINFARCTION MYOCARDIAL RUPTURE**

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尽管在过去的40至50年中在预防，诊断和治疗心血管疾病方面取得了重大进展，但由它们引起的残疾和死亡率仍然很高。缺血性心脏病-心肌梗塞及其并发症，尤其是梗塞后心脏破裂[1, 2]占据了主导地位。今天，对其预后的评估是基于许多不同的因素，对其生命的诊断尚无明确的标准。我们已经开发了一个两级量表，用于早期预测梗死后心肌破裂，这将帮助执业医师尽快识别出具有高并发症风险的患者群。

关键词：心肌梗死；破裂；预测因子；量表。

Abstract. *Despite the significant progress achieved in the last 40-50 years in the prevention, diagnosis and treatment of cardiovascular diseases, the disability and mortality caused by them are still very high. The leading role in this is occupied by ischemic heart disease - myocardial infarction and its complications, in particular, postinfarction heart rupture [1,2]. Evaluation of its prognosis today is based on many disparate factors, there are no clear criteria for its lifetime diagnosis. We have developed a two-level scale for early prediction of postinfarction myocardial rupture, which will help a practicing physician to identify a cohort of patients with a high risk of this complication as soon as possible.*

Keywords: *myocardial infarction, rupture, predictors, scale.*

Relevance. Epidemiological studies make it possible to assess the relevance of the problem of acute myocardial infarction and postinfarction heart rupture for various population groups [3]. Isolation of risk factors for myocardial rupture allows us to identify groups of patients with the highest probability of its devel-

opment. Along with the generalization and analysis of the data of epidemiological studies, this makes it possible to identify the most informative predictors of the likelihood of postinfarction heart rupture. Thus, the problem of postinfarction heart rupture remains extremely urgent and at the same time practically not solved, because there are significant difficulties in early diagnosis and there are no real methods of prevention.

Predictors of postinfarction myocardial rupture. The nature of such a formidable complication of acute myocardial infarction as heart rupture, namely its transience and fatality, dictates the need to create an algorithm for its prediction. In our opinion, the most significant risk factors for its development, as well as a number of instrumental and laboratory markers, should be among the predictors of postinfarction heart rupture.

According to M. Ruiz-Bailén et al. [4], predictors of postinfarction heart rupture are: female sex, age over 75 years, first heart attack, use of thrombolytic drugs.

With a high risk of myocardial rupture, O.B. Oschepkova et al. [5] associate: old age, female sex; the first heart attack in this patient; anterior localization of myocardial infarction; transmural necrosis; the extent of the lesion (more than 20% of the myocardium); occlusive thrombosis of the infarction-dependent artery; poor development of collateral circulation; dyskinesia of the infarction zone against the background of hyperdynamic syndrome; the safety of the blood supply to the adjacent zones of the myocardium; the presence of arterial hypertension; concomitant diabetes mellitus; non-compliance with the regimen in the acute period of a heart attack; high rate of necrotization in the first day; carrying out thrombolytic therapy within a period of more than 14 hours from the onset of a heart attack.

G. Qian et al. [6] also proposed their own list of predictors of postinfarction heart rupture. These are female gender, age, heart rate, hemoglobin and leukocyte levels, thrombolytic therapy.

Of great importance are not only the timing of the initiation of thrombolytic therapy, but the type of drug: heart ruptures are diagnosed reliably more often when using thrombolytics of the first generation [7,8].

E.M. Zeltyn-Abramov and his colleagues in their works concretize the prognostic ECG signs of a high probability of postinfarction heart rupture: "The pre-rupture period is characterized by a protracted anginal attack and persistent sinus tachycardia. MI complicated by heart rupture is characterized by an "early" pathological Q wave (in the absence of thrombolytic therapy), ST segment elevation > 5 mm in two or more adjacent leads, an increase in the duration of the QTc interval, pronounced hyperkinesis of intact left ventricular (LV) myocardium in combined with ejection fraction (EF) LV <40%, aneurysmal deformity of the LV cavity, involvement of the apical segments of the LV in the zone of impaired local contractility, deceleration time (DT) of early diastolic filling <150 ms. Hyperki-

nesis of the intact myocardium in combination with LVEF <40%, involvement of the apical LV segments, segment elevation of ST > 5 mm, an increase in the duration of the QTc interval, an "early" pathological Q wave, primary MI, and also a protracted anginal attack at the onset of the disease. "

C. Solís et al. [9] believes that increased levels of brain and atrial natriuretic peptides may be a useful marker for predicting heart rupture. To date, the correlation of a high level of these peptides with an unfavorable outcome in heart failure has been proven.

M.B. Pepys, G.M. Hirschfield [10] in correspondence discussion with T.Anzai et al. [11] on the significance of C-reactive protein in predicting the outcome of acute myocardial infarction, note that the specificity of C-reactive protein can be compared with the specificity of body temperature. This is partly true, however, C-reactive protein and other indicators that allow assessing the severity and dynamics of inflammatory processes (both classical and chronic systemic) and metabolic disorders in the early postinfarction period can be included in the system of predictors of heart rupture.

Summarizing the above, we can say the following:

1. Postinfarction heart ruptures are still a poorly understood phenomenon in cardiology. This is evidenced, in particular, by a huge spread in the assessment of their frequency - from 0 to 30-35%. In many studies of 30-day mortality among patients with acute myocardial infarction, the cause of death, such as heart rupture, is simply absent. Perhaps this is due to the fact that the manifestation of postinfarction heart rupture and cardiogenic shock are very similar. Meanwhile, few studies performed with the involvement of pathologists indicate that the real proportion of heart ruptures as a cause of 30-day mortality in patients with acute myocardial infarction is significantly higher and ranges from 20 to 36%.

2. Postinfarction heart ruptures, as a rule, occur within the first two weeks, and in most cases - within 24 hours from the onset of acute myocardial infarction. The most common is a rupture of the anterior wall of the left ventricle. The most common form is a sudden rupture with extensive pericardial hemorrhage. The main characteristics of postinfarction heart rupture are fatality and suddenness. Therefore, a predictor system is needed to identify patients at high risk of heart failure.

Materials and research methods. Our study included 3209 patients with acute myocardial infarction. 900 of them developed complications that became the direct cause of death within the first 30 days from the onset of the disease. In 51.6% of cases, it was acute heart failure. In second place are thromboembolic complications (34.2%). In third place are postinfarction heart ruptures (9.0%).

Table 1 shows the main results of the examination of patients in the general pool, patients with acute myocardial infarction and patients with postinfarction heart failure.

Table 1. Results of examination of patients upon admission to the hospital

| Indicators | | Patients with myocardial infarction (n = 3209) | | Patients with heart rupture (n = 81) | |
|--------------------------------------|------------------------|--|------|--------------------------------------|-------|
| | | abs. | % | abs. | % |
| 1 | | 2 | 3 | 4 | 5 |
| Patient survey results | | | | | |
| Gender | - male | 1697 | 52,9 | 11 | 13,6 |
| | - female | 1512 | 47,1 | 70 | 86,4 |
| Average age | | 67,4 years | | 75,1 years | |
| Average hospitalization time | | 5 hr. 9 min. | | 7 hr. 2 min. | |
| Clinical course variation | - anginal | 2800 | 87,3 | 73 | 90,1 |
| | - others | 409 | 12,7 | 8 | 9,9 |
| Acute myocardial infarction: | - first | 2251 | 70,1 | 81 | 100,0 |
| | - repeated | 958 | 29,9 | - | - |
| Clinical and instrumental indicators | | | | | |
| Body temperature | - up to 38°C | 2905 | 90,5 | 66 | 81,5 |
| | - over 38°C | 304 | 9,5 | 15 | 18,5 |
| Breathing rate | - up to 20 per 1 min. | 2237 | 69,7 | 5 | 6,2 |
| | - over 20 per 1 min. | 972 | 30,3 | 76 | 93,8 |
| Heart rate | - up to 100 per 1 min. | 1500 | 46,7 | 9 | 11,1 |
| | - over 100 per 1 min. | 1709 | 53,3 | 72 | 88,9 |
| Arterial pressure | - hypotension | 266 | 8,3 | 24 | 29,6 |
| | - norm | 535 | 16,7 | 27 | 33,3 |
| | - hypertension | 2408 | 75,0 | 30 | 37,1 |
| ECG indicators | | | | | |
| Depth of lesion | - Q-infarction | 1861 | 58,0 | 81 | 100,0 |
| | - not Q-infarction | 1348 | 42,0 | - | - |
| Rhythm disturbances | - absent | 2279 | 71,0 | 36 | 44,4 |
| | - present | 930 | 29,0 | 45 | 55,6 |
| Conduction disturbances | - absent | 2631 | 82,0 | 26 | 32,1 |
| | - present | 578 | 18,0 | 55 | 67,9 |
| M-complex presence | - absent | 3200 | 99,7 | 72 | 88,9 |
| | - present | 9 | 0,3 | 9 | 11,1 |
| Elevation of the ST segment | - absent | 1221 | 38,0 | - | - |
| | - less than 2 mm | 1426 | 44,4 | - | - |
| | - from 2 to 5 mm | 432 | 13,5 | 21 | 25,9 |
| | - over 5 mm | 130 | 4,1 | 60 | 74,1 |

| | | | | | |
|---------------------------------|--------------------------------------|------|-------|----|-------|
| AMI localization | - front | 1919 | 59,8 | 66 | 81,5 |
| | - back | 1050 | 32,7 | 11 | 13,6 |
| | - other | 240 | 7,5 | 4 | 4,9 |
| Laboratory indicators | | | | | |
| Leukocytes, x10 ⁹ /l | - up to 12 | 2535 | 79,0 | 25 | 30,9 |
| | - over 12 | 659 | 20,5 | 56 | 69,1 |
| | - below 4 | 15 | 0,5 | - | - |
| Band shift % | - up to 6 | 2764 | 86,1 | 67 | 82,7 |
| | - over 6 | 397 | 12,4 | 14 | 17,3 |
| | - shift to youth | 48 | 1,5 | - | - |
| Fibrinogen, g/l | - up to 4 | 2310 | 72,0 | 17 | 21,0 |
| | - from 4 to 10 | 784 | 24,4 | 64 | 79,0 |
| | - over 10 | 115 | 3,6 | - | - |
| CPK, units/l | - norm | 1170 | 36,5 | - | - |
| | - up to 1000 | 1382 | 43,1 | 14 | 17,3 |
| | - over 1000 | 657 | 20,4 | 67 | 82,7 |
| MB fraction of CPK, units/l | - diagnostically significant titer | 601 | 18,7 | 78 | 96,3 |
| | - diagnostically insignificant titer | 2608 | 81,3 | 3 | 3,7 |
| Creatinine, mol/l | - norm | 2488 | 77,5 | 37 | 45,7 |
| | - increased | 721 | 22,5 | 44 | 54,3 |
| Blood urea, mmol/l | - norm | 2410 | 75,1 | 73 | 90,1 |
| | - increased | 799 | 24,9 | 8 | 9,9 |
| Troponin T, ng/l | - positive | 3209 | 100,0 | 81 | 100,0 |
| | - negative | - | - | - | - |
| Blood sugar, mmol/l | - normoglycemia | 2357 | 73,4 | 17 | 21,0 |
| | - hyperglycemia | 852 | 26,6 | 64 | 79,0 |

According to the results of the examination, the integral indices of the severity degree of SIRS and the Killip class were determined (Table 2).

Table 2. Patient distribution by severity degree SIRS and Killip class

| | Patients with myocardial infarction (n = 3209) | | Patients with heart rupture (n = 81) | |
|----------------------|--|-------|--------------------------------------|-------|
| | abs. | % | abs. | % |
| SIRS severity degree | | | | |
| SIRS is absent | 2237 | 69,7 | 7 | 8,6 |
| SIRS-2 | 298 | 9,3 | 9 | 11,1 |
| SIRS-3 | 370 | 11,5 | 44 | 54,3 |
| SIRS-4 | 304 | 9,5 | 21 | 25,9 |
| Total | 3209 | 100,0 | 81 | 100,0 |
| Killip class | | | | |
| I | 1472 | 45,9 | 4 | 4,9 |
| II | 945 | 29,4 | 21 | 26,0 |
| III | 411 | 12,8 | 47 | 58,0 |
| IV | 381 | 11,9 | 9 | 11,1 |

The study of the epidemiology and clinic of postinfarction heart ruptures made it possible to identify a number of risk factors for its development, from which a system of predictors was subsequently formed.

Research results. Several constants were obtained - each patient with heart rupture had: ST segment elevation of 2 mm or more; the presence of a Q-wave; the presence of the M-complex; the absence of acute myocardial infarction in the anamnesis.

Most of them were women (86.4%) over 65 years of age (91.4%) who were admitted to the cardiological intensive care unit within 3 hours or more (81.4%). 91.4% of them had an anginal variant of the course of acute myocardial infarction with extensive lesions and severe, recurrent pain syndrome, and an unclear comorbid background. The majority of patients (92.8%) had a systemic inflammatory response syndrome of at least severity 2: SIRS-2 - in 10.0%, SIRS-3 - in 57.1%, SIRS-4 - in 25.7%. In 67 cases out of 70 (95.7%), myocardial infarction was complicated by acute heart failure of the KillipII-IV class.

All cases of postinfarction heart rupture were confirmed by the results of post-mortem examination.

The overwhelming majority of cases of heart rupture (97.5%) occurred within the first 3 days from the moment of hospitalization, and only 2 patients had ruptures at a later date - on days 6 and 14.

