



# 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

Materials of the  
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国际会议

参与者的英文报告

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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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## 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 56 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,  
member of the Chinese Academy of 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”



强制医疗保险制度中牙科服务财务费用动态分析  
**ANALYSIS OF DYNAMICS OF FINANCIAL COSTS ON DENTAL SERVICES IN THE COMPULSORY HEALTH INSURANCE SYSTEM**

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**Butova Valentina Gavrilovna**

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*Central Research Institute of Dentistry and Maxillofacial Surgery*

抽象。 CHI计划在5年期间提供的牙科服务资助增加了16.0%，到2017年达到605亿卢布，其总体结构中的最大成本部分访问了该疾病 - 超过70%。 预防性服务的成本份额是四分之一。 1名被保险公民的成本略有上升11.45%，2017年对应412,06卢布。 2017年平均融资成本1次访问为533,06卢布。最便宜的是紧急形式的访问，其成本增加了35%，达到608.97卢布。 到2017年，这表明患者的病理恶化及其对牙科服务的不合时宜的治疗。 及时申请牙科服务，计划提供，启动预防措施将降低牙科服务的财务成本。

关键词：融资，牙科服务，强制医疗保险计划

**Abstract.** *The Funding of dental services provided by CHI program over a 5 – year period increased by 16.0%, reaching 2017 of 60.5 billion rubles, the Maximum fraction of the cost in their General structure has on a visit for the disease - more than 70%. The share of costs for preventive services is a quarter. The cost of 1 insured citizen have a tendency of a slight increase by 11.45% and correspond in 2017 412,06 RUB. Average funding costs 1 visit to be 533,06 RUB in 2017. The most expensive were visits in emergency form, their cost increased by 35%, amounting to 608.97 rubles. by 2017, which indicates the aggravation of pathology in patients and their untimely treatment for dental services. Timely application for dental services, their planned provision, activation of preventive measures will reduce the financial costs of dental services.*

**Keywords:** *financing, dental services, Compulsory health insurance program*

The purpose of the State Program is to ensure the availability of medical care and increase the efficiency of medical services, the volumes, types and quality of which should correspond to the level of morbidity and the needs of the population,

and the latest scientific achievements. The priority indicators in the implementation of the CHI program and ensuring the quality of dental services are the costs of financing the CHI system [177].

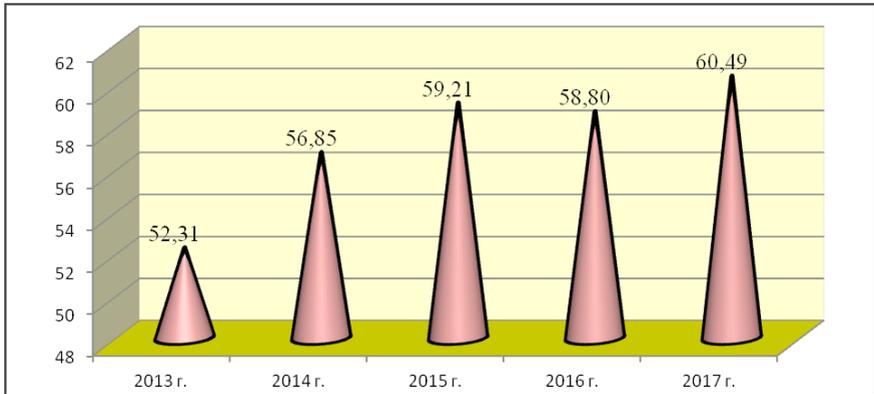
Letters of the Ministry of Health and the Federal Health Insurance Fund emphasize that when paying for outpatient dental care for visits and appeals, it is recommended to take into account the conventional units of labor-intensiveness (CUL) that have been used in dentistry for many years to plan the accounting of services provided, to report on the activities of specialists, and to pay them. Payment of dental care on an outpatient basis for tariffs based on CUL should be based on adherence to the principle of maximum reorganization of the oral cavity and teeth (treatment of 2, 3 teeth) per visit, which is most effective, as it reduces the time to call the patient, preparation of a workplace, a transaction field, work with documents, etc.

We analyzed the dynamics of the existing volume, type and cost of dental services provided by the CHI program in Russia in 2013-2017. The source of information was the materials of the state statistical annual reports of the Ministry of Health of the Russian Federation for a five-year period:

- "Information on the work of medical organizations in the field of CHI in the Russian Federation", form No. 14-MED (CHI), section "Main indicators of the activities of medical organizations on the provision of dental care in an outpatient setting".

In the course of the present study, an analysis and assessment of the value of indicators were carried out, comparing and comparing them in dynamics, in determining the relationship between indicators, their conditionality. Statistical, economic, analytical and graphical methods, interpretation of the data and conclusions were used. The relationship between the number of visits and the amount of their funding was established by the method of correlation analysis using the Pearson formula.

The research results show that funding for dental services provided by the CHI program is constantly increasing. So, for the 5-year period under study, this figure increased by 13.5%, corresponding to 2013 52306523937.65 rubles, in 2014 - 56851 842 660.21 rubles, in 2015 - 59 214 608 164.69 rubles. , in 2016 - 58,800,768,991.65 rubles, in 2017 - 60,491,976,322.51 rubles. (Picture 1). The inflation process, which took place from 2013 to 2017, according to the Ministry of Economic Development of the Russian Federation, was 19%.

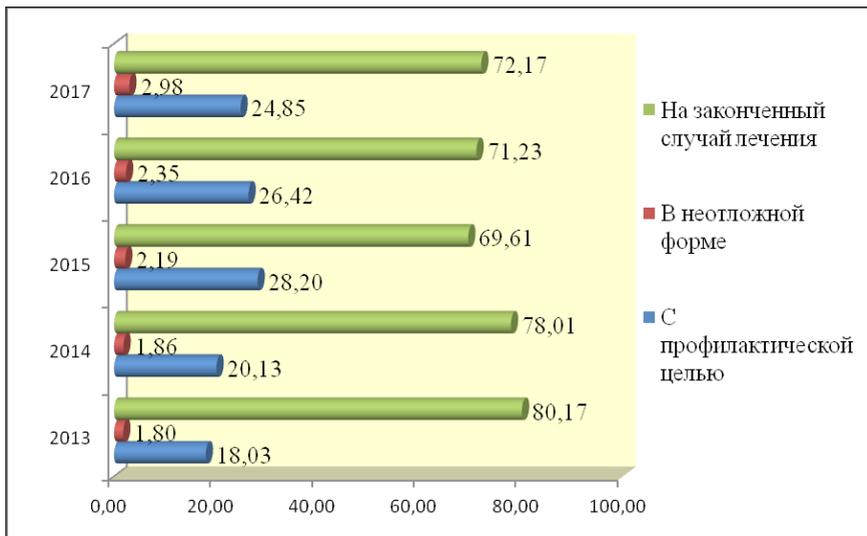


*Figure 1 - Dynamics of financing dental services of the CHI system (billion rubles)*

The structure of expenses for the financing of dental services according to the purpose of treatment is presented in Table 1. An analysis of the financing of services by goal of treatment allowed us to establish their growth in 2017 by the base period (2013) by 1.04 times for the completed treatment case, 1.59 times for preventive services and 1.91 times for emergency dental care. The results of the study indicate that the maximum share of expenses in the structure of expenses for dental services - from 80% (2013) to 70% (subsequent years), accounts for visits for the disease. In the study period, the share of costs for services with a preventive purpose is very variable and amounts to: 18.03% in 2013, 20.13% in 2014, 28.20% in 2015, 26.42% in 2016 and 24.85% in 2017. The share of costs for emergency dental care ranges from 1.8% in 2013 to 2.98% in 2017 (Figure 2).

*Table 1 - The structure of the cost of financing dental services for the purpose of treatment*

Years	Cost of visits including dental services rendered (rubles)			
	With the preventive purpose	In urgent form	On the finished case of treatment	For all types of visits, including dental services
2013	9 430 094 157,90	941 680 807,51	41 934 748 972,24	52306523937,65
2014	11 445 426 270,41	1 055 674 652,96	44 350 741 736,84	56 851 842 660,21
2015	16 700 064 483,04	1 297 264 005,83	41 217 279 675,82	59 214 608 164,69
2016	15 535 289 474,91	1 384 449 187,93	41 881 030 328,81	58 800 768 991,65
2017	15 034 764 169,88	1 800 944 001,84	43 656 268 150,79	60 491 976 322,51
Growth	1,59	1,91	1,04	1,16



**Figure 2 - Structure of costs for dental services in terms of treatment (%)**

Analysis of the dynamics of expenses for 1 insured citizen allowed us to establish the trend of their constant, but insignificant growth. So in the study period, they increased by only 11.45% and correspond to: 364.89 rubles. in 2013, 395.72 rubles. in 2014, 405.84 rubles. in 2015, 401.25 rubles. in 2016 and 412.06 rubles. in 2017. (Table 2). At the same time, CUL should note a one and a half fold increase in expenditures on preventive goals from 65.79 rubles. in 2013 to 102.41 rubles. in 2017. However, over the past 2 years there has been a decrease in this indicator. Also, the expenses for 1 insured citizen for the provision of emergency dental care increased by two times. The results of the study indicate a lack of activity in the conduct of planned dental services and the delayed treatment of the population for dental care.

*Table 2 - Dynamics of expenses for dental services of the CHI system for 1 insured in accordance with the purpose of treatment*

Years	Expenses for 1 insured (rub.)			
	With the preventive purpose	In urgent form	On the finished case of treatment	TOTAL
2013	65,79	6,57	292,54	364,89
2014	79,67	7,35	308,71	395,72
2015	114,17	8,87	281,79	404,84
2016	106,01	9,45	285,79	401,25
2017	102,41	12,27	297,38	412,06
Growth	1,56	1,87	1,02	1,13

When executing a state order for the implementation of the CBC and planning financial support, medical organizations are guided by the cost of 1 visit per treatment goal, therefore, these indicators need to be updated. This study found that the average standards of financial costs 1 visit is: 401.71 rubles. in 2013, 442,90 rub. in 2014, 505.47 rubles. in 2015, 507.68 rubles. in 2016 and 533.06 rubles. in 2017. The dynamics of the cost of one visit for the purpose of treatment is presented in Table 3.

It is necessary to focus on the cost of providing dental services when applying to medical organizations for a disease that is a complete case of treatment.

*Table 3 - The Dynamics of the cost of one visit for the purpose of treatment*

Years	The cost of one visit (rub.)			
	With the preventive purpose	In urgent form	On the finished case of treatment	For all types of visits
2013	353,37	451,52	413,40	401,71
2014	375,20	470,12	463,86	442,90
2015	523,80	515,01	498,11	505,47
2016	505,65	538,29	507,48	507,68
2017	530,55	608,97	531,20	533,06
Growth	1,50	1,35	1,28	1,33

Earlier (in section 3.1.) The number of visits in 1 completed case of treatment of a dental disease, given their multiplicity, is indicated, the cost of treatment will be 1012.83 rubles. in 2013, 1182.84 rubles. in 2014, 1,170.56 rubles. in 2015, 1,192.58 rubles. in 2016 and 1264.26 rubles. in 2017. (Table 4).