In the overwhelming majority of cases (93.8%), patients developed the most dangerous and transient type of heart rupture - external. In turn, the overwhelming majority of external myocardial ruptures accounted for linear ruptures between damaged tissue and healthy tissue - 52 cases, or 64.2%; ruptures in the center of the necrotic mass were found in 28 cases, or 34.6%.

Verification of diagnoses during pathological examination showed an overestimation of the incidence of chronic heart failure and chronic kidney disease, as well as an underestimation of the incidence of arterial hypertension, coronary heart disease, obliterating atherosclerosis of the arteries of the lower extremities, diabetes mellitus, obesity, diffuse nodular goiter and especially - chronic obstructive pulmonary disease. Only in 6 cases out of 81 (7.4%) the anamnestic data were confirmed by the results of postmortem examination. All patients suffered from at least three comorbid chronic non-communicable diseases, and in many cases they did not know about it.

Based on the results of a comparative analysis of the prognostic value of a number of clinical, instrumental and laboratory parameters, statistically significant predictors of postinfarction heart rupture were determined. These are the fibrinogen level on admission, CPK values 6, 24 and 36 hours after hospitalization, C-reactive protein on admission, as well as 6, 12, 24 and 36 after hospitalization, SIRS class and ST segment elevation above 5 mm.

Regression analysis showed that the main predictors of myocardial rupture with a high degree of reliability are: fibrinogen, determined upon admission of the patient to the hospital; CPK, determined after 6 and 24 hours from admission; C-reactive protein, determined on admission and after 12 hours; SIRS on admission.

Based on the conducted studies and our own clinical experience, as well as the collective experience of domestic and foreign cardiologists who studied the possibilities of predicting postinfarction heart rupture, we proposed the following risk assessment scale.

Level 1 predictors and their scores in points

| Predictor | | Score in points |
|---|-----------------------|-----------------|
| Female gender | | 1 |
| Age | 55-65 years | 1 |
| | 66-75 years | 3 |
| | over 75 years | 2 |
| Terms of admission to the hospital | from 1 to 3 hours | 1 |
| | more than 3 hours | 3 |
| Thrombolytic therapy at the prehospital stage within 10 hours or more from the onset of the disease | | 1 |
| Physical activity | cough and runny nose | 1 |
| | nausea and vomiting | 1 |
| | violation of bed rest | 1 |
| | constipation tendency | 1 |
| Arterial hypertension (systolic blood pressure equal to or higher than 160 mmHg or diastolic blood pressure equal to or higher than 100 mmHg) | | 1 |
| Anginal variant of the course with recurrent pain syndrome | | 1 |
| First acute myocardial infarction | | 2 |
| Anterior localization | | 1 |
| M-complex * | | 22 |
| Q-positive heart attack | | 1 |
| Elevation of the ST segment | from 2 to 5 mm | 2 |
| | over 5 mm | 4 |
| KILLIP class | II | 1 |
| | III | 2 |
| | IV | 4 |

* - the presence of the M-complex on the electrocardiogram is a sufficient reason for the patient to be included in the high-risk group for postinfarction heart failure.

All these data are determined during the first examination of the patient in the ICU. With a total of 11 or more points, the risk of developing postinfarction rup-

ture should be considered high, and a mandatory assessment of second-level predictors should be carried out, based on the results of which a final determination of the risk of developing postinfarction myocardial rupture is made.

Second-level predictors and their scores in points

| | |
|--|---|
| Fibrinogen level of over 6 g/l | 1 |
| C-reactive protein level of over 15 mg/l | 1 |
| Systemic inflammatory response syndrome (SIRS-2- SIRS-4) | 1 |

When a minimum of 2 points is obtained, together with a high risk of development according to the assessment of the first level of predictors, there is a high level of development of post-infarction myocardial rupture. If 1 point - the risk of developing postinfarction myocardial rupture should be regarded as low even if there is a high risk based on the results of assessing the first level predictors.

The proposed scale for assessing the risk of heart rupture is easy to use, it includes clinical, instrumental and laboratory parameters that can be performed even in a non-specialized hospital.

Conclusion: 1. All patients with acute myocardial infarction complicated by heart rupture had ST segment elevation of 2 mm or more; Q-wave; M-complex; the absence of acute myocardial infarction in the anamnesis. Most of the patients were female (86.4%) and had recurrent pain (91.4%) and acute heart failure of the KILLIP II-IV class (95.7%). Also predictors of postinfarction heart rupture are: age over 65 years (91.4%) and hospitalization time more than 3 hours from the onset of the disease (81.4%). 2. The number of statistically significant predictors of postinfarction heart rupture included: systemic inflammatory response syndrome, increased levels of fibrinogen (at least 6 g / l) and C-reactive protein (at least 15 mg/l), determined upon admission to the hospital, as well as the level of C-reactive protein (not less than 40 mg/l), determined 12 hours after hospitalization. 3. The proposed scale for assessing the risk of postinfarction heart rupture has the following operational characteristics: sensitivity - 100.0%; specificity - 98.0%; predictive value of a positive result (gap) - 98.1%; the predictive value of a negative result is 100.0%; prediction accuracy - 99.0%. 4. In addition to high reliability, the proposed scale for assessing the risk of heart rupture is easy to use and includes clinical, instrumental and laboratory parameters that can be performed even in a non-specialized hospital.

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幼儿严重烧伤毒血症期间温度反应的昼夜节律的相位分析
**PHASE ANALYSIS OF THE CIRCADIAN RHYTHM OF THE
TEMPERATURE REACTION DURING TOXEMIA IN SEVERE BURNS
IN TODDLERS**

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作者对幼儿严重烧伤的毒血症期间温度反应的昼夜节律的相位分析表明，在毒气期间，前三天有1, 2, 3组中视的儿童 在正常范围内，顶相，浸没相的温度指标在亚热值范围内。 烧伤伤害越严重，治疗第一天每天体温的波动范围就越大。

关键词：昼夜节律，温度，毒血症，烧伤，学龄前儿童

Abstract. *The phase analysis of the circadian rhythm of the temperature reaction carried out by the authors during the period of toxemia in severe burns in toddlers has revealed that during the period of toxemia in children of 1,2,3 groups of mesor in the first three days it was within the normal range, the temperature indicators in acrophase, bathiphase were within subfebrile values. The more severe the burn injury was, the greater was the range of daily fluctuations in body temperature on the first day of treatment.*

Keywords: *circadian rhythm, temperature, toxemia, burns, preschool age.*

Relevance. Each person has their own pain threshold and way of responding to external stimuli. There are times when preventive measures are ineffective. The temperature can be kept for a week when any methods of dealing with the symptom do not give the desired result. Due to the high risk of complications and mortality, the problem of developing effective timely corrective measures for excessive systemic inflammatory response during the period of toxemia of burn disease

in children remains urgent. The most significant often determining ones during the period of toxemia are timely correction under continuous monitoring by thermometry of very rapidly developing dysfunctions of vital organs and complications that are inevitable in the absence of rapid timely medical and other types of correction. Destruction of tissues and organs caused by severe pain stress, shock, impaired tissue perfusion, and the function of the pulmonary circulation lead to an increase in the large area of the entrance gate for infection, increasing the inflammatory reaction of the tissues preserved around the areas of necrotic burns. Moreover, the deeper the damage to the skin, the stronger the local and generalized inflammatory reaction with its inherent generalized violation of the membrane wall, vascular permeability, hypercatabolism.

Purpose of the work. Study and assess the results of the phase analysis of the circadian rhythm of the temperature reaction during the period of toxemia in severe burns in toddlers

Clinical material and research methods. Data of studies of 24 children aged from 3.1 to 7 years was examined. Patients were considered depending on the severity and area of damage, age, duration of treatment in the ICU. Thus, the number of children in the ICU for up to 10 days was 10 (1 subgroup), 11-20 days - 8 children (2 subgroup), more than 21 days (21-54 days –6 children). The severity of the burn was assessed by calculating the surface area of the damaged skin and using the Frank index. A detailed analysis of reliably significant deviations, intergroup differences of the studied indicators was carried out. The results were obtained by monitoring with hourly registration of the studied parameters. The research data were processed by the method of variation statistics using the Excel program by calculating the arithmetic mean values (M) and mean errors (m). To assess the reliability of the differences between the two values, the parametric Student's test (t) was used. The interrelation of the dynamics of the studied indicators was determined by the method of paired correlations. The critical level of significance was assumed to be 0.05.

Intensive therapy from the moment of admission was aimed at removing from burn shock, adequate anesthesia and intravenous administration of crystalloids, volemic solutions under the control of hemodynamics, volume of urine output. Intensive therapy also consisted of regular, every 8-12 hours, introduction of cardiogenic, desensitizing, stress-limiting, vasodilators. According to indications, hormones and blood substitutes were used. Inhalation of humidified oxygen and physical heating methods were carried out. In all children, vitamins C and group B, antipyretic and hyposensitizing agents, as well as drugs against stress damage to the gastrointestinal tract, convalescence, septicotoxemia and toxemia were used. According to indications, early, delayed surgical necrectomy, prevention of coagulopathy, energy deficiency, volemic disorders, and correction of "tachycar-

dial syndrome" were successfully carried out.

Table 1. Characteristics of patients aged 3.1-7 years

| Groups | Body weight, kg | Age, years | Height, cm | Burn area 2-3A degree, % | Burn area 3B degree, % | FI, units | Duration of inpatient treatment | Number of days in the ICU |
|--------|-----------------|------------|------------|--------------------------|------------------------|-------------|---------------------------------|---------------------------|
| 1 | 15,8±1,8 | 4,7±0,8 | 99,7±5,9 | 37,3±14,7 | 3,1±4,4 | 42,5±15,7 | 25,5±10,3 | 8,1±1,3 |
| 2 | 16,6±2,4 | 4,0±0,1 | 103,5±8,3 | 47,9±17,1 | 18,1±12,2 | 85,1±28,7 | 49,9±16,9 | 13,1±1,9* |
| 3 | 16,4±2,4 | 4,4±0,6 | 107,3±9,8 | 59,2±12,2 | 36,7±13,3* | 127,5±33,3* | 61,8±13,5* | 27,3±3,2* |

The average age of children with severe burns in the age group from 3.1 to 7 years ranged from 4 to 4.7 years, height from 99.7 to 107.3 cm, body weight 15.8 - 16.4 kg (Table 1). There were no significant differences between the groups and in the index of the area of the 2-3A burn, and it was $37.3 \pm 14.7\%$ in group 1, $47.9 \pm 17.1\%$ in group 2, and $59.2 \pm 12.2\%$ in group 3. However, a statistically significant difference was found in the area of grade 3B burns in groups 1 and 3, which in the most severe group of children exceeded the grade 3B burns in group 1 by 11 times ($p < 0.05$) and was 6 times greater than in group 2. The Frank index in group 2 turned out to be two times higher than in the first (not significant due to the large spread of the indicator in the group), and in group 3 it was significantly higher than in the first more than three times ($p < 0.05$). In accordance with the severity of the condition, the duration of intensive therapy in ICU conditions in group 2 was more than in the first by 62% ($p < 0.05$), in group 3 more than three times longer ($p < 0.05$) than in the first. According to the severity of the condition, the duration of inpatient therapy in group 1 was 25.5 ± 10.3 days, in group 2 - 49.9 ± 16.9 , in group 3 - 61.8 ± 13.5 days. Thus, the determinants of the need for inpatient treatment were such indicators as the size of the burn area of 3B degree, the Frank index, the duration of intensive care in the ICU.

In group 1, there were 6 girls, 4 boys, in group 2 - 4 girls, 4 boys, in group 3 - 1 girl, 5 boys. A distinctive feature of groups 2 and 3 of patients turned out to be that in group 1, a grade 3 b burn was detected in 2 patients (20% of patients), in group 2 - in 5 patients (62% of patients), in group 3 in all children (100 %), and the area of the 3B degree burn was more than 15% to 70% of the body surface.

The duration of intensive care in the ICU and treatment in the hospital corresponded to the severity and depth of damage to the skin surface and FI (Table 1).

Results and discussion.

As can be seen from the data presented in Table 2, only on day 1, the minimum values of body temperature in the bathyphase were significantly lower than the average daily indicator (mesor), regardless of the severity of the burn injury. In addition, the body temperature indicators in the bathyphase were significantly less than the temperature in the acrophase in the 2nd group on the 14,15,16 days. The methods of syndromic correction, anti-inflammatory therapy, effective ther-

apy of an energy deficient state, complications of the "autocanibalism" syndrome characteristic of a burn disease made it possible to maintain the parameters of the circadian rhythm as close as possible to physiological characteristics.