*Table 4 - The Dynamics of the cost of one completed case of treatment*

Years	Cost of 1 visit in the finished case of treatment (rub.)	Number of visits in one completed case of treatment	Cost of a completed treatment case (rub.)
2013	413,40	2,45	1012,83
2014	463,86	2,55	1182,84
2015	498,11	2,35	1170,56
2016	507,48	2,35	1192,58
2017	531,20	2,38	1264,26

In the study period, with the exception of 2015, visits in the urgent form turned out to be the most expensive, their cost from 451.52 rubles. in 2013 increased by 35%, reaching 608.97 rubles. by 2017. The minimum cost has developed for services with the preventive purpose, although their cost is from 353.37 rubles. in 2013 increased by 50%, reaching 530.55 rubles. by 2017.

#### **Conclusion**

Financing of dental services provided under the CHI program over the 5-year period increased by only 16.0%, reaching 60.5 billion by 2017. rub. The maximum share of costs - more than 70% in their overall structure accounts for visits for the disease. The share of the cost of services for the preventive purpose is the fourth part. The cost of 1 insured citizen in 2017 has a tendency to slightly increase by 11.45% and correspond to 412.06 rubles. The average standards of financial expenses for 1 visit in the same year are 533.06 rubles. Urgent visits turned out to be the most expensive, their cost increased by 35%, reaching 608.97 rubles. by 2017. This fact testifies CUL about the weighting of the pathology in patients and the untimely treatment of dental services. Timely treatment for dental services, their planned provision, activation of preventive measures will reduce the financial costs of dental services.

银行业：增加残疾人银行产品和服务的可用性

## **BANKING: INCREASING THE AVAILABILITY OF BANKING PRODUCTS AND SERVICES FOR PEOPLE WITH DISABILITIES**

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注解。 本文讨论了中央银行旨在改善残疾人和行动不便人士提供金融服务的活动。 作为麦当劳网络 (MacAvto) 的一个例子，作者提出了一种可能性，即银行员工在汽车中识别残疾客户，客户使用该生物识别。

关键词：残疾，身份，办公室，银行服务，客户。

***Annotation.** The article discusses the activities of the Central Bank aimed at improving the availability of financial services for people with disabilities and people with limited mobility. Using the example of the McDonald's network (MacAvto), the author proposes the possibility of identifying a client with disabilities by a bank employee right in the car, on which the client was brought using biometric identification.*

***Keywords:** disabilities, identification, offices, banking services, client.*

According to the RIA Novosti survey, in 2017, Russian banks made a big step towards the adaptation of bank branches, ATMs and digital services for people with disabilities, elderly and disabled people [5].

According to the federal register of persons with disabilities, as of April 1, 2018, more than 12 million people with disabilities live in Russia [3]. At the same time, according to a NAFS study, the vast majority of them use the following banking services: accounts (92%), bank cards (82%), deposits (40%) and bank loans (16%) [7].

In early 2017, the Bank of Russia established a working group to increase the availability of financial services for such people. The composition of the working group: representatives of the Central Bank, public organizations and associations of persons with disabilities, the State Duma, the Council of the Federation, relevant ministries and departments, banks, financial organizations, associations, self-regulatory organizations, universities and other organizations. It should be noted that the initiator of the setting up of the working group was the pop singer, a member of the Public Chamber of the Russian Federation, the Commission under the President of the Russian Federation on Disabled Affairs Diana Gurtuskaya [4].

The working group of the Central Bank has currently approved recommendations on creating a barrier-free environment for people with disabilities and people with limited mobility in Russian banks. The Central Bank sent letters with recommendations to banks, special studies and a survey of clients with disabilities were also planned to evaluate the results of the work being done and to identify the main trends in terms of affordability.

Also, the Central Bank plans to introduce a phased banking supervision system to assess the quality of services provided to people with disabilities, the elderly and people with limited mobility. It is worth noting that in 2017, the Central Bank held a seminar on understanding disability for managers of large banks and recommended them to retrain their bank employees in this direction.

The Central Bank is also working on the development of a special rating of credit institutions, in which it is possible to apply tough measures for those who do not comply with the recommendations [6]. A rating technique is being developed [2].

**In the Strategy of increasing financial affordability in the Russian Federation for the period 2018–2020, the direction of increasing financial accessibility for people with disabilities, the elderly and other people with limited mobility is also highlighted in a separate priority area of activity [1].**

Thus, Russian banks are following the recommendations of the Central Bank. For example, Raiffeisenbank JSC has developed remote service channels, employees of the bank's information center provide information on the nearest equipped offices for people with disabilities and people with limited mobility, take calls to visit the manager to the client, etc.

Also, if we look at the activities of AKB Rosbank of the French group Societe Generale, which has always paid attention to the subject of socialization of people with disabilities, then an example is the annual charity run for children with Down syndrome, in which employees of the Societe Generale group participate" in Russia.

Currently, the following activities are carried out by Russian banks: new bank branches are designed and built taking into account the need to serve people with disabilities; banks equip terminals with the marking of the keyboard buttons in a relief-dot font; implement developed training courses for employees working with these groups of the population.

Currently, the picture of customer service with disabilities is as follows: customers are brought to the bank by car, if there is a ladder for wheelchairs, then they are brought by relatives into the office. There are still branches in which there are no equipped places and stairs for people with disabilities, then relatives in their arms bring them to the office or bank employees go to the car to identify clients and then issue or execute the bank product necessary for the client.

I consider it expedient, using the example of the McDonalds network (MacAvto), to create the possibility of identifying a client with disabilities by a bank employee right in the car that brought the client using biometric identification. Also offer for customers with disabilities special electronic terminals for self-ordering of a banking service or product directly from the car.

**Summary.** 1. The Central Bank of the Russian Federation pursues a policy aimed at the availability of financial services for people with disabilities. 2. Russian banks organize their activities with the recommendations of the Central Bank. 3. The author proposes to consider the possibility of providing banking services to people with disabilities without visiting a bank branch, and using biometric identification to receive banking products right in the car on which they were brought to the office.

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俄罗斯公司内部控制组织实践  
**PRACTICE OF ORGANIZATION OF INTERNAL CONTROL  
IN RUSSIAN COMPANIES**

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**Annotation.** *In modern conditions of functioning of organizations internal control and audit become especially actual. Special attention is paid to their development, as they are an effective tool to eliminate various mistakes, fraud, and most importantly, should improve the efficiency of companies. Therefore, in the realities of the modern Russian economy, it is especially important to monitor and evaluate the elaboration and organization of internal control and audit in organizations.*

**Key words:** *internal control, internal audit, internal control system (ICS), control environment, efficiency, monitoring*

Internal control is a process which goal is to ensure that the organization creates and provides the following aspects: the reliability of the accounting (financial), as well as the internal reporting of the company; achieving high and effective results and indicators of economic activity; following current applicable laws in the course of its activities.

Each organization has its own tasks and goals, both operational and long-term. The creation and maintenance of internal control in an economic entity creates the prerequisites for their achievement.

Internal control (and also audit) was not always mandatory for all categories

of organizations. To control the activities of banks and insurance organizations, certain regulations are provided that relate directly to their industry.

For other organizations to conduct an internal audit (control) became necessary after the Federal Law "On Accounting" of 06.12.2011 N 402-FL came into force. Article 19 of this law states: "an economic entity is obliged to organize and exercise internal control over the committed facts of economic life. An economic entity which financial statements are subject to compulsory audit is obliged to organize and exercise internal control over the accounting records and the preparation of financial statements (except for the cases when its manager has assumed the responsibility of accounting for himself)." [1]

A review of the internal audit category in a situation of changing environmental conditions revealed some semantic differences.

*Table 1 Comparison of the category of internal audit in a situation of changing environmental conditions*

General internal control	Special internal control
According to the Federal Law No. 402-FL, it is obligatory to be carried out in all organizations.	It can be organized in an organization as part of general internal control (for example, internal control in order to counteract the legalization (laundering) of income from crime and the financing of terrorism). [2]

There are opinions that it is possible to identify external and internal control (audit). That is, all the functions of the internal auditor coincide with the functions of the external, for example: the implementation of personnel, legal and accounting documentation. And the difference is that the internal auditor, as opposed to the external one, relates directly to the state of the organization being audited. However, this is a misconception. Such a conclusion can be made based on the Information of the Ministry of Finance N EN-11/2013 "Organization and implementation by the economic entity of internal control of the committed facts of economic life, accounting and compilation of accounting (financial) statements".

To begin with, the internal audit can be carried out by external specialists, because the information of the Ministry of Finance states: "The organization and evaluation of internal control can be carried out by an economic entity independently or / and by an external consultant (including an audit organization)." [3]

In addition, the substantive part of the internal audit has a number of differences from the external one. The origin of the internal audit occurred in the regulations of the International Institute of Internal Auditors of the USA in 1941 and the main task of the internal auditor was to analytically identify the likely risks that the organization would wait and calculate the percentage possibility of their occurrence.

The work of the internal auditor covers all areas of the company: this is controlling; efficiency and principles of building a budget; investment project evaluation; strategic asset protection; monitoring the systematization of measures to reduce corrupt practice within the organization; investigation of fraud; analysis of the quality and quantity of output; assessment of control work with clients. One of the most important and widespread goals of internal audit today is to make a profit by the enterprise and safeguard its assets. Exploring the regulatory framework of the Russian legislation, which regulates the activities of internal audit (Article 19 of the Federal Law “On Accounting”) reports on the obligatory conduct of internal controls by economic entities, it is worth paying attention to the inconsistency of categories. In general, internal control is supposed to be carried out among all possible areas of the enterprise, however, in the second part of the same article, clarifications are given on the subject of the economic entity, whose accounting statements are subject to mandatory audit, which is obliged to organize and exercise internal control over accounting.

A natural question arises as to whether an internal audit is required (in addition to accounting and reporting) to be conducted in other areas of activity of an economic entity. In theory, the requirements for internal control of such organizations, on the contrary, should be more stringent than for firms that are not subject to mandatory external audit. Or is it implied that internal audit is mandatory for all organizations (including in the area of control of accounting records); and for companies subject to internal audit, it is strictly mandatory? In our opinion, the article leaves a wide field of action for its interpretation.

Studying in more detail some items of information of the Ministry of Finance N EN-11/2013, we note that on its basis the effectiveness of the internal control system may be limited to: exceeding official powers by employees of the organization or management, including staff collusion; changes in the economic situation, the emergence of new circumstances outside the sphere of influence of the leadership of the economic entity; the occurrence of errors in the decision-making process, the implementation of the facts of economic life, accounting, including the preparation of accounting (financial) statements. [6]

Any system of internal control of the organization is formed by the following elements of internal control: control environment; risk assessment; internal control procedures; information and communication; internal control assessment.

According to the Information of the Ministry of Finance N EN-11/2013, the organization can apply the following internal control procedures:

- documenting (for example, the formation of records in accounting registers on the basis of all primary accounting documents);
- proof of the relationship between objects, documents, or their compliance with the requirements set (for example, reconciliation of primary documents with the established requirements when they are accepted for accounting);

- authorization of various transactions and operations, which provides confirmation of the legality of their performance;
- data collation;
- delimitation and change of powers of responsibilities of employees of the organization;
- supervision and observation, providing an assessment of the achievement of goals and planned indicators, and so on.