Table 2. Dynamics of the mesor, temperature in the acrophase and bathiphase of the circadian rhythm of body temperature during the period of toxemia in children aged 3.1-7 years

| Days | Mesor | | | T°C in acrophase | | | T°C in bathiphase | | |
|------|----------|----------|----------|------------------|----------|----------|-------------------|-----------|------------|
| | 1 gr | 2 gr | 3 gr | 1 gr | 2 gr | 3 gr | 1 gr | 2 gr | 3 gr |
| 1 | 36,6±0,2 | 36,5±0,3 | 36,7±0,3 | 36,8±0,2 | 36,6±0,6 | 37,0±0,7 | 36,1±0,1** | 35,8±0,1* | 35,9±0,2** |
| 2 | 36,9±0,2 | 36,8±0,4 | 36,6±0,4 | 37,1±0,4 | 37,0±0,4 | 36,8±0,4 | 36,7±0,1 | 36,6±0,4 | 36,4±0,5 |
| 3 | 36,9±0,2 | 36,9±0,3 | 36,7±0,3 | 37,1±0,3 | 37,0±0,3 | 36,8±0,5 | 36,7±0,1 | 36,8±0,2 | 36,6±0,3 |
| 4 | 37,0±0,3 | 37,1±0,3 | 37,0±0,3 | 37,2±0,4 | 37,3±0,5 | 37,2±0,4 | 36,9±0,2 | 36,9±0,2 | 36,8±0,1 |
| 5 | 36,9±0,2 | 37,0±0,2 | 37,0±0,3 | 37,1±0,2 | 37,2±0,3 | 37,3±0,4 | 36,8±0,2 | 36,8±0,2 | 36,8±0,1 |
| 6 | 37,0±0,2 | 36,9±0,3 | 36,8±0,2 | 37,1±0,3 | 37,1±0,6 | 37,0±0,4 | 36,9±0,2 | 36,8±0,2 | 36,7±0,1 |
| 7 | 37,1±0,3 | 37,1±0,3 | 36,9±0,3 | 37,2±0,4 | 37,2±0,3 | 37,1±0,6 | 37,0±0,2 | 36,9±0,2 | 36,8±0,3 |
| 8 | 37,1±0,3 | 37,0±0,3 | 37,0±0,4 | 37,4±0,4 | 37,3±0,4 | 37,2±0,5 | 36,8±0,3 | 36,9±0,2 | 36,8±0,2 |
| 9 | 37,0±0,2 | 37,1±0,3 | 37,0±0,3 | 37,4±0,3 | 37,4±0,6 | 37,1±0,4 | 36,8±0,3 | 36,8±0,2 | 36,9±0,2 |
| 10 | 36,9±0,1 | 37,2±0,3 | 37,0±0,3 | 37,3±0,2 | 37,3±0,2 | 37,1±0,4 | 36,4±0,1 | 37,0±0,3 | 36,9±0,4 |
| 11 | | 37,1±0,2 | 37,0±0,4 | | 37,3±0,3 | 37,3±0,8 | | 36,9±0,1 | 36,8±0,2 |
| 12 | | 37,0±0,3 | 37,2±0,3 | | 37,4±0,3 | 37,5±0,6 | | 36,9±0,2 | 37,0±0,3 |
| 13 | | 37,1±0,2 | 37,3±0,3 | | 37,3±0,4 | 37,5±0,4 | | 37,0±0,2 | 37,1±0,2 |
| 14 | | 37,1±0,2 | 37,2±0,4 | | 37,3±0,1 | 37,4±0,6 | | 36,9±0,1" | 37,1±0,4 |
| 15 | | 37,2±0,1 | 37,0±0,3 | | 37,5±0,2 | 37,3±0,3 | | 36,8±0,1" | 36,8±0,3 |
| 16 | | 37,2±0,2 | 37,3±0,5 | | 37,6±0,2 | 37,5±0,8 | | 36,9±0,2" | 37,0±0,3 |
| 17 | | | 37,2±0,3 | | | 37,4±0,4 | | | 37,1±0,2 |
| 18 | | | 37,3±0,3 | | | 37,7±0,7 | | | 37,1±0,3 |
| 19 | | | 37,2±0,3 | | | 37,5±0,2 | | | 37,0±0,4 |
| 20 | | | 37,1±0,3 | | | 37,3±0,4 | | | 36,8±0,2 |
| 21 | | | 37,2±0,3 | | | 37,7±0,7 | | | 36,8±0,2 |
| 22 | | | 37,2±0,3 | | | 37,4±0,5 | | | 37,0±0,2 |
| 23 | | | 37,2±0,3 | | | 37,5±0,3 | | | 37,0±0,1 |
| 24 | | | 37,2±0,3 | | | 37,4±0,4 | | | 37,0±0,2 |
| 25 | | | 37,2±0,2 | | | 37,7±0,5 | | | 37,0±0,2 |
| 26 | | | 37,3±0,3 | | | 37,5±0,4 | | | 37,1±0,3 |
| 27 | | | 37,1±0,4 | | | 37,3±0,5 | | | 36,7±0,1 |
| 28 | | | 37,1±0,3 | | | 37,4±0,5 | | | 36,9±0,2 |
| 29 | | | 37,3±0,4 | | | 37,5±0,6 | | | 37,0±0,3 |
| 30 | | | 37,1±0,3 | | | 37,4±0,3 | | | 37,0±0,2 |

* deviation is reliable relative to the mesor indicator of the group

" deviation is significant relative to the indicator in acrophase in the group of the same name

Thus, during the period of toxemia in preschool children of the 1,2,3 groups, the mesor in the first three days was within the normal range. The body temperature in acrophase, bathiphase was within the subfebrile range, which corresponded to timely complex intensive therapy. Only on the first day was the temperature in the bathiphase significantly lower than the temperature in the acrophase.

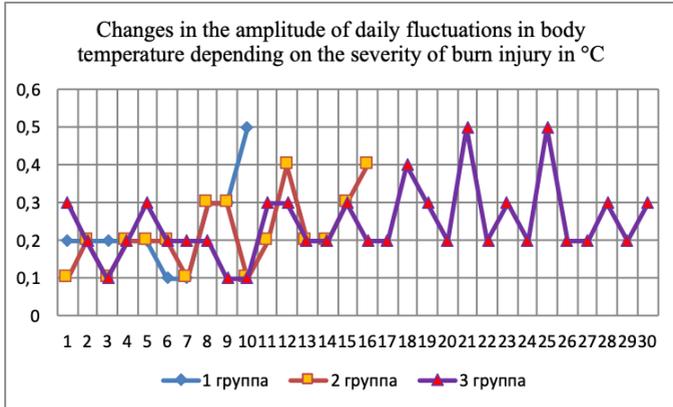


Fig.1

Figure 1 shows fluctuations in the amplitude of daily temperature changes. Tendency towards an increase in the amplitude of daily fluctuations in body temperature in group 1 on the 10th day was revealed. In the 2nd group of children in the first seven days the amplitude of the daily temperature fluctuation was 0.1°, on the 8-16th day it gradually increased to 0.4 °C. In group 3, in the first 10 days, the amplitude of daily fluctuations was 0.1-0.2°, on days 11-17, 0.2-0.3°, on days 20-25 it increased to 0.5°, with a decrease to 0.2 -0.3° on days 26-30.

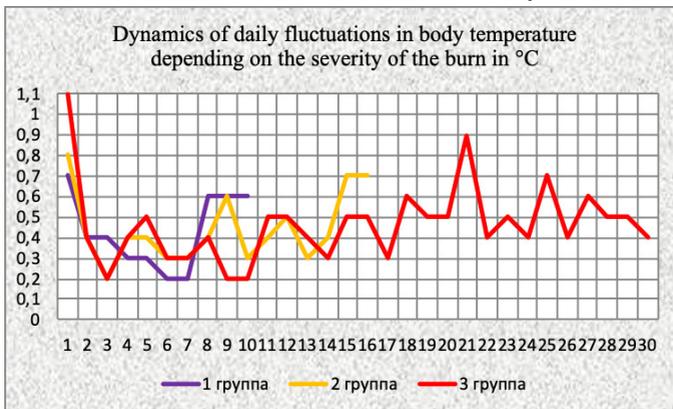


Fig.2

Figure 2 shows the dynamics of the daily range of body temperature fluctuations. On day 1, the minimum daily range (0.7 °C) was found in group 1, 0.8 °C - in group 2, and the largest range of 1.1 °C was observed in children of group 3. That is, the maximum range of daily fluctuations in body temperature on the first day turned out to be an objective indicator, since it corresponded to the severity of the burn injury. That is, the more severe the burn injury, the greater the daily fluctuation in body temperature in the first day of treatment. In the next 2-9 days, no significant differences in daily fluctuations in body temperature in the severity of injury were observed. In group 2, the greatest daily fluctuations in body temperature were found on days 15-16, in group 3 on days 21, 25, 27, which was due to the persistence of a tendency to hyperthermic reaction on the indicated days. The latter was most likely associated with the addition of complications caused by infection against the background of a secondary immunodeficiency state characteristic of severe burn injury, hypermetabolism, an energy deficit state in conditions of significant damage to nonspecific and specific protective factors.

Table 3. The number of days with the projection of acrophase in the daytime, bathiphase at night

| | Number of days with acrophase projection during the day | Number of days with bathiphase projection during the night |
|---------|---|--|
| Group 1 | 80% (8 out of 10) | 10% (1 out of 10) |
| Group 2 | 93% (15 out of 16) | 31% (5 out of 16) |
| Group 3 | 80% (24 out of 30) | 20% (6 out of 30) |

Regardless of the severity of the burn injury, the inversion of the circadian rhythm of body temperature was not revealed, that is, the displacements of the acrophase were relatively less significant (that is, they were limited by fluctuations within daylight hours) in group 1 for 80%, in group 2 - 93%, in group 3 for 80% of the duration period of toxemia. More significant changes in the migration of the minimum temperature indices of the bathiphase were revealed in group 1 for 10%, 2 - 31%, 3 - 20% of the duration of the toxemia period, when the minimum body temperature should be at night, and in children with severe burn injury, the minimum temperature bodies were noted in the daytime with a tendency to rise at night.

Conclusions. During the period of toxemia in children of groups 1, 2, 3, the mesor of circadian rhythm temperature in the first three days was within normal limits. The body temperature values of preschool children in acrophase, bathyphase of the circadian rhythm in the process of timely complex intensive therapy were within the subfebrile range. The more severe the burn injury was, the greater the daily fluctuation in body temperature in the first day of treatment.

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儿童妇科疾病的风险因素分析

ANALYSIS OF RISK FACTORS FOR GYNECOLOGICAL DISEASES OF CHILDHOOD

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本文介绍了有关儿童外阴阴道炎的文献分析。 外阴炎，阴道炎，外阴阴道炎（英语文献中的可互换术语）是下生殖道的炎症性疾病。 外阴阴道炎仍然是儿童期主要的妇科病理学。 青春期前女孩的这些疾病是女孩本人及其父母所关注的。 我们分析了国内外作者的出版物，并确定了儿童期外阴阴道炎发育的主要危险因素。

关键词：外阴炎，外阴阴道炎，细菌性阴道病。

Abstract. This article presents an analysis of the literature on vulvovaginitis in childhood. Vulvitis, vaginitis, vulvovaginitis (interchangeable terms in the English-language literature) are inflammatory diseases of the lower genital tract. Vulvovaginitis remains the leading gynecological pathology of childhood. These diseases in prepubertal girls are of concern to both girls themselves and their parents. We analyzed the publications of domestic and foreign authors and identified the main risk factors for the development of vulvovaginitis in childhood.

Keywords: vulvitis, vulvovaginitis, bacvaginosis.

Vulvitis is manifested by genital itching (45-58%), burning (74%), redness (82%) or rash, with or without odor. [1] Dysuric disorders (19%) and bleeding

(10%) are possible [2]. The disease may be accompanied by increased irritability, tearfulness, fatigue of the child.

The disease has its own characteristics of the course in different age periods. So, during the neonatal period, maternal estrogens lead to "self-cleaning" of the vagina, and, starting from one month and up to 7-8 years, the inflammatory processes manifest themselves quite clearly in the form of swelling and hyperemia, spreading beyond the genital tract to the perineum, inguinal - groin areas and femoral folds.

In girls aged 8 to 12 years, the acute course of the inflammatory process is less often observed, more often chronic, low-symptom. In some cases, symptoms of inflammation of the upper part of the urogenital tract are possible. Puffiness in the genital area is insignificant, hyperemia is often stagnant. The relatively "quiet" course of vulvovaginitis is associated with hormonal changes and the inclusion of natural defense mechanisms - both at the local and general levels. It is at this age that the formation of the immune system is completed, in particular, adequate nonspecific defense reactions. [3]

There are two main groups of vulvovaginitis: infectious and primary non-infectious. It should be noted that in childhood the proportion of primary non-infectious lesions of the vagina is quite large. According to various authors, in 25-75% of cases of vulvovaginitis it is impossible to identify a specific pathogen, and inflammation in the genitourinary tract can be associated with the soap or shampoo used, contamination with feces, tight clothing and insufficient level of intimate hygiene [4, 5,6,7, 8].

The causes of primary non-infectious vulvovaginitis are also often:

- foreign bodies in the vagina, for example: the remains of toilet paper, [9] batteries [10, 11, 12,13], parts of toys [14];
- helminthic invasions and enterobiasis [15,16,17,18];
- chemical and thermal factors;
- changes in the nonspecific reactivity of the body, in particular psoriasis and dermatitis [19].

From these literature data, it follows that when examining a child for certain complaints of discomfort in the genital tract, the diagnostic search should be different than in a patient of reproductive age.

The main risk factors for vulvovaginitis in girls of neutral age are as follows. The hypoestrogenic status of girls in the neutral period increases the susceptibility of the vaginal mucosa to infections [20]. The vaginal mucosa is thin, the pH - not acidic enough. Poor development of fat on the labia, lack of pubic hair, as well as poor hygiene skills - all these serve as risk factors for vulvovaginitis [21,22,23,24]. The role of transferring bacteria from hands to genitals is discussed in the works [25,26,27,28].

According to [29] WR.Lang and [30] RH Heller, synthetic underwear irritating skin and mucous membranes can also be attributed to risk factors for vulvovaginitis.