In order to combat possible abuses, the most effective internal control procedures will be the authorization of any transactions and operations and the delimitation and change of powers of the duties of employees of the organization. Also, such procedures may include controlling the actual existence and state of objects. [4]

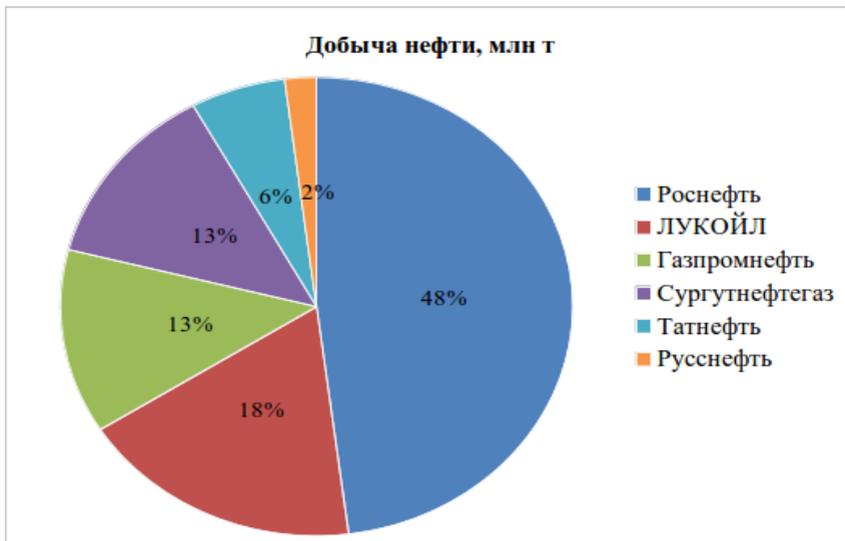
The evaluation of the internal control system should be done at least once a year. The scope of work and areas for evaluating internal control is established by the head of the organization or the internal audit service, if one exists. One of its types is constant monitoring of the internal control system. It can be carried out by the management of the enterprise in the form of regular analysis of the results of the economic entity's activities, verification of the performance of individual business transactions, continuous evaluation and refinement of internal documentation, and so on. [4]

A separate part of the Ministry of Finance information is devoted to the topic of documenting internal control. Based on it, it can be summarized that the following documents should be drawn up in the organization in terms of internal control: a risk matrix; a document that describes the business processes and procedures of the organization; documents reflecting the procedure for organizing and applying internal control; documents establishing the rules of communication: these may include a provision on information policy, schedules for providing data and reporting, as well as job descriptions of enterprise employees.

The documentation responsible for organizing internal control in an organization should be regularly updated. This should occur at least once a year.

In order to assess the organization and degree of elaboration of the internal control system in the actual practice of companies, we will conduct a brief analysis of internal control in the largest Russian oil producing companies.

According to the Analytical Center under the Government of the Russian Federation, the structure of the main oil producing companies in the Russian market in 2018 was distributed among the following leading Russian companies, which can be seen in Figure 1. [5]



**Figure 1.** Structure of the largest oil producing companies in Russia in 2018

In monitoring the characteristics of the organization of the internal control system to assess the impact on their effectiveness and performance in several of the largest oil producing companies, we compared the main parameters of the internal control system in PJSC Lukoil, PJSC NK Rosneft, PJSC Tatneft, PJSC Gazprom Neft, which are presented in Table 2.

**Table 2.** Comparison of the state of ICS organization practice in the largest oil producing companies of the Russian Federation

Indicator	Company			
	PJSC Lukoil	PJSC NK Rosneft	PJSC Tatneft	PJSC Gazprom Neft
1. Local regulations of ICS	Risk Management and Internal Control Policy	Company policy. Risk management and internal control system.	Regulations on the management of internal audit	Internal Control Policy.
2. Definition of internal control	a process carried out by the governing and control bodies of the Organization, their employees, aimed at ensuring reasonable confidence in achieving the goals of the Organization related to operating activities, preparing reports, complying with legal requirements, local regulations, adopted corporate principles, norms and rules. [8]	the process carried out by the subjects of the risk management and internal control system aimed at ensuring reasonable confidence in achieving the following objectives of the Company: the efficiency of financial and economic activities; reliability of financial and non-financial reporting; Compliance with applicable laws and local regulations. [9]	the process carried out by the Board of Directors, executive bodies and employees of the Company, ensuring the achievement of the following objectives by the Company: efficiency and efficient operating activities, reliability of financial reporting, compliance with applicable laws, external requirements and rules. [10]	a process designed to provide reasonable confidence in the achievement of the goals set for the Company and carried out by the Board of Directors, the Executive and Supervisory Bodies, the top management of the Company, and structural divisions and employees of the Company, endowed with relevant authority. [7]
3. Subjects of the internal control system	Board of Directors, Board Audit Committee, President, Management Board, Risk Committee, Senior Vice President, Finance, Risk Management and Internal Control Department, Internal Audit Service	Board of Directors, Audit Committee of the Board of Directors, Chief Executive Officer, Management Board, Risk Management Committee, Risk and Internal Control Department, Security Service, Audit Commission, Internal Audit Service	Board of Directors, Audit Committee of the Board of Directors, Corporate Governance Committee of the Board of Directors	Board of Directors, Audit Committee, Executive bodies and top management of the Company, Internal Audit Department, Audit Commission

Indicator	Company			
	PJSC Lukoil	PJSC NK Rosneft	PJSC Tatneft	PJSC Gazprom Neft
4. Compliance with international standards in the field of internal control and risk management	Corresponds to the concept of COSO "Integrated concept of building an internal control system" and "Risk management of organizations. Integrated model "	Corresponds to the policy of the Concept "Internal Control. Integrated Model" Committee of Sponsoring Organizations of the Treadway Commission (COSO)	Complies with international standards in the field of internal control and audit	Corresponds to the policy of the Concept "Internal Control. Integrated Model "Committee of Sponsoring Organizations of the Treadway Commission (COSO)

In accordance with the data presented in Table 2, in a comparative assessment we will determine the level of elaboration of local regulatory documents on internal control. In such companies as PJSC Lukoil and PJSC NK Rosneft, internal control is determined by the Risk Management and Internal Control Policy. In Gazprom Neft PJSC, internal control is provided by the Internal Control Policy, but risk management is determined by a separate regulatory act. At the same time, in PJSC TATNEFT there is only a Regulation on the management of internal audit, in which the organization of internal control is only affected, and there are no separate Regulations on internal control and risks. The most comprehensive definition of internal control is given in PJSC Rosneft - it affects, among other things, the provision of risk management, the efficiency of financial and business activities, the reliability of accounts and records, etc. Also, sufficiently detailed definitions are presented in PJSC Lukoil and PJSC Tatneft, however, they contain no references to risk management. And in the definition given by Gazprom Neft PJSC, it is only assumed that the organization's goals are achieved.

Considering the subjects of internal control, it can be noted that PJSC NK Rosneft and PJSC Lukoil are represented by the largest number of participants in the organization of internal control, compared to the two remaining companies, which proves a higher degree of well-developed interaction of the organization's entities with all departments and processes in ICS. A positive point is that the local regulatory documents in the field of internal control for all companies comply with the recommendations of international standards in the field of risk management and internal control, which makes it less painful to work in terms of world trade.

Summarizing the above, we can conclude that the organization of the internal control system in PJSC Rosneft and PJSC Lukoil is most fully, efficiently and effectively worked out when there are some gaps in PJSC Gazprom Neft and PJSC Tatneft.

Since the main task of internal control is to ensure the effectiveness of the company's activities and the achievement of the goals set, it means that a better organization of the internal control system must ensure a higher performance of the company compared to its competitors.

*Table 3. Revenue of the largest oil producing companies of the Russian Federation in 2017*

	<b>PJSC NK "Rosneft"</b>	<b>PJSC "Lukoil"</b>	<b>PJSC "Gazprom Neft"</b>	<b>PJSC "Tatneft"</b>
Revenue for 2017 (billion rubles)	6014 [9]	5 936,7 [8]	2004 [7]	581,5 [10]

Accordingly, based on the data of Table 3, it can be seen that the level of revenue from sales is directly proportional to the degree of organization and the elaboration of the internal control system in companies.

Thus, the following conclusion can be made: the level of development of local regulatory acts, the organization in the field of the internal control system, as well as many other parameters on which the formulation of the internal control system in companies is based, directly affect their performance and efficiency. The system of internal control, the formation of which is mandatory in organizations (except for the cases discussed in this article), gives impetus to the growth of companies, and provides them with leadership in competitive positions.

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健康环境 and 环境责任的权利  
**THE RIGHT TO A HEALTHY ENVIRONMENT AND  
ENVIRONMENTAL LIABILITY**

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**Annotation.** *The article discusses the understanding and legal nature of the right to a favorable environment. After that, the conclusion is formulated that there is no unity in the approaches on these issues either in science or in practice. The authors express their opinions on these issues. Having considered the peculiarities of the right to a favorable environment, it is indicated that in case of its violation, there are special protection mechanisms. Separately, it is noted that one of these mechanisms is to bring to a specific type of responsibility (environmental). The authors point to the formation of environmental responsibility as an independent type of legal responsibility, which is due to the public law nature of environmental human rights, including the right to a favorable environment.*

**Keywords:** *the right to a favorable environment, environmental responsibility, public law, environmental harm.*

Today, the world community pays special attention to the issues of human ecological well-being. This is reflected in the existence of a bloc of international legal acts in this area, as well as in the activities of relevant international organizations (bodies) such as the World Health Organization, the International Environmental Court, etc. However, it's not possible to solve these issues exclusively at the international level, therefore at the national level level must also have effective mechanisms for ensuring environmental human rights.

In the Russian legal system, the basis of such regulation is Article 42 of the Constitution of the Russian Federation [1], which states that everyone has the right to a favorable environment, reliable information about its condition and compensation for damage caused to its health or property by an environmental offense. The scientific interest is the

understanding and legal nature of the right to a favorable environment. Our analysis of current legislation, scientific literature and judicial practice shows that there is no consensus on the issues raised. For example, discussions arise regarding the understanding of the “favorability” criterion, which forms the basis of the right in question. The legislator in Article 1 of the Federal Law "On Environmental Protection" establishes that a favorable environment is an environment, the quality of which ensures the sustainable functioning of natural ecological systems, natural and natural-anthropogenic objects [3]. However, in science this definition is subject to objective criticism, in our opinion. For example, prof. MM Brinchuk notes that the definition of a criterion of favorableness through quality is an unsuccessful decision, it would be better to focus on the state of the environment [8; p.43]. In the latter case, both qualitative and quantitative criteria will be taken into account. Professor O. I. Krassov believes that the use of turnover “sustainable functioning of ecological systems” as a criterion for the environment’s goodness does not have legal significance, since it cannot be used in law enforcement practice [11; C.89]. The courts also give their interpretation of this right. So, from the meaning of the position expressed by the Constitutional Court of the Russian Federation in Definition of July 15, 2010 No. 931-OO [16] and supported by other courts [20], it follows that the right to a favorable environment can be extended to protect human-made objects. Although the legislator gives a different interpretation, limiting the criterion of favorableness to natural and natural-anthropogenic objects. It can be noted that the question remains controversial today. In this regard, we believe that the legislative definition of a favorable environment requires improvement by the legislator, since it constitutes a central element when considering the right to a favorable environment, and the current discrepancies in its understanding are unacceptable.

As for the legal nature of the right to a favorable environment, the main question is whether it is private law or public law. We believe that in this situation it is more correct to speak about the public law nature of the law in question. This is evidenced by the fact that in case of violation of the right to a favorable environment, the interests of the surrounding people are not actually protected, but the interests of all those around them in pursuit of the common good. Under such a blessing should understand the environment in which, as you know, all people live. The public nature of this right is also indicated by the Supreme Court of the Russian Federation. For example, the Definition of the Supreme Court of the Russian Federation of August 1, 2017 on case No. A70-2706 / 2016 [19] explicitly states: “ensuring the right of citizens to a favorable environment is necessary for ensuring public interests”. On the basis of such a legal position, it can be concluded that the right of citizens to a favorable environment is directly related to public interests and, accordingly, is of a public law nature.

In practice, cases of violation of the right to a favorable environment are not isolated, and the law contains a number of legal remedies, one of which is legal liability. However, the question arises, what kind of responsibility comes in the

event of a violation of the human right to a favorable environment when filing claims for compensation for environmental harm - traditional civic responsibility for the Russian law or specific - environmental?

Ecological and legal responsibility today, according to the apt expression of the Russian civil law specialist R.S. Bevzenko, is "a matter of the highest theoretical complexity" [10]. And this is no coincidence, since its legal nature causes serious discussions and enforcement problems. The doctrinal development of environmental responsibility has received in the works of many famous scientists in the field of environmental law. The most consistent and complete independence of environmental responsibility in the system of types of legal responsibility is defended by prof. M.M. Brinchuk [9; p. 26-47]. He argues that the interests of the favorable state of the environment are public law in nature and, accordingly, should not be protected by civil law [12; p. 62].

It is noteworthy that such a position finds its response in the framework of the European Union. As is known, Directive No. 2004/35 / CE of the European Parliament and of the Council of the European Union "On environmental liability, aimed at preventing environmental damage and eliminating its consequences" [4], operates within the framework of the European Union law. This Directive creates at the EU level the standard of public liability for environmental damage [6; C. 25-28].

Anyway, in the legal system of Russia today conservative views prevail on the compensation of environmental harm in the framework of civil (tort) liability [7; 13]. But is this reasonable?

In search of an answer to this question, let us turn to the practice of the Constitutional Court of the Russian Federation. In 2015, the constitutional justice body of Russia issued the landmark Decree No. 12-P of 02/06/2015 [14], in paragraph 3.1 of which he notes that there are "features of a new environmental responsibility implying the costs of restoring all ecosystem components in a damaged area". He stated that, as a general rule, a compensatory function is inherent in civil liability. However, the harm caused to the environment is often difficult to repair or irreparable at all, and its previous state, which existed before the offense, is irreparable. The Court also emphasizes that environmental damage affects both private and public interest. The Resolution of the Constitutional Court of the Russian Federation we have indicated is not unique in the matter of the specifics of environmental legal liability. Currently, the Constitutional Court of the Russian Federation also continues to insist on the manifestation of its features as an independent category. In paragraph 9 of the reasoning part of the Resolution of March 30, 2018 No. 14-П [15], he concludes about the priority of public interests in the field of environmental protection and notes the increased "environmental responsibility" of hunting subjects.

A number of Resolutions of the Plenum of the Supreme Court of the Russian Federation echo this position of the Constitutional Court of the Russian Federation [17; 18]. A systematic analysis of the data of the Resolutions shows that the Supreme Court recognizes

that such a measure of responsibility has certain specific features and does not fully respond to the institution of civil liability. For example, paragraph 2 of clause 13 of Resolution No. 49 of 30.11.2017 indicates the need to take into account the public interest in preserving a favorable environment when applying measures of responsibility to the guilty person.

The above points to public law elements of environmental legal relations. A kind of legal “hybrid” is being created with the presence of both private law elements and public law, where features such as “environmental responsibility”, including both compensatory and stimulating functions, begin to emerge. It is noteworthy that in this context, the Model Law of the CIS “On Environmental Responsibility in relation to the Prevention and Elimination of Environmental Harm” [5] defines the definition of environmental responsibility in the perspective and retrospective aspects, indicating that in retrospect it is understood through the duty of the legal relationship subject to undergo adverse consequences in connection with causing them harm to the environment (Clause 1, Article 2). Systemic interpretation allows us to say that in this way it manifests itself as an independent type of legal responsibility, and not as a type of civil liability.

Take, for example, such a component of the natural environment as land (Article 1 of the Federal Law "On Environmental Protection"). The Land Code of the Russian Federation [2] (Article 1) the category of “land” is understood in two aspects: (1) as an object of property rights and other rights, (2) as the basis of human life and activity. In the event of damage to the land as an object of property rights, we are, indeed, dealing with civil liability. However, the harm caused to the earth, as the basis of human life and activity, as a certain component of the ecosystem, is quite problematic to call a civil-law tort and, therefore, the basis of application of civil-law liability. Rather, there will be an environmental offense and a special environmental responsibility. Interestingly, this position is supported by the Ministry of Natural Resources and Ecology of the Russian Federation. Thus, in the framework of the hearings on the case of Zapolyarneft (Resolution of the Constitutional Court of the Russian Federation No. 12-II of 02.06.2015), Deputy Director of the Legal Department of the Ministry of Natural Resources of the Russian Federation V.V. Rashevskaya stressed that the responsibility established by environmental legislation is not civil law in nature, but has some tendencies to segregation.

It should be recognized that in the practice of arbitration courts the harm caused to the environment most often qualifies exclusively from the point of view of civil liability [21; 22]. And this is understandable, since the courts are guided by the current legislation, which does not directly regulate environmental liability. Of course, required to be included in the environmental legislation of Russia. And here, the doctrinal workings of Russian scientists and the experience of the European Union countries in implementing Directive No. 2004/35 / CE of the European Parliament and the Council of the European Union “On environmental responsibility aimed at preventing environmental damage and eliminating its consequences” can play an invaluable role.

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通过文化和教育活动适应学生  
ADAPTATION OF STUDENTS BY MEANS OF CULTURAL AND  
EDUCATIONAL ACTIVITY

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注解。由于社会的快速发展，由于创新，信息技术，现代活动方法，技术和教育方法的引入，一年级学生，甚至更多的外国人，可以在一个快速变化的社会中共存，管理适应并实现其内在的创造力和专业潜力。这项工作致力于适应外国学生的问题，并对他们最重要的课外教育活动：文化，教育和休闲活动。因此，强调中国学生的社会和职业适应性作为研究对象，选择通过文化，教育和休闲活动形成中国学生社会和职业适应的教学条件作为研究对象。研究。

关键词：大学，文化和教育活动，文化和休闲活动，学生，社会化，社会和职业适应，教育活动，教育文化，教育条件，学生，个性。

**Annotation.** *Due to the rapid development of society, thanks to innovations, information technologies, the introduction of modern methods of activities, techniques and approaches to education, first-year students, and even more foreigners, can coexist in a rapidly changing society, managing to adapt and realize their inner creative and professional potentials. The work is devoted to the problem of adaptation of foreign students and the most important for them extracurricular educational activities: cultural, educational and leisure activities. Therefore, the social and professional adaptation of Chinese students is highlighted as the object of the study, and the pedagogical conditions for the formation of the social and professional adaptation of Chinese students by means of cultural, educational and leisure activities are chosen as the subject of the study.*

**Keywords:** *university, cultural and educational activities, cultural and leisure activities, students, socialization, social and professional adaptation, pedagogical activity, pedagogical culture, pedagogical conditions, student, personality.*

With each new century, a culture of pedagogical activity is formed. The basis for this is the development of society, its activation of culture, including a system of social relations aimed at the production and reproduction of cultural values in the process of training and education. Pedagogical activity is directly related to the general culture of a person, representing a special sphere of society. It carries out the purposeful formation of the individual, controls the processes of formation and development, is responsible for the adaptation and socialization of the individual, performs the functions of cultural inheritance. The forms and methods of pedagogical professional activity are always based on a specific, historically formed sociocultural complex, a peculiar level of spiritual culture that helps to establish and realize itself, its role in the system of professional and personal positions, serving as an integral indicator of creativity. Here is the breadth of outlook, and the degree of social activity, and the nature of emotional susceptibility, and orientation of the individual.

The rapid development of society in terms of information technology puts forward relevant time requirements for the educational environment of the higher school of professional education and, in particular, for first-year students who need to coexist in a rapidly changing society, managing to adapt and realize their inner creative and professional potentials. Such atmosphere is very difficult for foreign students with a different mentality, cultural traditions and beliefs [1, 2, 4].

Taking into account all the above and the goal of the educational process in an innovative environment i.e. is to develop an individual personality, ready for a responsible choice, and professional education in relevant areas of life activity acts as a means of self-realization, self-expression and self-affirmation of the personality, as well as a means of sustainability, social self-defense and individual adaptation, it was decided to pay attention to the cultural, educational and leisure activities of first-year students, which could contribute to their development (adaptation) in the environment of the university [3, 5].

Therefore, social and professional adaptation of Chinese students was singled out in their scientific work through cultural, educational and leisure activities, and the pedagogical conditions for the formation of social and professional adaptation of Chinese students in Moscow were selected as the subject of the study.

The aim of the study was to build and develop a model as an instrumental technology for the social and professional adaptation of Chinese students who come to study in Moscow through the organization of their cultural, educational and leisure activities.

To achieve this goal we put forward the following tasks:

1. To determine the specifics of cultural, educational and leisure activities in the process of social and professional adaptation of Chinese students in Moscow.
2. To build an organizational and pedagogical model of social and professional

adaptation of Chinese students in Moscow by means of cultural, educational and leisure activities.

3. To develop and experimentally test the technology of social and professional adaptation of Chinese students in Moscow by means of cultural, educational and leisure activities.

4. To offer practical recommendations on the social and professional adaptation of Chinese students in Moscow by means of cultural, educational and leisure activities.

The study conducted included the development of a phased program of support for the adaptation of foreigners "Moscow through the eyes of Chinese students." The program was designed for 10 months and divided into several stages:

- introductory (September-October);
- creative (November-December);
- responsible (January-February);
- rewarding (March-April);
- perspective (May-June).

Each stage contains several cycles of meetings (8-9), various goals and forms of work, role-playing games, trainings, tests, cases and diagnostics, visits to museums, galleries, theaters, etc.

Based on the hypothesis that by providing support and accompaniment to foreign first-year students, revealing to them the diversity of the spiritual and cultural life of Russians, it is possible to overcome language barriers, remove alarming clips to an unfamiliar world for them, as a result, to carry out more successful education, professional formation and development of students in high school as future professionals. Therefore, at the first meeting-classes the curators' phones were provided, as "hot-emergency buttons" for all cases of vital activity in the city, conversations were held on the expectations of immediate prospects and problems of the organization of life related to food, accommodation in a hostel and transport. At the same time, an organizational-pedagogical plan was prepared with a clear algorithm of actions, the use of personality-developing psychological-pedagogical methods, which would give: a painless and stress-free stay of students in an academic environment; increase the level of their cognitive activity, performance and self-esteem; will develop personal needs and value orientations, as well as harmonious interpersonal relationships.