A study by G Reid I [31] focused on analyzing symptoms in relation to stimulus exposure and demonstrated an association between inadequate genital hygiene, tight clothing, and toiletry use with dysuria and genital discomfort (pain, itching) ($p \leq 0.05$).

Underwear is a determining factor contributing to the onset of inflammation in the genital area [32,33]. The type and cleanliness of underwear, as well as the frequency of its change, are important risk factors for nonspecific infection of the urinary and genital tract [34]. Contrary to previous findings, a study [35] by Sevil et al. did not reveal a correlation between the frequency of changing underwear and genital infections ($p < 0.05$), however, a significantly higher frequency of vulvovaginitis in female students was demonstrated, depending on the material of the underwear. Things that are more attractive to girls are considered to be less hygienically appropriate because they are predominantly made of relatively impermeable synthetic materials, cause moisture accumulation and facilitate the spread of infection. Moreover, the thong has a tendency to move during wear and can thus mechanically transfer microorganisms from the area around the anus to the vagina.

In adolescence, especially after menarche, the spectrum of behavioral risk factors for vulvovaginitis and bacvaginosis expands. According to various authors, this primarily includes vaginal douching [36], which is practiced by 15% of American girls and young women [37]. According to Schwebke JR, in a multivariate model, including such risk factors as sexual intercourse and multiple sexual partners, the strongest association of bacvaginosis was established precisely for douching after menstruation: the odds ratio is 5.11; 95% CI: 1.99-13.15).

Similar results were obtained in a study of 3620 girls and women aged 15–44 years to study the influence of personal hygiene features on the development of bacvaginosis [38]. In multivariate models adjusted for demographic and social factors, it was found that the only statistically significant predictor is the fact of vaginal douching, while such potential risk factors as synthetic or cotton underwear, tampons or panty liners on the days of menstruation, the use of panty liners, hygiene sprays, dehumidifiers, or towels do not alter the risk of bacvaginosis.

Another factor influencing the microflora of the lower genital tract in girls after menarche is depilation of pubic hair. Sevil et al. (2013) found a significantly lower incidence ($p < 0.05$) of genital infections among girls who performed genital hair removal once every two months or less. Pubic hair plays an important protective role due to the fact that it contains microflora, which is necessary to stimulate the vaginal immunity. In 60% of women, complications associated with intimate depilation were noted.

According to I Beyiter and S Kavukcu, based on their analysis of the literature on vulvovaginitis in children, this condition is usually caused by nonspecific factors and the most useful recommendations are hygiene measures, taking bioyogurts, avoiding douching with chemicals, and controlling weight and dysfunction of urination.

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简述蒙医“三根”健态功能及病态临床表现

**BRIEF DESCRIPTION OF THE HEALTH FUNCTION AND
PATHOLOGICAL CLINICAL MANIFESTATION OF THE "THREE
ROOTS" OF MONGOLIAN MEDICINE**

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摘要：介绍了蒙医核心理论之一“人体赖以进行生命活动的三种能量和基本物质”三根即赫依、希拉、巴达干，正常、健康状态功能；三根在内因、外因影响下偏盛或偏衰，致使平衡失调发生“赫依病”，“希拉病”，或“巴达干病”所表现的临床症状据蒙医经典理论，下面简述三根健康状态功能及病变临床表现。简述了蒙医“三根”理论与印度阿育吠陀医学“三体液”或“三秽素”学说和藏医学渊源关系，等待更多专家学者进一步研究，解开其谜底。

关键词：三根 赫依 希拉 巴达干 身心语三业

Abstract. *This paper introduces the normal and healthy functions of three basic substances: Khii; Shar; Badgan, one of the core theories of Mongolian medicine, "three kinds of energy and basic substances on which the human body depends for life activities". Under the influence of internal and external causes, the three sides are partial or partial, resulting in the occurrence of "Khii disease", "Shar disease", or "Badgan disease". According to the classical theory of Mongolian medicine, The following is a brief description of the three health state functions and clinical manifestations of lesions. This paper briefly describes the relationship between the theory of " Three basic substances " in Mongolian medicine and the "Tridosha" theory in Ayurveda medicine and the origin of Tibetan medicine, and waits for more experts and scholars to further study and solve its mystery.*

Keywords: *Three basic substances: Khii; Shar; Badgan; Psychological, physical, verbal*

Introduction

The “three roots”^[1-3] in the basic theory of Mongolian medicine refer to “Khii” (meaning vitality), “Shar” (bile), “Badgan” (mucus, tissue fluid, etc.), “three kinds of energy and basic substances on which the human body relies for life activities”^[4]. They participate in all life activities such as the coordination of human organs, the organic connection between internal organs and body surface tissues and organs, and depend on and restrict each other. In a state of relative balance, the human body functions normally and completes its physiological function. However, when the normal three roots flourish or decline under the influence of internal and external causes, the imbalance results in “Khii disease”, or “Shar disease”, or “Badgan disease”, etc., and other organs, tissues and the functional structures of systems are also involved, which results in complications or systemic diseases. The three roots of pathological changes can also be called “three maladies”. The “three roots” theory of Mongolian medicine has been a unique theoretical system to explain human physiology and pathology, and it has also become the core theory of clinical medication and syndrome differentiation of Mongolian medicine to treat various diseases^[5-15]. According to the classical theory of Mongolian medicine, the following is a brief description of the healthy functions as well as pathological changes of the three roots.

1. Khii

1.1 Functions of healthy “Khii”

Under normal, healthy and balanced conditions, as the secret place, Khii exists in the lower part of the body. It has the function of completing the physiological function and nerve function of human organs, and is one of the essential vital energy elements of human body. In its normal state, it performs the function of “smooth breathing, active work and potential source of disease, and making the senses clear and the body strong”^[16].

1.2 Clinical manifestations of Khii disease

Healthy Khii was damaged by the irregular life as a result of the faults in conduct karma, speech karma and thinking karma^[17,18], pessimistic mood, lack of sleep, poor diet, lust and excessive thinking, etc., and frequent diet of buckwheat, strong tea and other bitter, cold food, nutrient deficiency for long-term consumption of low-nutrient food, living in a cold environment wearing thin clothing and other living factors, some seasonal factors such as summer, dawn and night, plus some special factors (under the historical conditions at that time, the causes of diseases such as tetanus and plague that were difficult to explain, the same as below). Due to the adverse effects of these “four external causes”, the function of Khii appears to be overactive, declining and disordered, which makes the “three root” function lose relative balance and lead to Khii disease. The main manifestations include trembling, yawn, chills, retching, blurred perception of five senses, restlessness,

mood instability, palpitations, insomnia, systemic wandering pain, dizziness, warmth preference, fasting pain. The constitution of the elderly is Khii-dominated, and they are susceptible to Khii disease. In addition to signs and symptoms such as the pressing pain at the acupoint of Khii, the pulse is empty, the tongue coating is dry and red, and the urine is light with much large foam.

2. Shar

2.1 Functions of healthy Shar

As one of the “three roots” of the human body, Shar exists in the middle of the body. Under normal, healthy and balanced state, it can transform the heat energy of human body and participate in the function of material metabolism. It is one of the essential vital energy elements in human body. Under normal state, Shar performs the function of “feeling hungry and thirsty, feeding and digestion, providing heat and energy to maintain physical and mental activities”^[16].

2.2 Clinical manifestations of Shar disease

Healthy Shar is damaged by the faults in conduct karma, speech karma and thinking karma, and frequent diet of garlic, wine and other spicy, acid, and warm food, long-term consumption of high calorie food and other dietary factors; living in a hot and warm environment, sunburn, fatigue and other living factors; in case of autumn, noon, midnight and other seasonal timing factors, plus trauma and so on. Due to the adverse effects of the “four external causes”, the function of Shar appears to be overactive, declining and disordered, thus making the “three roots” function lose relative balance and lead to Shar disease. The main symptoms are pain in the mouth, fever, headache, chest and back pain, preferring sour and spicy food, and pain aggravation after eating, etc. The constitution of the middle-aged and young people are Shar-dominated, and they are susceptible to Shar disease. In addition to signs and symptoms such as pressing pain at the acupoint of Shar, the pulse is tense, full, stringy, or rapid; the tongue coating is yellow, thick and greasy, and the urine is yellow with strong odor.

3. Badgan

3.1 Functions of healthy Badgan

As one of the “three roots” of the human body, Badgan belongs to the brain. Under normal, healthy and balanced conditions, Badgan plays a vital role in human digestion, regulating humoral functions and secreting substances. It is one of the essential vital energy elements of human body. Under normal state, Badgan performs the function of “being physically and mentally strong, sound sleeping, tough joints and flexible body”^[16].

3.2. Clinical manifestations of Badgan disease

Healthy Badgan is damaged by the faults in conduct karma, speech karma and thinking karma, and the frequent diet of lettuce, immature fruit, pork and other

sweet, cold food, continual eating before full digestion and other dietary factors, living in windy and damp cold environment and other living factors; in the case of spring, early morning, dusk and other seasonal factors. Under the bad influence of the “four external causes”, the function of Badgan is overactive, declining and disordered, thus making the “three roots” function lose relative balance and leading to Badgan disease. The main symptoms include loss of appetite, vomiting, abdominal distension, hiccup, fatigue, body coldness and aggravation after meals and so on. The constitution of children is Badgan-dominated, and they are susceptible to Badgan disease. Besides signs and symptoms such as pressing pain at the acupoint of Badgan, the pulse is dull, late and weak, and the tongue coating is white, wet and slippery, and the urine is white with weak smell.

Conclusion

The “three roots” theory of Mongolian medicine is closely related to the “three humors” and “three unhealthy elements” of Ayurvedic medicine in India and the origin of Tibetan medicine. Tumenjirigale and his peers concluded that the “three roots” are highly consistent with the “comparative study on the core connotation of the concept of secondary functions of the ‘three humors’ theory” of Ayurvedic medicine [19-22]. More experts and scholars are expected to make further study and solve the mystery.

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在相机实验中，部分浸水下白海沿岸生长的三种盐生植物的碳水化合物状况

**THE CARBOHYDRATE STATUS OF THREE HALOPHYTES
GROWING ON THE LITTORAL OF THE WHITE SEA UNDER
PARTIAL FLOODING IN A CAMERAL EXPERIMENT**

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我们研究了盐生植物 (*Triglochin maritima* L., *Tripolium vulgare* Ness.) , *Glaux maritima* L.) 取材于自然生长条件, 并每天进行部分淹没实验。事实证明, 每天局部淹水的条件有利于马里氏木霉, 不利于寻常豆草, 而胁迫马氏木藻则与该物种的生物学, 专门组织的存在和起源有关。

关键词: 盐生植物, 非结构性碳水化合物, 转化酶, 蔗糖合酶, 适应性, 白海沿岸地区。

Abstract. *We studied the total carbohydrate content, the distribution of non-structural carbohydrate fractions (monosaccharides, sucrose, starch), the activity of sucrose utilization enzymes (invertase and sucrose synthase) between organs in halophyte plants (*Triglochin maritima* L., *Tripolium vulgare* Ness., *Glaux maritima* L.) taken from natural growing conditions and placed on a daily experiment with partial flooding. The conditions of daily partial flooding turned out to be favorable for *T. maritima*, less favorable for *T. vulgare*, and stressful for *G. maritima*, which is associated with the biology of the species, the presence of specialized tissues, and origin.*

Keywords: *halophytes, non-structural carbohydrates, invertase, sucrose synthase, adaptations, coastal areas of the White Sea.*

Introduction

Littoral is a transitional zone between marine and terrestrial ecosystems, subject to extreme climatic conditions, such as: constant soil salinity and tidal cycle, which causes a periodic change of water and air environments, temperature gradients, illumination, etc. (Rasool et al., 2019 and etc.). The individual and combined effects of these factors have a strong effect on autotrophic organisms, often resulting in low species diversity in the littoral zone of the coast (Rasool et al., 2019). This territory is predominantly inhabited by halophytic plants with various morphological, anatomical, physiological adaptations and/or alternative metabolic pathways to a complex of unfavorable factors (Rozema et al., 1985; Rasool et al., 2019).

The synthesis and accumulation of compatible metabolites is the general response of organisms to any stressful influences that lead to cellular dehydration (Khan et al. 2010; Gil et al., 2013). The group of compatible metabolites may also include carbohydrates, the role of which in this protective function is not fully understood. However, a number of physiological studies have shown that soluble carbohydrates, such as glucose, fructose, and sucrose, make a significant contribution to the mechanisms of adaptation to both salinity (Kerepesi, Galiba, 2000; Parida et al., 2002) and flooding (Ye et al., 2018).

A study of the metabolic characteristics of plants in the tidal zone showed that two classes of substances are synthesized as compatible metabolites: carbohydrates and nitrogenous bases (Briens and Larher, 1982; Ewing et al., 1989). However, the synthesis of nitrogenous bases, in contrast to carbohydrate compounds, requires additional energy costs in the unstable conditions of coastal areas, where there may be energy constraints. However, the question of the participation of products of primary metabolism - carbohydrates in the pathways of adaptation of halophytes to salinization and flooding in specific conditions of coastal territories remains open.

The objective of this study was to assess the carbohydrate status (distribution of non-structural carbohydrate fractions, the activity of enzymes for utilizing sucrose between leaves, stems, and roots) in 3 dominant species in coastal ecotopes of the White Sea littoral zone.