Due to the fact that pedagogical activity is an integral part of the educational process and it directly depends on how much education contributes to the development of a student's professional identity, we consider pedagogical activity as part of a cultural code. And in the dissertation research we build a program on cultural, educational and leisure activities of foreign students because we consider it to be the most important pedagogical tool for social and professional adaptation of first-year foreigners.

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通过在旅游方向培训学士学位，整合制图方法和infografichesky提交信息  
**INTEGRATION OF A CARTOGRAPHICAL METHOD OF TRAINING  
AND INFOGRAFICHESKY SUBMISSION OF INFORMATION BY  
TRAINING BACHELORS IN THE TOURISM DIRECTION**

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注解。 文章揭示了旅游制图支持与信息图表呈现相结合的效果，需要形成现代通用图形语言，在大学培养学生的基础上，根据旅游学习单位的学习经验提供教育信息。 图形旅游和娱乐建模涉及一种信息可视化语言的出现和使用。

关键词：可视化，旅游，旅游制图，地图，图形旅游和娱乐建模，信息和制图方式的职业培训

*Annotation.* The article reveals the effect of integration of tourism cartographic support and infographic presentation of information, the need to form a modern universal graphic language for providing educational information when training students at the university based on the experience of preparing bachelors in Tourism. Graphic tourism and recreational modeling involves the emergence and use of a kind of information visualization language.

*Keywords:* visualization, tourism, cartographic support of tourism, map, graphic tourism and recreational modeling, information and cartographic way of vocational training

Tourism as a specialty came to educational institutions from the market of tourist services, gained popularity, attracted personnel, began to develop. The integrative efforts of scientists - economists, geographers, country scientists, recreators, resort scientists, professional tourists, other organizers and managers, numerous conferences and discussions, a change in the openness of the geopolitical situation in the country - all this contributed to the formation of a synergistic effect from The interaction of various systems of the science of tourism, called tourism science. We believe that the **object** of tourism science is a natural recreational geospace, consisting of objects of tourist interest, arranged in a certain way in tourist destinations. The backbone of energy tourists is the flow of tourists-holidaymakers, which is formed according to certain natural ones. logistic patterns.

As research methods in geo-tourism, well-known general scientific and widely known methods should be applied: analysis and synthesis, a systematic approach, geometry, a cartographical method, a geo-image theory (A.M. Berlyant), information geography, geographical linguistics (Sokolova A.A.), various infographic methods. [1]

The modern period of the existence of civilization has become characteristic of the expansion of the “on-screen” communicative culture. A significant part of the information flow is presented on computer screens, on Skype, on TV screens, mobile phones, etc. It is quite natural that modern methods and methods of visualization should take their place among the presentation of educational information in the training of specialists - in universities, in particular. [3]

Our time is the time of “unfiltered” informational content of the consciousness of especially unprepared young people. One of the objectives of the learning process is to teach students to manage the information flow, bearing in mind a certain goal, to be able to use information, process it, put some “filters” on it, understand that information is not knowledge. It is necessary to resolve the contradiction between the existing large flow of the most varied information and the separation from it of the essence of educational information leading to the accumulation of knowledge, the enhancement of general cultural and professional competence.

Speaking of visualization, it should be noted that the term “visibility” has long been widely known in teaching as a method that accompanies verbal information that evokes a figurative, real representation of an object. But it becomes obvious that visualization of educational information in the form of gratification has a huge, untapped pedagogical resource both as a didactic learning tool, and as a method of presenting educational information, and as various ways of its “folding”, generalization, scaling, respectively - working with it. With this kind of training, the most important thing can happen, - the development of the personality of the student, the formation of his figurative spatial abstract thinking. [2]

The graphic language of visualization exists in the depths of the ancient fundamental science - cartography - and it is embodied in such a geo-image as a map, which is a “language of geography”. Indeed, a map, modern geo-images, infographic objects are various models that occupy a position between the image and the preimage researcher, i.e. material or virtual reality. [3]

However, we note various approaches to the map in modern infographics and in cartography, although in both cases we are talking about a visual image. The image of the map in infographics is a picture that may not have a scale, but conveys a general idea of the depicted space: its configuration, neighborhood, and features of the structure. [4] In the cartography, this image was called cartoid. (For example, the UN emblem, where the world map is used in azimuthal projection).

The topographic (geographical) map is constructed according to strict math-

ematical principles, reliable in all respects. According to it, you can make various measurements of distances, areas, angles, azimuths, perform design for a specific territory. The scale of lengths and, accordingly, areas is saved on the map, the principle of generalization is applied, any point on it has three coordinates, the graphic image of the map consists of lines, points, areas, conventional symbols. All parameters on such a map are measurable, the information is absolutely reliable and varied.

In order to understand the universal language of graphic visualization of various types in order to use it in various situations, it is necessary to develop a methodology for its use, the ability to "translate" verbal statements into a graphic language. And if this language is developed only for topographic maps, then a timely task is to study the general principles of creating a graphic language for tourist maps, as well as visualization of any educational information by means of grading.

The dependence between the letter (letter) and the sound is known - literature, it is likely to assume that a similar dependence also exists between the grapheme and its meaning (gratification). This idea allows us to speak about a peculiar language of visualization of theoretical knowledge. If we are talking about educational information, then this already determines the purpose of visualization - to contribute to the qualitative assimilation of educational information, translate it into knowledge by reducing the volume by graphically folding the verbal array.

To do this, you must perform an action to generalize information - highlighting the main and summarizing the details when translating a verbal text into a graphic utterance using the visualization method. You need to be able to show only the main ideas. At the stage of owning visual literacy, the student, in the process of cognitive activity, perceives the visualized didactic object mentally, on the inner plane in the form of a certain mental image, and reflects on the outer in the form of its graphic image. This is consistent with the opinion of A. Verbitsky. (1999) that the process of visualization is the folding of mental contents into a visual image. Being perceived, the image can be deployed and can serve as a support for adequate mental and practical actions. [2]

It is important to note that at the core of the process of mastering, in accordance with the activity theory of the doctrine, is internal or external action (mental or practical), and not perception. Many psychologists believe that the terms "image", "representation", "mental picture" are synonymous and that image is visual knowledge. [five]

The integrative essence of the cartographic teaching method is the ability to visualize any simulated space. The language of a geographic map — the language of symbols and graphic images — makes it possible to form an abstract idea of the prototype of a real-life space with its proximity and length. We have already mentioned that a map is a work constructed according to mathematical laws, in

a certain projection, etc. And infographic images are not strict, this direction has other goals, namely, to give any information in graphic form for its quick perception. This is usually the design, advertising, information about something, logo, pictograms, etc.

So, the combination of the cartographic method and the methods of infographics, their mutual sharing in the training of specialists for the tourism industry gives a synergistic effect of visualizing the system representation of the geospace and visual figurative knowledge of such for professional purposes. At the same time, we especially note the universal “end-to-end” method of cognition of the natural-recreational space - an *information-cartographic method* of its visualization in various ways, primarily with the help of geo-images, economic maps and kartoiodov. The visual model allows to simultaneously “see”, compare, compare, evaluate, measure the natural-recreational space, study its structure, manage the tourist flows, outlining the routes of their movement.

Indeed, the model of tourist and recreational space in the form of a corresponding map basically has a topographic map, and professional language of symbols, tables, graphs, and various diagrams is used as an additional burden. When constructing such a model for students, the phenomenon of a graphic image of the territory corresponds to the process of mastering the intellectual-graphic method of visualizing educational information in general.

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户外运动中发展的身体健康往往是学龄前儿童卡他性疾病  
**OUTDOOR GAMES IN THE DEVELOPMENT OF PHYSICAL FITNESS  
OFTEN CHILDREN WITH CATARRHAL DISEASES  
OF PRESCHOOL AGE**

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注解。运动是一种天生的，至关重要的人类需求，其满足程度在很大程度上影响儿童的身体健康。每个年龄段的代谢过程水平和器官和系统的形成取决于运动活动的数量。每个年龄都有一个最佳选择。如果运动活动低于最佳水平，则儿童的生长和发育会延迟，他/她的适应性身体可能性会降低。对运动功能减退的唯一预防和清算措施是增加儿童和青少年的身体活动，使用淬火，进行更多的户外运动，并使用提供治疗和恢复效果的基本运动运动在新鲜空气中进行运动[2]。

关键词：户外运动，体能，疾病，运动活动

*Annotation. Motor activity is an innate, vital human need, the degree of satisfaction of which largely influences the physical health of a child. The level of metabolic processes and the formation of organs and systems in each age period depend on the quantity of motor activity. There is an optimum for every age. If motor activity is below the optimal level there is a delay in growth and development of a child, his/her adaptive body possibilities reduce. The only preventive and*

*liquidation measure for hypokinesia is to increase physical activity of children and teenagers, to use quenching, to play more outdoor games and go in for sport in the fresh air using the basic athletic movements which provide therapeutic, restorative effect [2].*

**Key words:** *outdoor games, physical fitness, diseases, motor activity*

Relevance. The most important result of the game is to get merry and feel better emotionally. That is why outdoor games, which especially have elements of competition (may be applied to children in the condition of persistent disease remission), are more acceptable than other forms of physical culture, as they satisfy the needs of a growing body such as movement. They also stimulate complex harmonious physical and mental development of children as well as their ethical and moral characteristics and practical skills. In addition, outdoor games which are reasonably selected considering the age, health condition, nature of functional organism changed and degree of physical fitness of children, can simultaneously help to recover and strengthen a child's organism as well as to quench it and as a result to prevent acute conditions [1].

The purpose of the study is – to identify the feasibility of using outdoor games to improve physical fitness of recurrent respiratory infection children.

To achieve this purpose we set several tasks:

1) To detect the level of physical fitness of recurrent respiratory infection child of preschool age.

2) To elaborate and apply the methodology of outdoor games which aims to develop physical characteristics of preschool children.

3) To estimate the effectiveness of the methodology of outdoor games in physical fitness development of recurrent respiratory infection children.

The object of the study is the development of physical qualities of recurrent respiratory infection children of preschool age.

The Subject of the study is the effectiveness of the methodology of outdoor games in the development of physical fitness recurrent respiratory infection children.

Hypothesis. It is assumed that physical fitness can be improved if the methods of outdoor games are included during the lesson.

Practical significance. The results of the study can be used in the physical culture instructor activities at the organization of sports and recreational work in preschool educational institutions with recurrent respiratory infection children.

Organization of the study: the study involved recurrent respiratory infection preschoolers. To make the experiment the two groups of 13 people each were formed. The control group was engaged in physical training 2 times a week for 25 minutes on the basic program of preschool education, and the experimental group,

in addition to physical training, was additionally engaged 2 times a week for 25 minutes of outdoor games. The program of outdoor games included games that develop the basic physical qualities of preschoolers: coordination, agility, speed, endurance, strength and flexibility. Obstacle courses and relay races were also used. All outdoor games were selected, considering the age and individual characteristics of preschoolers.

The results of the study and discussion of them.

During the analysis of medical records of experiment participating children, it was revealed that usually they have frequent respiratory diseases and damages to the bronchopulmonary system, which has led to low motor activity. At the beginning of the experiment, there were no significant differences in the studied physical fitness indicators between the groups what proves the homogeneity of the groups.

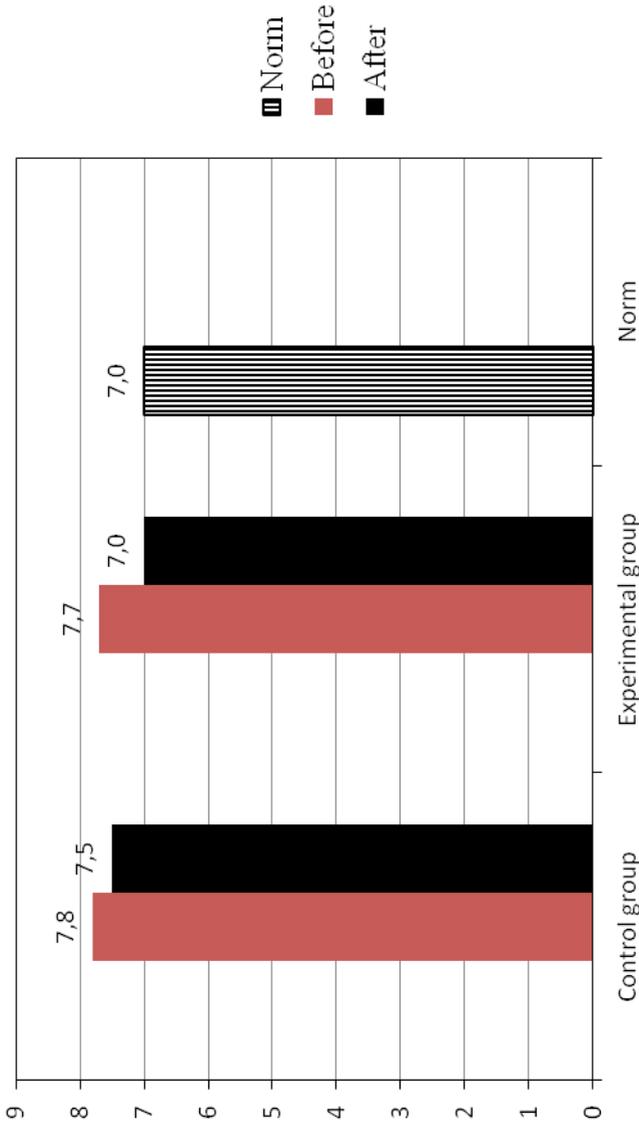
After the experiment, it was found that outdoor games during the additional classes in the experimental group were more effective than usual classes in the control group. This is especially noticeable at the dexterity indicators, which approached the results of the age norm after the end of the experiment. Other indicators of physical fitness also showed positive changes (Pic. 1 and 2).

Thus, we can talk about high effectiveness of the applied the methodology of outdoor games which aims to develop physical characteristics of children.

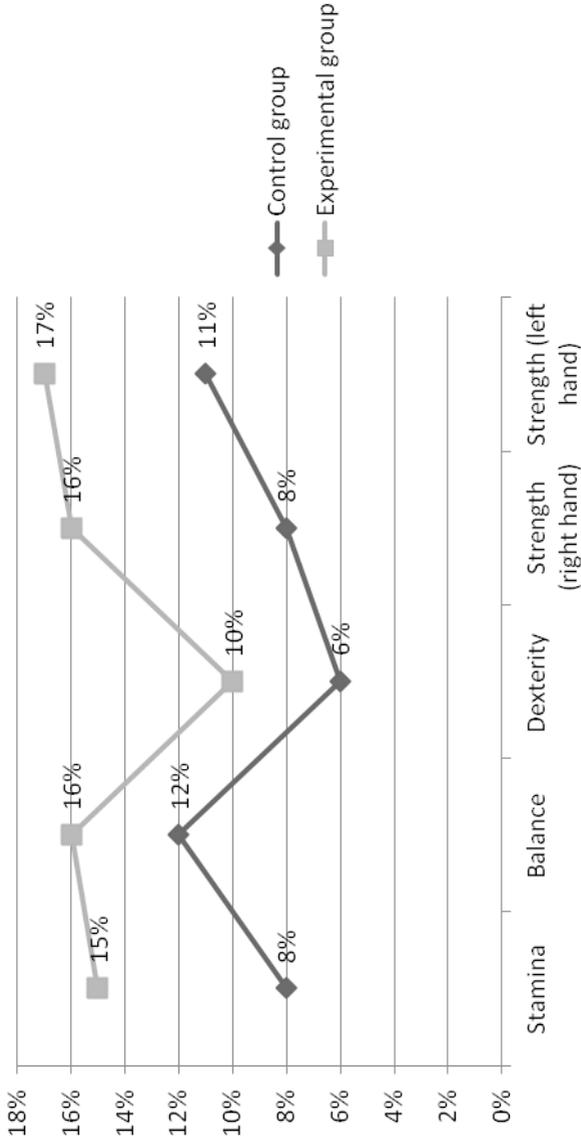
The data presented in the pictures shows that the children from experimental group have all indicators higher than children from the control group. Therefore, it can be assumed that the proposed method has sufficient efficiency and can be proposed for practical implementation.

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*Pic.1 The results of dexterity (sec) indicators diagnostics of recurrent respiratory infection children.*



**Rice.2** The Dynamics of growth of physical indicators after the experiment in the control and experimental groups is over

学习障碍的学龄儿童身体准备的矫正技术  
**CORRECTIONAL METHODS OF PHYSICAL FITNESS  
OF PUPILS WITH SPEECH DISORDERS  
BY MEANS OF PHYSICAL CULTURE**

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注解。 本文载有关于通过篮球纠正一般语言障碍的小学生身体发育和身体健康的信息。 本文重点研究了以篮球为主要内容的作者体育锻炼计划的理论描述; 据称, 在整个体育和矫正计划中使用基于篮球的体育锻炼有助于消除患有一般言语障碍的儿童的运动活动的差异。

关键词: 有限的身体能力, 一般言语障碍, 矫正, 初中生, 虚拟健身。

**Annotation.** *The article contains the information about the correction of physical development and physical fitness of primary school pupils with General speech disorder by means of basketball. The article focuses on theoretical description of author's physical exercises program based mainly on basketball elements; It is stated that use of physical exercises based on basketball throughout physical education and correctional program helps to delete differences in motor activity of children with general speech disorder.*

**Key words:** *limited physical capacities, general speech disorder, correction, junior pupils, physical fitness.*

Health condition of children and teenagers is of reasonable concern to specialists: doctors, teachers, psychologists, etc. Recently, the amount of functional and chronic disorders of junior pupils has increased by 92%. About 50% of boys and 75% of girls are unable to meet the standards of physical fitness.

Ministry of Health of Russian Federation (data of 2005) and World Health Organization state that currently the number of children with speech disorders is increasing. More than 30% of children at an early age have speech defects of different severity. The percentage of first-year pupils with speech disorder is 20-30%. There is a number of reasons such as increasing birth rate in different risk groups, bad environment, little attention of parents, limits of pedagogic possibilities.

It is necessary to note that medical and pedagogic diagnostics has reached higher level today. Its methods and techniques help to diagnose speech pathology in the early stages. Specialists from different countries develop effective rehabilitation programs for children with disorders and look for ways to restore their health, social adaptation and normal life. This is rather hard and it is necessary that doctors would make researches with teachers and specialists in physical education and sports to solve the problem.

Persons with the most severe disorders need special (correctional) education. The category of these children as an object of pedagogic activities can be various: according to the nature of disorder (intellectual, speech, vision, hearing disorders), according to age, the degree and structure of the main defect, according to reasons and behaviour of the disorder, according to medical prognosis, presence of side-disorders and secondary damages, according to condition of saved functions and other features [8,7,9]. More than half of students in secondary schools need classes of correctional and recreational orientation [1, 2].

The number of children with General speech disorder (GSD) is growing recently. As a result, lots of correctional schools and additional speech therapy classes appear. Far in the end of the XIX century it was considered that GSP is the result of verbal asynergia. [7] General speech disorder is different complex speech disorder characterized by normal hearing and intellectual condition but damaged forming of all speech system components of children. However, children with GSD have certain individual characteristics.

R. E. Levina [9] together with other specialists studied the periodization of GSD: from the complete absence of speech (the first level of speech development) to complex forms of coherent speech with elements of phonetic-phonemic and lexical-grammatical exaltation (the third level). The transition from one level to another is detected by the increase in speech activity, the occurrence of new language skills. The individual speed of the child's progress depends on the severity of his/her primary defect and its form.

One of the leading places in correctional and educational work with children suffering from speech disorders is occupied by physical training because of the two reasons: во-первых, по мнению многих авторов [3, 4], двигательный анализатор играет большую роль в развитии речи, а во-вторых, уже с детского возраста у людей, страдающих речевыми нарушениями, наблюдается отставание показателей физического развития. It is important that some scientists state that children suffering from GSD have undeveloped physical characteristics not only because of organs of speech but also due to undeveloped functional motion analyzer and inefficient educational method of physical exercises [1,9,10]. The analysis of the research works revealed the problem of insufficient development of methodological techniques in special (correctional) pedagogy for correction and development of morphological and functional status of children with GSD. Some scientists studied the subject of using physical education for children with GSD [1,3,4,9]. Most of the physical education lessons for children with GSD of the III level are carried out according to the standard program developed for healthy children with normal physical development. The physical education syllabus for pupils of special medical group of general education institutions [3,5,6], made according to the Obligatory minimum of physical education and Minimal requirements to primary school pupils' physical level does not solve the problems of physical education and correction of junior schoolchildren with GSD of the III level. Junior schoolchildren with GSD are affected by huge static amount of work connected to school classes and homework. At the same time, it is emphasized that the movement is a biological need of the child [1], and the degree of its satisfaction determines the growth and development of the child's body.

Because of these disadvantages of the previous programs, the new research of more effective methods and conditions for children's rehabilitation was made. It seems to be reasonable to use information about personal characteristics of junior schoolchildren to form their motivation for educational physical activity and throughout the process of general educational program. Important education activity indicators of pupils with GSD, e.g. their age and sex are very important. However, the existing practice of schooling is based mainly on the "passport" age of children with GSD. At the same time, the specifics of physical development of pupils with GSD of the III level, the condition of the musculoskeletal system, biological maturation and sexual development have a significant impact on the functioning of all body systems and are the important criteria of health.

At the beginning of the experiment the age dynamics of the main morphological and functional characteristics of younger students with speech disorders was studied. One of the most effective rehabilitation methods of adults and children is to form the necessary motivation level to make physical exercises, to use game elements of activity and consider it like a sport-game. That what was mentioned

before made it necessary to elaborate and introduce the new correctional program of physical education with children suffering from speech disorders.

The main characteristic of the proposed experimental program is that it is based on the course of learning to play basketball and mastering the techniques of basic sports, because it is believed that in primary school age mastering of the basic motor actions continues. The program contains the following sections: - a set of exercises with elements of basketball;

- complex of outdoor games;
- tasks for the development of hands motor skills;
- exercises for prevention of visual impairment;
- coordinating exercises and training of the vestibular apparatus;
- a set of exercises with elements of fitball gymnastics;
- special breathing and breathing - speech exercises, combined with physical exercises, in a three-phase rhythm, with the pronunciation of poetic lines.