Materials and methods

Region of the study. The study was carried out in July 2018 in the Keret Bay of the White Sea on the coast in the vicinity of Keret (66°28'58 "N, 33°58'72" E). According to the classification of climates by B.P. Alisov (1956) (classification by the mode of circulation of air masses), the climate at the place of study is of the moderate type. Summers are cool, the temperature usually stays within 15-20 °C. During the study period, partly cloudy weather and temperatures with average dai-

ly values of about 18-22 °C were noted in Keret. The soil is sandy with a salinity of 18-20 ‰ (conductivity 2.7 ohm/cm). The salinity of water near plants at high tide is 10 ‰.

Objects of the study. The work was performed on the monocotyledonous perennial *Triglochin maritima* L. (*Juncaginaceae*), the dicotyledonous perennial *Glaux maritima* L. (*Primulaceae*), and the dicotyledonous biennial *Tripolium vulgare* Ness. (*Asteraceae*), which grow in estuarine zones on the moderately saline soil of the littoral of the White Sea, at different distances from the water's edge and are subject to different duration, but complete flooding during high tide and successfully pass all stages of ontogenetic development. Duration of flooding: in *T. maritima*, *T. vulgare* during one tidal cycle was about 3-4 hours, and for *G. maritima* - about 2

Sampling conditions. The study was carried out on 3 flowering plants of each species, which were taken together with a soil ball from their natural habitat and placed in an open container with salt water under partial flooding conditions. Most of the leaves were in the air, while the roots and the lower part of the shoot were in the aquatic environment. The container was placed in a chamber at a temperature of 18 °C, illumination of about 35 $\mu\text{mol}/\text{m}^2$. The duration of the experiment was 1 day, after which the plants were taken into the experiment. The conditions of partial flooding were close to the natural habitats of most of the species in the littoral and supralittoral zones of the sea coast.

For carbohydrate analysis, 3 mixed samples of each species were taken separately for the sample of leaves, peduncles (stems) and roots (rhizomes). The content of non-structural carbohydrates (starch, sucrose, glucose, fructose) was determined in the leaves, peduncle (stem), root (rhizome); activity of sucrose metabolizing enzymes (SS and Inv) in the leaf and root (rhizome). The studies were carried out on scientific equipment of the Center for Shared Use of the Federal Research Center "Karelian Research Center of the Russian Academy of Sciences".

Content of non-structural carbohydrates. Isolation and extraction of sugars was carried out according to the method described in detail earlier (Galibina et al., 2012).

Determination of enzyme activity. To determine the activity of enzymes, a method was used that was described in detail earlier (Galibina et al., 2015)

Statistical analysis. Data processing based on the research results was carried out using generally accepted methods of statistical analysis using *Microsoft Excel* software packages. Data are presented as arithmetic means and standard errors. Differences in the distribution of indicators between groups of plants were determined by the method of assessing the significance of differences in mean values (Student's t-test). Differences were considered statistically significant at $p < 0.05$.

Results and discussion

The study showed that the content of non-structural sugars in the three studied species and their distribution in organs are very different. Thus, the total carbohydrate content in *T. maritima* was 410 mg/g (of which 368 mg/g dry wt soluble, which is 1416 $\mu\text{mol/g}$ dry wt), in *T. vulgare* - 543 mg/g dry wt (of which 540 mg/g dry wt are soluble, which is 1648 $\mu\text{mol/g}$ dry wt) and in *G. maritima* - 310 mg/g dry wt (of which 224 mg/g dry wt soluble, which is 720 $\mu\text{mol/g}$ dry wt). The starch content amounted to the total amount of structural carbohydrates: in *T. maritima* - 42 mg/g dry wt (10%), in *T. vulgare* - 3 mg/g dry wt (traces), in *G. maritima* - 86 mg/g dry wt (27%) of the total carbohydrate content. The data obtained showed that the species differ in the content of soluble carbohydrates and are arranged in descending order: *T. vulgare*, *T. maritima*, *G. maritima*, and vice versa in starch content: *G. maritima*, *T. maritima*, *T. vulgare*. The initial values of the total content of non-structural carbohydrates in the leaves of the littoral halophytes showed that their total amount in *T. maritima* and *T. vulgare* (150 and 130) falls within the average range that is given in the literature on terrestrial and aquatic plants (from 120 to 190 mg/g dry wt) (Ronzhina et al., 2009). The exception was *G. maritima*, in which the content of the total fraction of non-structural sugars was significantly lower. In contrast to terrestrial plants, all coastal halophytes had a significantly higher percentage of soluble sugars: in *T. maritima*, about 90%, in *T. vulgare*, about 100%, and in *G. maritima* - 73% from the group of non-structural carbohydrates. This group of carbohydrates was dominant in all studied plants. For plants in fresh habitats, this figure did not exceed 13% (Ronzhina et al., 2009).

It is known that mono- and disaccharides are involved in maintaining resistance to salinity and flooding, and only soluble carbohydrates are involved in the osmotic balance of the cell, and therefore the ratio of these fractions (monosaccharide/sucrose) was calculated. This calculation showed that in *T. maritima* in the leaves this ratio (68/32), in the peduncle (68/32) - monosaccharides dominate, in *T. vulgare* in the leaves (26/74), in the peduncle (20/80) - sucrose dominates, in *G. maritima* the values are similar in leaves (51/49), sucrose dominates in the stem (34/66). In all three species, in the root, the ratio of mono- and disaccharides is similar (18/82, 13/87, 16/84) and sucrose dominates. A comparative study of *T. maritima*, *G. maritima*, *T. vulgare* in terms of the ratio (monosaccharide/sucrose) with published results for the species of the same name growing on salt marshes in England (Gorhman et al., 1980) and France (Briens, Larher, 1982) showed similar values for *T. maritima* in terms of values by leaves (Gorhman et al., 1980), for roots (Briens, Larher, 1982), for *T. vulgare* by leaves, roots and stems (Gorhman et al., 1980), for *G. maritima* by leaves (Gorhman et al., 1980). These data indicate the high importance of soluble carbohydrates in plants as the main metabolic fraction of carbohydrates, which dominates in plants that grow in the

littoral zone, where salinity and periodic flooding are the leading factors. Large biological differences between species may indicate different ways of adaptation and maintenance of photosynthetic function of these species.

The accumulation of starch as a way of removing its excess in metabolism has shown that this process is active in the powerful rhizome of *T. maritima*. *G. maritima* showed high starch content in leaves and rhizome, since the activity of enzymes responsible for starch degradation can be inhibited under experimental partial flooding (Guglielminetti et al., 1995). Low values of starch content are noted in the leaves and peduncles of *T. maritima* and in the leaves and roots of *T. vulgare*.

In plants, there are three forms of invertase, which differ in their biochemical properties and location of localization: vacuolar (VacInv), cytoplasmic (CytInv), apoplastic (ApInv), and sucrose synthase (SS). It has been shown that the ratio of the activities of different forms of enzymes determines the predominant inclusion of the sucrose they break down into various metabolic pathways (Galibina et al. 2015).

In *T. maritima*, the total activity of Inv 13.7 and 3.3 $\mu\text{mol sucrose/g tissue}$ in the leaf and root was significantly higher than that in *T. vulgare* and *G. maritima*. In the leaf of *T. maritima*, the activity of acidic invertases prevailed over neutral ones: the activities of ApInv and VacInv were 5.2 and 5.7 $\mu\text{mol sucrose/g tissue}$, while CytInv did not exceed 2.8 $\mu\text{mol sucrose/g tissue}$. At the root, the activity of the apoplastic enzyme reached 2.4 $\mu\text{mol sucrose/g tissue}$, while the activity of intracellular invertases (CytInv and VacInv) did not exceed 0.8 $\mu\text{mol sucrose/g tissue}$. In addition, *T. maritima* exhibited the highest SS activity in leaves for sucrose synthesis (18 $\mu\text{mol sucrose/g protein}$) and, in the root, for sucrose degradation (1.8 $\mu\text{mol sucrose/mg protein}$). The higher activity of Inv and SS indicates a high metabolic activity, both in leaves and roots.

In *T. vulgare*, the total activity of Inv was lower and amounted to 1.0 and 2.7 $\mu\text{mol sucrose/g tissue}$ in the leaf and root, respectively. ApInv was more active, its value was 0.5 and 0.8 $\mu\text{mol sucrose/g tissue}$ in the leaf and root, respectively. CytInv and VacInv activities did not exceed 0.4 $\mu\text{mol sucrose/g tissue}$ in both organs. However, *T. vulgare* had a high SS activity in the leaf (13 $\mu\text{mol sucrose/mg protein}$), while at the root its value was minimal (0.3 $\mu\text{mol with acharose/mg protein}$). According to the total activity of Inv, the main metabolic processes associated with the activity of Inv are concentrated in the root system, while SS is highly active in the leaves.

In *G. maritima*, the total activity of Inv was 1.7 and 1.5 $\mu\text{mol sucrose/g tissue}$ in the leaf and root, respectively. The activity of ApInv 0.7 and 0.8 $\mu\text{mol sucrose/g tissue}$ in the leaf and root was higher, the activity of intracellular invertases (CytInv and VacInv) varied in the range 0.3–0.7 $\mu\text{mol sucrose/g tissue}$. In *G. maritima*,

the SS activity in the leaf is 7.3 μmol sucrose/mg protein, which is 2.6 and 1.9 times lower than in *T. maritima* and *T. vulgare*, respectively. At the root, the value of its activity did not exceed 0.6 μmol sucrose/mg protein. In the rhizome of the plant, a higher content of sucrose and starch is noted in comparison with the leaf, which may indicate the ontogenetic priority of the formation, first of all, of the system of underground organs that ensure the long-term existence of the plant organism.

The results obtained showed different mechanisms of adaptation of halophytes in coastal ecotopes. The experiment with partial flooding showed that all the studied species, adapted to environmental conditions in the rhythm of tidal dynamics, turned out to be differently resistant to daily partial flooding. The disturbances noted in the course of the study (different degrees of decrease and the ratio of the activity of the studied enzymes) indicate a large role of carbohydrate metabolism in the adaptation of all halophyte species to the conditions of tidal dynamics. The response of species even to partial flooding varies dramatically. In these non-standard conditions of prolonged flooding, *T. maritima* maintains an active functional state due to the available specialized tissues of the structure (aerenchyma in the leaves and root). *T. vulgare* has an active pathway, which includes a reorganization of metabolism (in the rhythm of the tidal cycle) and a transition to an unstable state, in which the plant, apparently, remained for a day. For *G. maritima*, which avoids flooding in natural habitat conditions and does not withstand prolonged flooding (Rozema et al., 1977), these conditions turned out to be stressful and inhibition of carbohydrate metabolism was noted.

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双歧杆菌 - 止痛药的来源

BIFIDOBACTERIA – SOURCES OF ANTIMYCOTIC SYSTEMS

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Microbiology*

根据自己的结果，强调了将益生菌双歧杆菌作为识别型（凝集素型）个体和复杂因子（具有不同作用机制的系统代谢组）的适应性和受控网络偶联抗真菌药生产者的基本立场。

关键词：双歧杆菌，益生菌，抗真菌药，凝集素系统，糖结合物

Abstract. *Based on own results, the basis positions concerning probiotic bifidobacteria as producers of adaptable and controlled network coupled antimycotics of the recognizing type (lectin type) individual and complex agents (system metabolomebiotics with different mechanisms of action) are accented.*

Keywords: *bifidobacteria, probiotics, antimycotics, lectin systems, glycoconjugates*

Bifidobacteria (genus *Bifidobacterium*, family *Actinomycetaceae*, order *Actinomycetales*, class *Actinobacteria*) are characterized with similarity to not only lactobacilli and symbiotic corynebacteria, but also to fungi possessing high level of adaptation in biotope surrounding. Bifidobacteria reveal adaptive morphological and functional polymorphism during live circle (evolutionary and involutionary steps are observed) depending on: a) surrounding conditions (also in varying media), b) mucosal organ status (for example in mother organism before and during

gestation periods, as well as in infants). Programmed high adaptive potential of bifidobacteria is realized in diversity of their behavior in different mucosal biotopes of open cavities of organism (including a number of cases providing domination of bifidobacteria in mucosal microbiocenosis taxonomic composition and inter-niche hierarchical relationships among microbes). Bifidobacteria reveal visible antagonism in respect of yeast-like fungi (on examples of *Candida* species) that indicates capability of bifidobacteria to produce antimycotics similarly to fungi.

Lectins are related to proteins which are capable to recognize and reversibly bind carbohydrates and carbohydrate moiety of glycoconjugates (GC). Lectins of the cultural probiotic strains of lactobacilli and bifidobacteria (from the healthy adult donor intestine) were isolated and characterized by us. Probiotic lectins studied were from multi-strain lactobacillar probiotic Acilact (its properties as additives of ingredient strains) and bifidobacterial mixture of consortium type. Lectin preparations represent probiotic lectin systems (PLS as associates > 27 kDa, anionic and cationic, lactobacillar and bifidobacterial: aLL, cLL, aLB and cLB) which reveal key properties and activities of indigenous strains and consortia of mucus within mucosal organs and possess system synergistic action.

The aim is – based on own data [1-30] to accent potential of bifidobacteria as sources of serial system antimycotics (including complex and individual synergistic combinations) against opportunistic combinations of fungi and Gram positive bacteria.