Children with GSD of the III level of primary school age going to special correctional school were selected to participate the experimental part of the research. The participants of the pedagogical experiment were divided into experimental and control groups of 24 people. A set of five morphological and functional indicators that reflect the degree of relationship with the energy level of the body, the level of overall endurance and acute morbidity was used for rapid estimation of the somatic health of pupils [10]. As the indicators should be measured in different units, the estimation of each one was transferred into points.

We have calculated the following indicators (indices):

1. Quetelet index showed the growth-weight correspondence of the body;
2. Robinson index characterized the regulation of the cardiovascular system;
3. The Skibinski index reflected the functionality of the respiratory and circulatory organs and the body's resistance to hypoxia;
4. The level of motor qualities of strength, speed and endurance is presented by V. A. Shapovalova index. A. It also showed functional abilities of cardiorespiratory system;
5. The Rufe index showed the level of adaptation reserves of cardiovascular and respiratory systems.

These indices are closely related to the level of General endurance, to the level of aerobic capacity of the body as well as to a number of indicators of physical fitness and the frequency of acute respiratory diseases.

The comparative analysis data of the groups shows that the growth dynamics of measured indicators in absolute values in the experimental group was much higher than in the control group. The results of the experiment revealed: the majority of children from experimental group have improved their physical health: in this group there were 20.8% boys with the health level "below the average", with

the average health - 58.3%, with the health level "over the average" - 20.8%; also there were 80% of girls with the average health condition and 20 % with health below the average. These indicators in the control group are much lower: There were 79.2% of boys with health "below the average" level, 20.8% with the average health level; also 75% of girls with the health "below the average" level, 25% with the average health. Children from experimental group (EG) increased their indicators of physical fitness increased: The growth of physical fitness indicators of boys from the EG is from 10.1% to 113.4%, of girls from EG is from 7.3% to 108.4%. The growth of physical fitness indicators of boys from the control group (CG) is from 5.9% to 82.6%, of girls from CG is from 5.3% to 76.9%.

In general, the results of the experiment shows that physical education of the junior pupils suffering from GSD of the III level by means of our model of educational process influences positively the development of the speech function, increases the indicators of volitional motor skills, maintains physical health and increases the level of physical fitness of pupils.

That is why it is possible to say that the correctional health-improving program of physical education elaborated considering different signs of speech disorder includes special exercises and helps to correct motor disorders in more effective way and to increase the level morphological and functional development of physical fitness of children in comparison with the traditional program of health education. The results of the study allow to claim that the application of the proposed correction and health-improving program of physical education increases of the morphological and functional status and physical fitness of children with the General exhalation of speech. In General, the results of the work say that physical culture is an important factor that has a versatile effect on strengthening the body of children with GSD.

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利用体育文化发展大学生社会重要素质的特征

**FEATURES OF DEVELOPMENT  
OF SOCIALLY IMPORTANT QUALITIES OF UNIVERSITY STUDENTS  
USING MEANS OF PHYSICAL CULTURE**

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**Annotation:** *The article discusses the issues of technology management of development of socially significant qualities of higher educational institutions students using the means of physical culture and sports. The conditions which are necessary for the effective management of the development of socially significant qualities among university students using the means of physical culture and sports are determined. There are the conditions such as: improving the selection, training and placement of teachers of physical culture and sports; stimulating the growth of students' diversified physical development. The criteria for assessing the effectiveness of teachers in the development of socially significant qualities of university students using the means of physical culture and sports are developed. The positive influence of the developed technology of managing the development of socially significant qualities among university students using the means of physical culture and sports has been established.*

**Key words:** *students, physical culture, physical culture and recreation activities, functional state, socially significant qualities, technology.*

The activities of each university student are social. The forms of his social behavior in various situations of the existence of a collective are diverse. Their regularities are difficult to correlate with the peculiarities of situations and many situational and social factors.

Kandybovich L.A. (1985), Volkov V.I. (1987) note that a person's social behavior determines, first of all, his adaptation to environmental conditions. The involving of a person into the system of subject to subject relations essentially influences the basic mental expression of the personality, such as: sensations, cognitive processes, and functional states. The wide sphere of influence of interpersonal relations pointedly raises the problem of studying the factors that determine the regularities of the emergence and dynamics of mutual contacts between people, their adequacy to the structure of joint activities and current environmental requirements [1, 2, 3].

Studies of a number of psychologists [2, 3, 4, 5] showed that in intense and extreme situations of joint activity, latent sides of group psychology appear that are not expressed directly in the context of the group's activities. However, it is important to remember that the effect of joint activity is individual for each student, i.e. the fact of such a change of its state may lead to the fact that the individual's working capacity in the study group will increase or decrease.

Among the numerous determinants of intragroup interaction, a special role is played by the personality, which follows from the continuous interaction and interdependence between the personality and the social environment. It is the peculiarities of the interaction of a person with other individuals that lead to the most noticeable restructuring of the personality structure of the subject of group interaction, and consequently, its adaptive functions change as part of ensuring the reliability of its activities [4, 5, 6, 7].

In order to study the above phenomena, we studied the dynamics of the development of socially significant qualities in various forms of educational, physical culture and sports activities. It was necessary to identify how some of the personality characteristics of the student cause the emergence and determine the dynamics of its relationships with other members of the student community.

The indicators chosen in the questionnaires were used as the main selection criteria in both the official and unofficial areas of communication. We were interested in the question of what factors influence the development of socially significant qualities among students in the process of educational, physical culture and sports activities. To assess the factors influencing the development of socially significant qualities, a special survey of the teaching personnel of the department of

physical education and sports was conducted. A total of 36 people participated in the survey. Analysis of the survey showed that the most important factors influencing the nature of the development of socially significant qualities among students are the level of professional preparedness of physical culture and sports teachers and the availability of physical education and sports experience among students.

We were also interested in the question of what psychological compatibility and need for communication is, with a view to further adjusting them. A count of the number of elections showed that students in the study group have different sociometric statuses and different representations on the social ladder of personal relationships.

The results indicate that the behavior of students in simple situations and in stressful conditions is not the same and true interpersonal relations, feelings and socially significant qualities manifest, above all, in difficult conditions.

Differentiation took place in almost all study groups. Below, Table 1 shows the results of the dynamics of the official and unofficial spheres of communication before and at the end of the examination session (1 and 2 examination) of the “best” and “worst” groups in physical fitness.

**Table 1**  
*Status of students in various types of group activities*

Status zones	Official sphere (educational)				Unofficial sphere (sport activity)			
	qty	%	qty	%	qty	%	qty	%
	1-st examination.		2-nd examination.		1-st examination.		2-nd examination.	
<b>Group 1 («the best»)</b>								
«Leaders»	15	50	13	42	13	42	14	46
«Preferred»	5	17	7	23	8	28	9	30
«Accepted»	7	23	8	28	6	20	4	14
«Unaccepted»	3	10	2	7	3	10	3	10
Total: 30 ppl.								
<b>Group 2 («the worst»)</b>								
«Leaders»	10	33,3	8	26,6	7	23,3	9	30
«Preferred»	10	33,3	9	30	11	36,3	5	10,7
«Accepted»	8	26,8	4	13,3	6	20	7	23,3
«Unaccepted»	2	6,6	9	30	6	20	9	30
Total: 30 ppl.								

The results formed the basis for the planning of educational work on the development of socially significant qualities among students.

On the basis of the above socio-psychological analysis, it was necessary to eliminate the incompatibility and mutual misunderstanding between students.

In this regard, students from the “best” group had to consolidate and improve their positive socially significant and comradesly qualities.

The students of the “worst” group needed to fundamentally change their attitude towards working in physical culture classes, cultivate the spirit of real partnership, responsibility for each other and for the common cause, promote the transfer to higher status zones. At the same time the special attention was paid to finding ways of pedagogical impact on the development of these qualities.

The socio-psychological atmosphere of the student team dictated the need to bring up all the psychological qualities that at every moment of joint sports work would contribute to the solution of the common problem. More over it should be done on their own, on the basis of a personal assessment of the evolving situation, without any instructions and requests, that is, to develop their collectivist motivation.

As an additional material, these conversations with students and teachers of physical culture and sport were used in the work, taking into account the effectiveness of each student’s workout at trainings and during academic studies.

The results indicate that the student’s behavior in a simple situation and in stressful conditions (during the examination session) is not the same as true interpersonal relations, feelings and socially significant qualities manifest, above all, in complex conditions.

A comprehensive approach to the study of social activity of students, on the one hand, suggests that among those students who are regularly engaged in physical culture and sports, activity in the public sphere is higher. On the other hand, social activity as one of the socially significant qualities of a student noticeably influences his activity in physical culture and sports activities. This dialectic interrelation indicates a great potential of physical culture and sports means in increasing the social activity of students.

Thus, the identified factors have a great influence on the development of socially significant qualities among university students. The means of physical culture and sports should be used purposefully for the development of socially significant qualities at various stages of study at the university.

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关于大学旅游学士学位培训的旅游和制图方面综合科学的地理空间组成部分  
**GEOSPATIAL COMPONENT OF INTEGRATIVE SCIENCE ABOUT  
TOURISM AND CARTOGRAPHICAL ASPECTS OF TRAINING OF  
BACHELORS ON TOURISM AT UNIVERSITY**

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注解。 本文将地理空间视为一个综合的有组织系统,它由连接到特定区域的不同子系统组成。 旅游业务,如探索旅游休闲空间,目的地组织,旅游基础设施,物流,旅游产品的创造,理论上和实际上基于地理空间方面和该地区的自然特点。 图形地理空间模型是地理图像,例如 地图,研究和教育方法是制图。 教育信息的可视化强烈地影响了人们在心理和教育方面的发展,也影响了人们的职业竞争。

关键词: 地理空间, 旅游再造空间, 旅游产品, 空间信息可视化, 旅游制图提供, 制图能力。

***Annotation.** The article shows the view of geographical space as an integrative organized system which consists of different subsystems connected to a particular area. Tourism operations such as exploration of tourist-recreative space, destination organization, tourism infrastructure, logistics, creation of tourist product theoretically and practically base on geospatial aspects and natural peculiarities of the area. Graphical geospatial model is a geoimage e.g. a map, and the research and educative method is cartographical. Visualization of educative information strongly influences person's development psychologically and pedagogically as well as it influences people's professional competitions.*

***Keywords:** geographical space, tourist-recreate space, tourist product, visualization of spatial information, tourist cartographic providing, cartographic competence.*

Tourism studies is a modern integrative activity to provide tour operator service. The main notion is "tourist product" which is strongly connected to geographical recreate space which is offered to be studied in graphical model image. It can be a map, geoinformational system or any other visualized graphical image. Geographical recreate space is a part of earth geographical space. It is very important to learn its theoretical basis, structure and connections to educate specialists

of tourism. Tour operator, as it is known, creates a new tourist product - interesting and cognitive routes of different kind. It is impossible to create it without a map.

It is possible to find the location of something, to estimate distances and directions with map. As it was mentioned before, cartographic information is presented in symbol system which is almost intuitive to understand, but some of them are described in the legend.

Also a map is made to show main and general features of an area or an occurrence (for example, in a climatic map) that helps to find necessary spatial principles, if needed. Finally, distances and destinations are measured with map, quantitative characteristics are presented (like epures of tourist streams, density of tourist recreate area, road passability, bridge hoisting, village population etc.) Map features mentioned before are necessary to estimate its full, system, geographically well-done construction and to make tourist documents, to know how to make spatial-oriented managing decision.