Results. Consideration of postbiotics (PLS, others) proved to be a convenient instrumental approach to predict assessment of bifidobacterial potential (mono- and multi-strain combinations and consortia) as sources of varying antimycotic-like agents (molecules and supramolecular associates). Advantages of this approach are the following: a) revealing new properties of PLS compared to low molecular mass postbiotics, b) consideration of PLS within recognizing GC network with action in knots of cascade reaction branches, c) possibility to order PLS in direction of potential therapeutic postbiotics.

A. New properties of PLS compared to low molecular mass postbiotics.

PLS (major and minor visible asymmetric subsystems) imitate main activities of probiotic cells and realize these activities ahead and independently of cells. They act independently on the presence of antibiotics and are not influenced with other cell limiting environmental factors. They show synergy with other types of antimicrobial agents and food and cold stress factors. In subcytoagglutinating doses PLS realize lectin-coupled biological and physiological add-on activities as minicascades. Settings of the further reaction cascades in the metabolomebiotic and metabolic axes network can be predicted.

PLS (strongly acidic [pI 4-4,5], slightly acidic [pI 5-6] and alkaline [pI 7-8 and higher]) reveal synergism in antimycotic actions. Examples of synergism in-

clude: LB and LL; PLS and phytolectins, PLS and classical antimycotics of azole type; PLS and factors of food and/or cold stress. Upon interaction of PLS with molecules and receptors, the formed contacts contribute into modification of previous type of specificity or switching specificity to a new GC type in cases of PLS components. As a result, a spectrum of targets for antimycotics is expanded, and effectiveness of their action is increased. In such conditions of mucosal biotope surrounding, the targetting PLS subsystems involving new effector complexes of LB and LL is improved. Complexing such antagonistic constituents involves nature parameters of opportunistic fungi (fungal components as signals and current phenotype memory) that allows orientation and action of PLS in respect of available fungal pathogens and their associates as minibiofilms) in surroundings using direct or indirect (through a network) influence.

B. PLS as a network including antimycotics - metabolomebiotics.

Postbiotics (on example of PLS) are represented as infrastructural (major visible protein/peptide containing ingredients) and signal (minor visible ingredients) components or major and minor subsystem components in complexes with or without GC. PLS act according to the following general rules of a network of relationships between PLS and GC: “Any component of PLS —A set of GC targets ranged in availability and affinity to the PLS component”, “One type of GC target—A set of PLS components (GC-dependent PLS subsystem) ranged in availability and affinity to the selected type of GC”. Interaction of PLS with metabolite or cell target results in supramolecular and (inter)cellular complexes possessing additional directed sites for further “PLS —GC recognition and binding” within contacts. The latter support idea that the formed complexes represent compositions possessing programmed modified or new (switched) directed specificity to GC.

Among obtained results there are main groups to be underlined as following.

1. Sensoric properties of specie and subspecie selectivity (communicative properties that can be used in antagonistic and competitive reactions) towards bifidobacteria at the level of postbiotic PLS targeted against fungi were established. Antagonism and antimycotic activity of LB in respect of *Candida* species were synergistically completed in the presence of additional LL action.

2. PLS (including products of dissociation of complexes and/or other type of conversion) behave like “mild” system GC-recognizing antimycotics of a new type (adaptable, system, cascade, redirect, involving target constituents) with early and deferred antifungal actions (according to different synergistic mechanisms) against *Candida* species of all groups I-III of epidemiological significance: a) through conversions in suspensions (using surrounding fungal hydrolases triggering metabolic suicide of *Candida* group I including *C. albicans* and *C. tropicalis*), b) through early biorhythmic functional separation of suspension forms of *Can-*

dida groups I (on example of *C. tropicalis*) and III (*C. krusei*), c) through assembling biofilms (BF) on surfaces or inter-phases (in cases of *C. albicans* and *S. aureus*), d) through neutralization of enzymatic virulent factors of *Candida* group II (*C. glabrata*), e) through prolonged biocontrol of bactericidness and fungicidness within common symbiotic microbial areas (for example, against the background of a joint territory restriction of mixed BF including *C. albicans* together with *aspergilli*).

3. Strategies against BF-forming chronic infections involving possibilities of the PLS-coupled simultaneous lysis of pathogen massifs and BF internally (strategy “Target-in-Target”) and directed from the external borders of BF (strategies of rational combination of probiotic attacks and antimicrobial preparations in respect of the whole BF) are especially perspective ones. Thus, in respect of combinations “*Candida*+*Staphylococcus*” it is possible to apply PLS in the following directions: a) *against Candida and other yeast like fungi*: aLB(visible action on peripheral regions of BF)> aLL(visible action on internal regions of BF possessing increased visible protection); aLB+aLL (residual multi-island BF after probiotic prolonged attack); LB+LL+metabolite-cellular probiotics (cell constituent as providing depth and reliability of resistance of microbiocenose probiotic compartment; possibility of maneuver through simplified cell amplification in the presence of LB and LL; potential of additional producing PLS); b) *against staphylococci*: aLL(actions that regionally differ from those of aLB within BF)> aLB(visible actions in peripheral regions of BF; actions that differ from the area and nature of those of aLL; peripheral completely lyzed BF fragments); aLL+aLB (synergism as both territorial and by the nature of the action); LL+LB+probiotics (the system revealing maximal prolonged synergism). cPLS (cLB and cLL) reveal deferred anti-*Candida* action (against *C. albicans* [later action compared to that of aPLS]; action against preferential internal areas of BF that directly capture the central - mostly protected region of the fungal pathogen massif and BF). Action of cPLS is supported by cofunctioning of both cLB and cLL with endogenic biosurfactants (for example providing the remote delivery of cPLS and peptides).

Conclusion. Aformentioned data justify bifidobacteria as perspective sources of adaptable functionally coupled in time and space GC-recognizing system antimycotics of a new (complex) type. Such antimycotic systems are one of key participants involved into organization of the whole synergistic metabolite-cellular anti(fungal pathogens) network (inter-organ/ inter-issue/ inter-cellular-axes connecting the mucosa and controlling the communication of the mucosal organ with other organs and tissues) targeting GC distributed in the body. Such a network assumes actions (synergistic participation and contribution) of other body protective systems. It involves functioning pre-, pro-, syn-, immuno- and postbiotics, ingredients of functional food and vaccines.

According to the data described above and conceptual proposals, it is possible new additional explanation and disclosure of the nature, for example, of the fact that in case of infant microbiocenoses there is a pronounced large-scale substitution of fungi and bacteria with minimal (in specie composition) bifidobacterial consortia (consortia possessing high signal and adaptive/ communicative potential in recognition of target sets). The latter allows successfully implemented monitoring of the local microbiota in mediating the dominant communications (in connection with the functional redistribution - the interception of fungal supervising functions) between microbiocenosis and mucosal organ infrastructure.

The use of consortium nature preparations of LB and LL (that are biocompatible and mimic the properties of consortia) as managed and directed sources of ordered/ serial/ system antibiotic/ antimycotic-like compounds and substances against combinations of pathogenic fungi and Gram positive bacteria (on examples of *C. albicans* and *S. aureus*) is the first of promised prospects. This can be important for increasing effectiveness of the fight (and prediction of its success) against BF-associated staphylococcoses (preferential action of system constituents of LL) and staphylococcal candidoses (preferential action of system constituents of LB, LB together with LL, PLS together with postbiotics and cell type probiotics). It is possible prognostic choice of mixed inter-specie (bifidobacterial) and inter-genus (bifidobacteria and lactobacilli) symbiotic consortia possessing mostly adequate action against pathogens using constructed consortium antimycotic system to act in a specific biotope.

These data are aimed at development development of new systems of the fight against chronic infections using synergistically acted PLS in combinations with effector GC, antibiotics, other antimicrobial and antiviral agents and factors.

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11-17岁年轻男性游泳者激素分布的动态
**THE DYNAMICS OF HORMONE PROFILE OF YOUNG MALE
SWIMMERS AGED 11-17**

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通过实验已经确定，年轻男性游泳者血液中睾丸激素含量的增加的特征在于，在其密集生长的两个高峰期（分别为12岁和15岁），动力学变化不均匀。年轻游泳者体内生长激素的浓度水平变化的特征在于其体内含量从11岁到13岁逐渐增加。在14岁时，其浓度有所下降，在15岁时，其浓度几乎保持不变，而在16-17岁时，其浓度持续下降。年轻游泳者血液中的皮质醇浓度从11岁逐渐增加到13岁，然后在14岁时其含量略有下降，在15岁时其含量显著增加，并在16-17岁时下降。旧。

关键词：年轻游泳者，体内激素水平，睾丸激素，生长激素，皮质醇。

Abstract. *It has been experimentally established that an increase in the content of testosterone in the blood of young male swimmers is characterized by uneven dynamics in the presence of two peaks of its intensive growth - at 12 years old and at 15 years old. The change in the level of concentration of somatotropin in the body of young swimmers is characterized by a progressive increase in its content in the body from 11 to 13 years. At the age of 14, its concentration decreases somewhat, at the age of 15 it remains practically unchanged, and at the age of 16-17 it continues to decline. The concentration of cortisol in the blood of young swimmers gradually increases from 11 to 13 years old, then there is a slight decrease in its content at 14 years old, a very significant increase at 15 years old and its subsequent decrease at 16-17 years old.*

Keywords: *Young swimmers, body hormonal profile, testosterone, somatotropin, cortisol.*

At present, when training young athletes, special attention is paid to the individualization of the training process, which should be based, inter alia, on taking into account the regularities of the physical development of a young organism, especially during puberty. At the same time, one of the most important criteria for managing the development process of adaptability (fitness) to muscular loads

is the use of such characteristics as biological age [1, 2, 4]. At the same time, in sports practice, taking into account biological laws, including the rates of physical development of young athletes as a criterion for managing sports training, is used extremely rarely [4]. This circumstance is mainly due to the fact that the determination of biological age is a rather laborious process, and objective and accurate methods are not always used. At present, the rate of physical development is proposed to be determined by biological age, determined during puberty by taking into account the stages of development of secondary sexual characteristics [4, 10]. This technique is not entirely accurate, and as practice shows, it is not widely used [2, 4].

At the same time, in order to increase the accuracy of indicating the degree of biological maturity, it is proposed, in addition to the traditional method for determining biological age by secondary sex characteristics, to use the determination of the level of concentration in the blood of sex hormones, primarily testosterone and somatotropin [1].

Based on this, it seems necessary to find out which hormones to a greater extent, and most accurately reflect the pace of physical development (biological age). As an object of research, first of all, sex hormones, such as testosterone, cortisol, somatotropin, which largely determine the biological maturation of the body in the age range from 11 to 17 years, should be determined. In addition, it is extremely important to find out the dynamics of the growth of the level of sex hormones with greater discreteness (with a smaller "step"). The available literature provides information on changes in the concentration of hormones with a "step" of 4-6 years. This accuracy is clearly not enough. For the practical use of the "hormonal scale", its discreteness should be equal to no more than one year.

In connection with the above, the main **purpose** of the study was to clarify the dynamics of the average values of the concentration in the body of testosterone, somatotropin, cortisol and their range in young swimmers in the age groups of 11, 12, 13, 14, 15 and 16-17 years old.

Organization and research methods. The studies were carried out with the participation of 93 male swimmers aged 11 - 17 years, who underwent clinical and physiological examination and were allowed to experiment and train in the Volgograd swimming club "Volga" and the swimming club "Albatross". Of these, 6 groups of young athletes were formed: boys and young men 11, 12, 13, 14, 15 and 16-17 years old.

Determination of the hormonal status of the organism was carried out using a photometric analyzer "Immunochem-2100 Microplate Reader", which made it possible to implement the method of enzyme-linked immunosorbent assay. In the determination of cortisol, a set of reagents for the quantitative enzyme-linked immunosorbent assay of cortisol in human serum "Steroid ELISA-cortisol" (Alkor

Bio Company) was used. Somatotrophic hormone (STH) was determined using a set of reagents for enzyme-linked immunosorbent assay of somatotropin in serum (plasma) "GR-IFL" (Production of "XEMA"). Total testosterone was determined by means of a set of reagents for the quantitative enzyme-linked immunosorbent assay of testosterone in human serum "Steroid ELISA-testosterone" (Alkor Bio Company).

Research results. Table 1 presents data reflecting the mean testosterone level (TSR) in boys and young men who go in for swimming at the age of 11-17 years and the range of its values in the surveyed groups.

From the presented data it can be seen that the average values of testosterone with increasing age of young swimmers, starting from 12 years, progressively increase. At the same time, from the same age, including the group of swimmers of 13 years old, a very significant expansion of the range of individual values of this hormone is observed, the extreme values of which in some cases are 4-fold differences from the average values and mainly in the direction of exceeding, while the downward differences were significantly less. This can be clearly seen in Fig. 1.

Table 1
Minimum, maximum and average testosterone values (TSR) in boy and young men swimming at the age of 11-17 years (Nmol/l)

| Age and gender | Minimum (Min) | Average value (M±m) | Maximum (Max) |
|--------------------|---------------|---------------------|---------------|
| 11 years (n=14) | 0,23 | 3,80±0,67 | 8,20 |
| 12 years (n=18) | 0,18 | 7,89±2,52 | 44,30 |
| 13 years (n=16) | 0,13 | 12,55±3,16 | 45,10 |
| 14 years (n=20) | 0,69 | 13,72±2,05 | 34,40 |
| 15 years (n=11) | 9,50 | 27,15±2,62* | 38,10 |
| 16-17 years (n=14) | 14,39 | 26,51±2,83 | 51,10 |

Note: * - hereinafter, the reliability of differences in comparison with the previous age group according to the Student's t-test at $p < 0.05$.

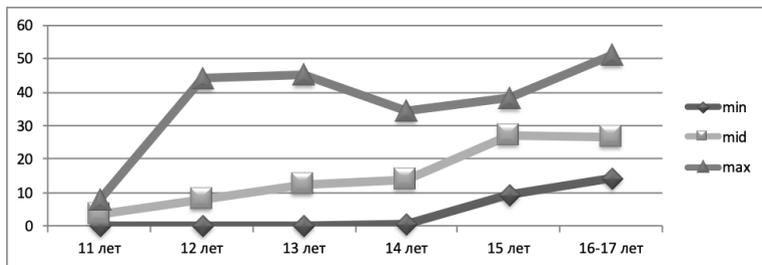


Fig. 1. Dynamics of minimum, maximum and average values of testosterone (TSR) in boy and young men swimmers at the age of 11-17 years

From what is shown in graph in the Fig. 1 it can be seen that the dynamics of the TSR concentration in the blood of young male swimmers is characterized by a significant unevenness of the rate of its growth. Two periods of intense growth ("jump") of testosterone levels in the blood of young swimmers are clearly observed. The first "jump" is observed at age 12, when the level of TSR increases in one year by 107.6% in relation to the level of this hormone in swimmers of 11 years.

The second "leap" is observed at 15 years old. In this age group, the increase in testosterone concentration is 97.9% in relation to the group of 14-year-old swimmers. Thus, in swimmers at the age of 12 and 15, the level of TSR in the blood suddenly doubles.

It is known that somatotropin, among other hormones, has a wide spectrum of metabolic and morphogenetic effects, which is expressed in connection with the general reactivity and resistance of the organism and affects the dynamics and rates of differences in morpho-phenotypes and physical development [5].

In this regard, we have determined the average values, maximum and minimum values of the somatotrophic hormone (STG) in the entire studied age range (11-17 years) in boys and young men involved in sports swimming. The digital values of this hormone are shown in Table 2, and the age-group dynamics is clearly shown in Fig. 2.

Table 2
Minimum, maximum and average values of somatotropin (STG) in boy and young men swimmers at the age of 11-17 years (mIU/l)

| Age and gender | Minimum (Min) | Average value (M±m) | Maximum (Max) |
|--------------------|---------------|---------------------|---------------|
| 11 years (n=14) | 0,31 | 10,97±3,78 | 53,16 |
| 12 years (n=18) | 0,16 | 15,03±5,27 | 74,80 |
| 13 years (n=16) | 0,17 | 16,99±2,81 | 40,80 |
| 14 years (n=20) | 0,71 | 13,40±3,14 | 66,21 |
| 15 years (n=11) | 0,16 | 13,15±6,89 | 79,10 |
| 16-17 years (n=14) | 0,18 | 10,55±3,17 | 34,51 |

Comparative analysis of the average values of the level of somatotrophic hormone content in young swimmers showed that in the period from 11 to 13 years old there is a relatively smooth progressive increase in its concentration in the blood from 10.97 ± 3.78 mIU/l at 11 years old to 16.99 ± 2.81 mIU/l at 13 years (see Fig. 2).

Starting from the age of 14, the concentration of STG in the blood of young swimmers also gradually decreases. At 14 years old, this indicator already amounts to 13.40 ± 3.14 mIU/l, at 15 years it remains practically unchanged (13.15 ± 6.89

mIU/l), at 16-17 years old it decreases to 10.55 ± 3.17 mIU/l.

Such dynamics is quite consistent with the literature data, where it is noted that in men a decrease in STG level is observed even after 14 years, while an inverse relationship of its activity with passport and biological age is shown [6].

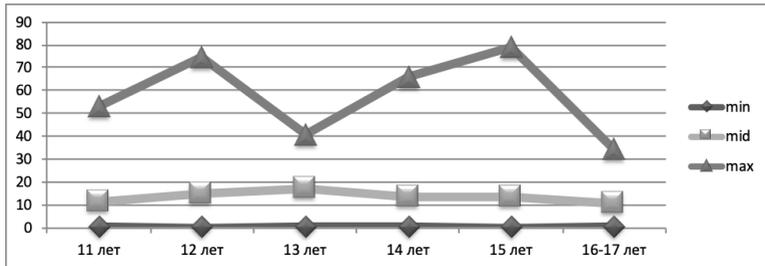


Fig. 2. Dynamics of the minimum, maximum and average values of somatotrophic hormone (STG) in boy and young men swimmers at the age of 11-17 years

It should be noted that the observed relatively smooth dynamics of the average STG values in the blood of young swimmers is accompanied by a very significant scatter of the individual minimum, and especially the maximum values of this hormone.

At the same time, the age dynamics of the maximum values of somatotrophic hormone draws attention. In fig. 2 you can see that there are two pronounced "peaks" in the concentration of the maximum STG values. One of them is found in the group of young swimmers 12 years old, and the second, in the group of 15 year old athletes.

This makes it necessary in the future to distribute the entire studied contingent into certain individual-typological groups, and the level of STG content to be more carefully correlated with other typological parameters.

Another indicator, the age dynamics of which we studied in the course of this work, was cortisol. Cortisol is involved in the optimization of the regulation of body functions during muscle activity, ensures the leveling of extreme emotional states, and helps to maintain homeostasis under stress [9]. At the same time, an excessive increase in cortisol inhibits the release of testosterone [7], which leads to a decrease in performance.

Table 3 shows the minimum, maximum and mean values of cortisol (CRS) in young swimmers in the studied age range from 11 to 17 years.

Table 3

Minimum, maximum, and mean values of cortisol (CRS) in boy and young men swimmers at the age of 11-17 years (Nmol/l)

| Age and gender | Minimum (Min) | Average value (M±m) | Maximum (Max) |
|--------------------|---------------|---------------------|---------------|
| 11 years (n=14) | 20,40 | 377,30±65,24 | 678,96 |
| 12 years (n=18) | 41,37 | 489,51±75,84 | 1217,20 |
| 13 years (n=16) | 358,45 | 575,73±38,06 | 913,20 |
| 14 years (n=20) | 193,13 | 512,52±32,36 | 830,90 |
| 15 years (n=11) | 405,52 | 805,04±86,26* | 1306,50 |
| 16-17 years (n=14) | 67,49 | 701,35±74,28 | 1106,30 |

From the data presented in Table 3, it can be seen that the average values of the cortisol content in the blood of young swimmers increases relatively smoothly from 11 to 13 years old. This increase is replaced by a slight decrease in the CSR concentration at 14 years old, and then by a rather sharp and statistically significant ($P < 0.05$) increase at 15 years old to 805.04 ± 86.26 Nmol/l. At the age of 16-17, the level of cortisol in the blood decreases slightly to 701.35 ± 74.28 Nmol/l.

It is noteworthy that the greatest range between the minimum and maximum values of cortisol is observed in swimmers at the age of 12. Exactly the same dynamics, and the same significant range between the minimum and maximum values, is noted in similar values of other hormones we study. Cortisol is a catabolic hormone and its increased concentration causes a decrease in muscle protein, while testosterone activates protein synthesis [8]. This indicator is widely used in practice, especially in sports training in order to quickly assess the optimality of the course of adaptation processes [3]. This suggests that the age period of 12 years for boys swimmers is critical, at least with regard to the dynamics of the hormonal status of their body. And this also necessitates further more thorough and voluminous research, since it is very likely that this age period may be of much greater importance than it is currently given.

Conclusion

The results of the study allow us to conclude that the dynamics of an increase in the content of testosterone in the blood of young male swimmers is characterized by an uneven rate of its growth. There are two peaks of an intense increase in testosterone levels in the blood of young swimmers - at 12 years old (an average increase of 107.6%, in relation to the previous age group) and at 15 years (an increase of 97.9%).

The dynamics of the level of concentration of somatotropic hormone in the body of young swimmers is characterized by a smooth progressive increase in its content in the body from 11 to 13 years old, starting from the age of 14, its concentration gradually decreases, at 15 years it remains practically unchanged, and

at 16-17 years it continues to decrease.

The average values of the concentration of cortisol in the blood of young swimmers rise relatively smoothly from 11 to 13 years. This increase is replaced by a slight decrease in its content at the age of 14, and then by a significant increase at the age of 15 and a slight decrease at the age of 16-17.

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常春藤常春藤的抗氧化活性

ANTIOXIDANT ACTIVITY OF IVY HEDERA HELIX L.

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以异丙苯氧化的模型反应为例，研究了常春藤的根茎，茎，叶和花的乙酸乙酯提取物的含量和抗氧化活性。发现所有研究的提取物均表现出抗氧化性能。结果表明，根据抗氧化剂的有效含量，常春藤器官排成一列：花>叶>根茎>茎，分别为： $1,19 \cdot 10^{-4}$ ， $0,76 \cdot 10^{-4}$ ， $0,70 \cdot 10^{-4}$ 和 $0,68 \cdot 10^{-4}$ mol / l。

还从反应速率常数确定了抗氧化活性。 $RO_2 + InH \xrightarrow{k_7} ROOH + In\cdot$ 被研究提取物的抗氧化活性是连续排列的：根茎 ($1,48 \cdot 10^5$) > 茎 ($1,31 \cdot 10^5$) > 叶 ($0,78 \cdot 10^5$) > 花 ($0,42 \cdot 10^5$ l / mol·s)。

关键词：抗氧化剂含量，抗氧化活性，乙酸乙酯提取物，常春藤。

Abstract. *By the example of a model reaction of cumene oxidation, both the content and the antioxidant activity of the ethyl acetate extract of rhizomes, stems, leaves and flowers of common ivy were studied. It was found that all investigated extracts exhibit antioxidant properties. It has been shown that according to the effective content of antioxidants, ivy organs are arranged in a row: flowers > leaves > rhizomes > stems, respectively: $1,19 \cdot 10^{-4}$, $0,76 \cdot 10^{-4}$, $0,70 \cdot 10^{-4}$ and $0,68 \cdot 10^{-4}$ mol/l in 1 mg.*

The antioxidant activities were also determined from the reaction rate constants $RO_2 + InH \xrightarrow{k_7} ROOH + In\cdot$. The antioxidant activity of the investigated extracts is arranged in a row: rhizomes ($1,48 \cdot 10^5$) > stems ($1,31 \cdot 10^5$) > leaves

$(0,78 \cdot 10^5) > \text{flowers } (0,42 \cdot 10^5 \text{ l/mol}\cdot\text{s})$.

Keywords: *antioxidant content, antioxidant activity, ethyl acetate extract, common ivy.*

The metabolic processes in the body are based on redox reactions. Among them, a special role is played by free radical reactions, in which peroxide compounds are formed. The initiators of the formation of such substances are free radicals - molecules or structural fragments of molecules that have an unpaired electron in one of the oxygen atoms in the outer orbital [1,2]. The biological role of free radicals in the body is very great. They take part in the activity of a number of membrane enzymes, the metabolism of some hormones, have an antibacterial effect, and initiate the oxidation reaction of substrates [3-5]. Free radical oxidation at its physiological intensity is a normal metabolic process. However, the powerful cytotoxic effect of free radicals used by the body to destroy pathogenic microorganisms and its own defective cells can be potentially dangerous, since uncontrolled "leakage" of free radicals often leads to irreversible damage to lipid molecules, proteins, and nucleic acids [6,7]. Increased generation of peroxides creates a negative contribution to the progression of atherosclerosis, ischemic heart disease, angina pectoris, gastrointestinal diseases, etc. [8-10].

In contrast to the processes of free radical oxidation in the body, there is a universal antioxidant system. In this regard, a special place is also occupied by natural antioxidants (AO) of plant origin, which are characterized by low toxicity, are easily obtained and have polyfunctional activity [11-13]. Therefore, the search and study of plant extracts with the highest antiradical and antioxidant activity (AOA) is a very urgent task. The therapeutic effect of medicinal plants is associated with the presence of pharmacologically active substances in them, which, when entered into the body of humans and animals, exhibit physiologically active properties and have a therapeutic effect.

Therefore, when choosing promising antioxidants, special attention is paid to the extracts of such plants, which (according to the literature) contain a significant amount of compounds that have the strongest antioxidant effect (flavonoids, terpenoids, glycosides, carotenoids, etc.) [14].

In this work, we investigated the AO properties of the common ivy extract (CI). Ivy is a woody liana with five-lobed leaves, which climbs with the help of aerial roots - suckers. In room culture, ordinary ivy, as well as its types and varieties, practically does not bloom. On the street, this plant can bloom in the ninth - tenth year of cultivation. Folk medicine uses the leaves and stems of the plant. Doctors say that thanks to the high molecular weight carbohydrates, the plant has a sorption effect. Antibacterial, expectorant and antifungal effects are promoted by the inherent triterpenoid glycosides [15]. Ivy leaves, which contain saponins,

hederin, as well as inositol, carotene, formic and malic acids, and stems, which contain gum, are used for chronic inflammation of the mucous membranes, tuberculosis, rickets, and other diseases. Fresh they are used as an external remedy for burns, for bandaging purulent wounds [16,17].

Despite the large number of studies devoted to this plant species, there are a number of problems that require additional study. First of all, these are the problems of the variability of the chemical composition of the vegetative organs of a given plant, associated with climatic features, soil composition, environmental factors, which have recently been given special importance [18].

In this regard, before using this plant raw material for medicinal purposes, or as a source of AO, it is necessary to study these properties of herbal extracts growing in a given geographical area.

The aim of our work is to study the AO properties of raw materials of various organs of the common ivy plant.

Experimental part

To determine the effective content of antioxidants (AO) in the extracts and their antioxidant activity (AOA), the roots, stems, flowers and leaves of common ivy growing in the vicinity of Goris (1650 m. Sea level) were examined. The CI herb was harvested in mid-August 2018. The raw materials were air-dried in an oven at 313K, packed in paper bags and stored at room temperature. To obtain the extract, the dried raw material was ground in a ceramic mortar to a powdery state, passed through a sieve with a diameter of 1 mm. Distilled ethyl acetate in a ratio of 1:20 (20 ml per 1 g of powder) was added to the resulting powder at room temperature, after 24 hours it was filtered with a paper filter. The filtrate was evaporated to constant weight at room temperature in a vacuum oven. The choice of ethyl acetate is justified by the fact that of the previously tested extractants (ethanol, chloroform, diethyl ether, methanol, benzene, ethyl acetate, acetone) [10], the largest amount of AO is extracted with ethyl acetate.

The AO properties of the obtained extracts were studied by the kinetic method using the example of a model reaction of initiated oxidation of cumene. Oxidation experiments were carried out on a manometric unit with automatic pressure control [19]. Azo-di-isobutyronitrile (AIBN) was used as the initiator of primary radicals; chlorobenzene served as a solvent. The volume of the reaction mixture in all experiments was 5 ml, the concentration of cumene was 2.87 mol/l. The reagents used — cumene, chlorobenzene, AIBN, and ethyl acetate — were purified according to the procedure described in [20].

The AO effect of the extracts was evaluated by the periods of induction (τ) of oxygen absorption during the oxidation of cumene, which is described by equation

$$(1), \quad \tau = \frac{f \cdot [lnH]}{v_i} \quad (1)$$

where $f \cdot [InH]$ - effective content of AO in a given sample of extract, V_i - initiation rate, f - stoichiometric inhibition coefficient (the number of radicals terminated on one inhibitor molecule InH). Since the extracts of plant raw materials represent a multicomponent system, including those containing different AOs in terms of chemical composition, the coefficient f was not calculated and, therefore, in the investigated extracts, not absolute, but effective AO contents were determined, i.e. product of $f \cdot [InH]$ (Tab.1).

Results and discussion

Experiments have shown that during the oxidation of cumene, pronounced induction periods appear on the kinetic curves of oxygen absorption in the presence of the studied extracts (Fig. 1). The appearance of the induction period indicates the presence of AO substances in the extracts. The detected induction periods are described by equation (1). Straightening the experimental data (Fig. 2) in the coordinates of equation (1), we determined the effective content of AO ($f \cdot [InH]$) in the investigated extracts in units of mol/l. The calculation results are shown in Tab.1.

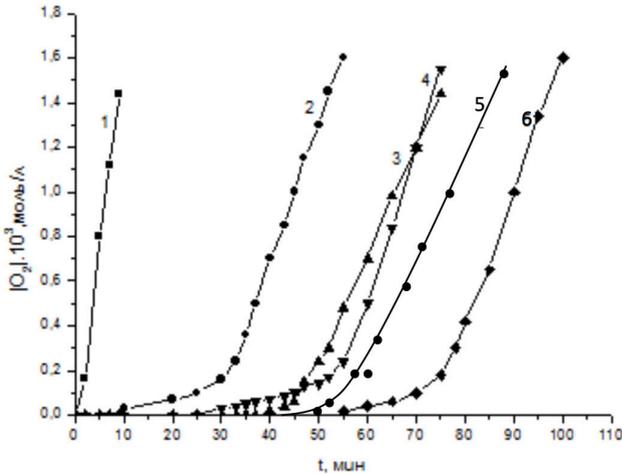


Fig. 1. Kinetic curves of oxygen absorption of oxidizing cumene in the absence (1) and in the presence of ethyl acetate extract of 3.01 mg rhizome (2), 5.0 mg rhizome (3), 5.25 mg leaves (4), 6.1 mg stems (5) and 4.75 mg of flowers (6) of the common ivy. $V_i = 1,25 \cdot 10^{-7}$ mol/l · s, $T=348K$

Table 1. Effective content of AO and AOA extracts of various organs of common ivy

| Organ | T, °K | V _i ·10 ⁷ , mol/l.s | Extract weight mg | τ, min | f[lnH] ⁺ ·10 ⁴ mol/l | AOA | |
|----------|-------|---|-------------------|--------|--|--|--|
| | | | | | | k _i ·10 ⁻⁴ l/ mols | k _τ ·10 ⁻² l/ mols |
| Rhizomes | 348 | 1.25 | 3.01 | 28 | 0.70 | 14.77 | 1.80 |
| | | 2.50 | 3.01 | 14 | 0.71 | 14.75 | 1.85 |
| | | 0.625 | 3.01 | 54 | 0.70 | 14.79 | 1.85 |
| | | 1.25 | 1.50 | 14 | 0.70 | 14.80 | 1.80 |
| | | 1.25 | 6.02 | 55 | 0.69 | 14.75 | 1.88 |
| | 339 | 0.783 | 3.30 | 56 | 0.80 | 12.75 | 1.73 |
| | | 0.783 | 1.65 | 28 | 0.80 | 12.80 | 1.75 |
| | | 1.25 | 3.30 | 35 | 0.79 | 12.65 | 1.74 |
| | 328 | 0.344 | 0.825 | 43 | 1.07 | 10.37 | 1.62 |
| | | 0.3444 | 1.05 | 55 | 1.08 | 10.35 | 1.65 |
| 0.75 | | 1.05 | 25 | 1.07 | 10.40 | 1.60 | |
| Leaves | 348 | 1.25 | 3.30 | 33 | 0.75 | 7.80 | 4.20 |
| | | 1.25 | 5.25 | 53 | 0.76 | 7.82 | 4.25 |
| | | 2.50 | 5.25 | 27 | 0.77 | 7.78 | 4.18 |
| | | 2.50 | 7.50 | 38 | 0.76 | 7.80 | 4.20 |
| | 339 | 0.783 | 1.20 | 28 | 1.09 | 4.31 | 3.46 |
| | | 0.783 | 2.40 | 55 | 1.08 | 4.30 | 3.45 |
| | | 0.780 | 2.40 | 24 | 1.07 | 4.32 | 3.45 |
| | 328 | 0.344 | 0.25 | 15 | 1.24 | 1.93 | 2.70 |
| | | 0.3444 | 0.75 | 45 | 1.25 | 1.92 | 2.69 |
| | | 0.783 | 1.25 | 32 | 1.23 | 1.93 | 2.71 |
| Stems | 348 | 1.25 | 3.25 | 29 | 0.68 | 11.82 | 7.17 |
| | | 2.50 | 3.25 | 15 | 0.69 | 11.83 | 7.18 |
| | | 0.625 | 3.25 | 59 | 0.68 | 11.80 | 7.16 |
| | | 1.25 | 5.00 | 45 | 0.68 | 11.84 | 7.17 |
| | 339 | 0.783 | 1.65 | 33 | 0.93 | 7.81 | 5.93 |
| | | 0.783 | 3.25 | 65 | 0.90 | 7.80 | 5.95 |
| | | 0.783 | 4.50 | 91 | 0.95 | 7.82 | 5.91 |
| | | 1.25 | 4.50 | 56 | 0.94 | 7.79 | 5.93 |
| | 328 | 0.344 | 0.86 | 52 | 1.24 | 4.47 | 4.16 |
| | | 0.344 | 0.43 | 25 | 1.22 | 4.50 | 4.20 |
| 0.688 | | 0.43 | 26 | 1.26 | 4.44 | 4.12 | |
| Flowers | 348 | 1.25 | 3.06 | 49 | 1.19 | 4.26 | 2.49 |
| | | 1.25 | 4.59 | 75 | 1.22 | 4.28 | 2.44 |
| | | 2.50 | 4.59 | 36 | 1.16 | 4.24 | 2.49 |
| | | 2.50 | 6.12 | 49 | 1.19 | 4.26 | 2.54 |
| | 339 | 0.783 | 2.04 | 54 | 1.25 | 2.71 | 2.14 |
| | | 0.783 | 4.08 | 111 | 1.28 | 2.75 | 2.15 |
| | | 1.25 | 4.08 | 77 | 1.25 | 2.70 | 2.16 |
| | | 2.5 | 4.08 | 33 | 1.23 | 2.67 | 2.12 |
| | 328 | 0.344 | 0.72 | 47 | 1.35 | 1.50 | 1.80 |
| | | 0.344 | 1.44 | 91 | 1.31 | 1.53 | 1.75 |
| 0.783 | | 1.44 | 41 | 1.35 | 1.47 | 1.77 | |
| 1.25 | | 1.75 | 32 | 1.39 | 1.50 | 1.76 | |

* the accuracy of measuring the kinetic parameters is ±5%.

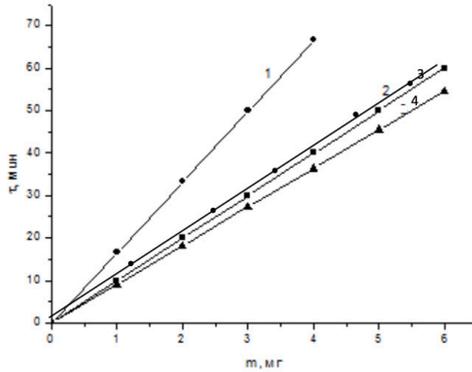
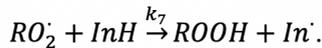


Fig. 2. Dependence of the periods of induction of oxygen absorption of oxidizing cumene on the content of extracts of flowers (1), stem (2), rhizome (3), and leaves (4) of common ivy. $V_i = 1,25 \cdot 10^{-7}$ mol/l · s, $T=348K$.

The fact that the effective content of antioxidants does not depend on the initial mass of the extract and the rate of initiation is evidence of the repeatability of the results obtained, and is repeated in terms of 1 mg of extract at a given temperature.

From the results shown in Table 1, it follows that the CI flowers contain 1.5 times more AO than the extract of its leaves. These results once again confirm the fact that the chemical composition of various plant organs has a different chemical composition.

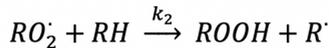
The AOA of the investigated extracts was also measured, i.e. the rate constant of the reaction of peroxy radicals (in our case cumyl peroxy radicals - RO_2) with inhibitors



When determining the values of k_7 , the experimental data on oxygen uptake during the induction period were straightened in the coordinates of equation 2 [21]

$$[O_2] = -\frac{k_2}{k_7} [RH] \ln\left(1 - \frac{t}{\tau}\right) \quad (2)$$

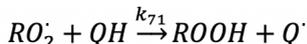
where, $[O_2]$ – the amount of oxygen consumed in time $t < \tau$, $[RH]$ – oxidizable hydrocarbon concentration, k_2 - chain extension reaction rate constant



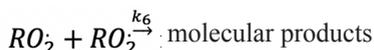
When calculating k_7 it was taken into account that for cumene, $k_7 = 4,66 \cdot 10^6 \exp(-9800/RT)$ l/mol.s [22].

The table shows that the AOA of the CI rhizome extract is 3.5 times higher than the AOA of the flower extract.

The table also shows the k_{71} , values characterizing the AOA of the products (QH) of the oxidation of the starting AO. It can be seen from the kinetic curves of oxygen absorption (Fig. 1) that after exiting the induction period, the rate of oxygen oxidation remains significantly underestimated compared to the rate of inhibited oxidation (compare the tangents of the angles of straight lines 1 and 2-5). Moreover, in the presence of QH, the kinetic curves do not show induction periods [23]. This indicates that, in the presence of QH, the chain is terminated both linearly,



and quadratically



It was found that between the rates of uninhibited oxidation of cumene (V_0) and after the exit from the induction period (V), there is a dependence

$$\frac{V_0}{V} - \frac{V}{V_0} = \frac{k_{71}f[Q]}{\sqrt{k_6V_i}} \quad (3)$$

When calculating k_{71} , the experimental data were straightened in the coordinates of equation (3). It was taken into account that for cumene $k_6 = 4,74 \cdot 10^5 \exp(-1800/RT)$ [22] and that $f[Q]=f[InH]$. The results obtained indicate that the AOA QH is much less compared to the original AO contained in the investigated extracts.

The values of k_7 and k_{71} were measured in the range 328-348K and by straightening them in the $\lg k_i - T^{-1}$ coordinates, their temperature dependences were obtained in the form of the Arrhenius equation [$k_i=A_i \exp(-E/RT)$]. The results are shown in Table 2.

Table 2. Temperature dependence of AOA (k_7 and k_{71}) of the studied extracts

| Extract name | lgA, l/mol.s | | E, cal. | |
|--------------|------------------|-------------------|----------------|-----------------|
| | lgA ₇ | lgA ₇₁ | E ₇ | E ₇₁ |
| CI rhizomes | 7.67 | 3.01 | 4007 | 1195 |
| CI leaves | 15.03 | 5.51 | 16120 | 5030 |
| CI stems | 12.10 | 6.12 | 11177 | 5193 |
| CI flowers | 12.06 | 4.83 | 11840 | 3863 |

Conclusions

1. It has been established that the effective content of AO in CI depends on the plant organs.
2. In order to withstand external aggressive environmental influences, more antioxidants accumulate in CI flowers, as evidenced by the results obtained.
3. Of the various CI organs, the rhizome extract exhibits the greatest AOA, which is most likely due to the fact that different organs contain different antioxidants.

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