Cartographic works (maps, atlases, tourist schemes, leaflets, advertising prospects etc.) are the most famous and concentrated folders of spatial-organized information and are widely used by tourists and tourism managers during different preparation and realization stages of tourist product.

Today a map as a logical visualization system is the main cognitive tool which also helps to use and manage recreate tourist space. Geographical spatial information such as thematic maps, electronic maps, different geographical informational systems will take leading place in informational management of social development.

The mutual connection between educational technologies like cartographic research and educational method and visualization of educational information is evident. Speaking about wide sense of cartographic educational method, it is necessary to emphasize one of its features such as its ability to describe the object of its research differently. In our case we speak about that cartographic method is universal (like mathematical method). It can be applied in different professions connected to geographic space image as well as to ways of visualization of educational information which is both: real and virtual [5].

It is evident that one of the informational continuum important parts of modern society is the spatially distributed information which maps contain. This can be referred both to cartography and infographics. [8].

In 90-s of the previous century there were four conceptual theoretic paradigms: map study, meta map study, cartology, graphical and communicative conception which had not special name in those days. Today we would like to call it *graphicalization*, or in more detailed way - *informational visualisation* graphicalational facilities. [4].

It is known that meta map studing conception (A.F. Aslanikashvili - the author) was elaborated in 70-s of the previous century. [1]/ This is a meta-theory which

"unites all parts of cartography in the united logical and methodological system. It finds its place in general epistemic science system"/ The method of science object comprehension is described by the author as cartographical model-making which includes the logical cognitive ways system connecting cartography with the epistemic, dialectic logs, semiotics, informational theory.

Graphical communicative conception and cartology appeared at the same time with meta-cartographics, but they were closer to the ideas of informational theory, cybernetics, infographics (which was not named like that).

Graphical communicative conception (developed by G. Berten, French scientist and E. Arnberger, Austrian cartographer and his school) is based on studying map language as well as maps themselves according to graphics rules (graphical semiotics) and visual perception of images. [4]

Thus, there are two approaches of graphical communicative conception or graphication: informational part itself which is presented by graphical language and the other one - intellectual cognitive approach of perception the information with the help of graphical language connected with spatial reasoning development. This approach has more potential power in bachelors' university educational process.

It is necessary to note that cartographic educational method helps to visualize graphical as well as any other simulated space to study it. Method develops spatial reasoning activating both semi-spheres of brain, integrates art and logical parts of cognition. Symbolic image language of geographic map stimulates forming of abstract thought of prototype which really exists. The sets created like that, knots, structural and landmark lines are steady invariant elements of graphical image phenomenon. "Form vocabulary" includes: points, lines, geometric figures, color, texture. The point has no dimension and can be of different size, shape and color tone. A line indicates direction, length, or movement. Figure (flat, two-dimensional shape) indicates the square, shape. Tone or color indicates the quality that characterizes the degree of color of the object. Gradation of tones as a structural element can characterize the intensity of the phenomenon.

Spatial organization of information in practice can be flat (one-dimensional), multidimensional or continuous (three-dimensional). Geographical space, for example, is traditionally modeled either flat (map), or like three-dimensional object in a plane (block diagram), or like spherical object (globe). It is important that a competent image of any type of space is subject to a certain "grammar of space".

"Space-time", as we know, is a universal form of existence, a form of existence of matter. All material objects are characterized by spatial extent. Space has three or more dimensions. The coordinates of the object characterize its position in relation to neighboring coexisting objects. In this regard, it is necessary to discuss the concept of *geographical space*, which is based on the representation of geometry, physics, and philosophy.

Two points on the ground can be compared in two ways: either in the form of an "image", and this is the so-called art–country approach, which is closer to art rather than to science, or in the form of a logical scheme - a drawing or a map. There is a transition from the primary sense perception of space to the development of intuitive spatial concepts and, ultimately, to their full formalization in some language. Solving its problems, cartography began to use "spatial language".

The concept of geographical space and its structure is necessary for understanding the essence of cartographic modeling which means an adequate and complete display of phenomena and objects of natural and socio-economic character by graphical ways. The geographical space is also correlated with layers structure (data base) for manufacturing electronic maps. So, the main form of space within the Earth shell is geographical space, geospace (GS) [7].

Everything that exists in the world belongs to any geographical system: landforms are to the geomorphological, lakes and seas are to the hydrological, population is to the demographic, etc. But in general, geographic space (GP) is an integration of hierarchically organized geosystems or a system correlation between geocomponents within a specific territory. The difference between a territory and geospace is that the territory (the surface of the Earth, more precisely land, is the sum of separate territories) serves as a common background (arena, metric) of the location of various natural and social geosystems that are "projected" on it, located above it, on it and under it.

These geosystems in conjunction create a geospace with its territory features, or "daylight surface"... But space itself is volumetric and at least three-dimensional. It should be noted that not only the Cartesian distance, but also time, energy and funds to overcome the distance (we should note for ourselves this property of GP, which is very essential for professionals of the tourist business) can be distance measures in geographical space.

Geospace relations are explored within Geography. In our applied case, within tourism and recreational geography (regional geography), which has an integrative method of research and teaching which is called a cartographic method.

The subject of knowledge of cartography differs from other sciences in its specificity - it is a specific objectively existing space of subjects or objects of natural or social mapping (as well as a temporary reordering), expressed in graphic language in the form of a figurative-sign model of reality.

The article discusses the issue of cartographic providing of tourism. It is about professional tourist maps, about what they should represent. [6]

Since the properties and purpose of general geographical and special (thematic) maps are known, the cartographic method of research has been studied, it is advisable first of all to refer to the concept of "tourism", namely, to what is the object of research in the science of tourism, for reliable determining of tourist

maps. To determine what will be the subject of mapping on tourist maps, the so-called prototype of a cartographic image, and which maps will meet the needs of tourism figures.

So, there are at least four views on tourism in the modern world. The tourism is:

- sector of the economy - the opinion of regional leaders, economists,
- interindustry complex or market, - the tour operator dominates,
- economic activity of serving tourists, - the prerogative of travel agencies, travel agencies,
- activities during the holidays - an initiative of the tourists themselves, travelers. [3] /

As you can see, tourism appears in its essence as an industry branch or as an activity.

The Federal Law of 1996 "On the Basics of Tourist Activity in the Russian Federation" determines the definition of tourist activity as a tour operator and travel agent activity, as well as other travel

organization activities. Thus, the object of tourism as a complex of interconnected sciences of tourism is the socio - economic interaction within the natural, historical and cultural recreational space, consisting of objects of tourist interest, composed in a certain way in tourist destinations. In this case, the backbone of the energy communication channel is the flow of tourists-holidaymakers, which is formed in accordance with certain natural and logistic patterns. [6].

From the preceding it may be determined that the objects of tourist-recreational mapping as an arena of social and economic interaction of different scale: tourist and recreational space, tourist destinations, objects of tourist interest and main tourist flows.

Consumers of cartographic products will be regional leaders, economists, entrepreneurs (tour operators and travel agents),

The use of the cartographic method as a method of knowledge in various Earth sciences is diverse and productive, but today the meaning of the method has "gone" beyond cartography and it has a universal character of visualization and research of the spatial regularities of the studied phenomenon. Its use especially effective in the sciences, traditionally associated with the use of topographic maps. The development of the method is associated with the use of mathematics, computer technology.

Scientific issues that are solved using geo-images as spatial models of reality are as follows:

- description and zoning of the territory;
- obtaining quantitative characteristics of a phenomenon or object;
- identification and analysis of the leading factors of location and development of phenomena;

- establishing the degree of mutual correspondence between phenomena;
- study of the dynamics and evolution of geographic systems and individual phenomena;
- experimental design and monitoring.

In all cases, the cartographic method acts as a general scientific method for the study of phenomena and objects that have spatial distribution along with the mathematical, logical, historical, etc.

The cartographic method is associated with the graphics of spatially distributed information. The term gratification refers to the visual-spatial aspect of human thinking and communication.

The high efficiency of graphic images in training is known, especially for the development of right-hemispheric thinking in the formation of spatial knowledge, ideas, concepts, as evidenced by psychological research.

The knowledge of the geospace theory, the language of the map, the ability to work with geo-images as graphical models reflecting territorial patterns, is achieved under the condition of cartographic literacy. [5]. The practical significance of such knowledge is obvious, since maps are the carriers of spatially organized information, a means for designing, training, and professional communication.

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实施包容性教育的主要哲学问题  
**THE MAIN PHILOSOPHICAL PROBLEMS  
OF THE INTRODUCTION OF INCLUSIVE EDUCATION**

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注解。 本文讨论了在高等教育中引入包容性教育的相关问题。 文章还强调需要为引入包容性教育创造特殊条件，特别是在大学层面。

关键词：教育哲学，包容性教育哲学，尊重权利，教育过程参与者，教育环境。

**Annotation.** *The article discusses the problems associated with the introduction of inclusive education in higher education. The article also emphasizes the need to create special conditions for the introduction of inclusive education particularly at the university level.*

**Keywords:** *philosophy of education, philosophy of inclusive education, respect for rights, participants of the educational process, educational environment.*

Currently, there are changes in the socio-economic, political, informational and technological processes of life. Changes dictate their own tendencies in reforming the education system, since it is fundamental in the development of the becoming of a personality. The main problem of social development is the becoming and self-realization of each person. A man is considered as a system of holistic self-development and self-knowledge by way of the resources of philosophical and social relations. In these relationships, each social individual is unique and significant.

Modern philosophy discusses the important postulates of the idea that the basis of any development should be based on humanistic consistency of values and goals. In recent years, the tolerance of our society has been growing. This stage in the development of our society is associated with rethinking by society and the state of their attitude towards people with disabilities, recognizing not only equality of their rights, but also awareness of their duty to provide such people equal opportunities with all others in different areas of life, including education.

Provision of equal opportunities to all categories of citizens in obtaining higher education brings society to the idea of the need to introduce inclusive education in universities.

Inclusive education is a term that is used to describe the learning process of people with special needs. The basis of inclusive education is a worldview that excludes any discrimination of students, ensures the same attitude towards all people and at the same time creates special conditions for students who have special educational needs [5].

Inclusive education is the process of development of modern education, which implies the access to education for all, in terms of adapting to the various needs of all groups of consumers of educational services [4]. Today, the problem of inclusive education is relevant. Every year the number of students who require special educational conditions is constantly growing. In order to solve this problem, inclusive groups are created.

In the present context, a more local problem can be identified: inclusive education is associated with the idea of educating ordinary children and children with disabilities. Thus, we can distinguish two aspects in the understanding of inclusion: on the one hand, this is the practice of including a person in culture and society (including a person in relation to the reference group), which contributes to the cultural beneficitation of both the person and the entire culture of present society. This concept, proposed in social philosophy, is based on the concept of an inclusive society. On the other hand, inclusion also refers to the introduction of a child with disabilities in the educational community of healthy coevals in accordance with his right to education. Such inclusion may or may not be provided with the means which are necessary to actual implement of the right to education.

The complex process of ensuring equal access to quality education for students with special educational needs in a higher educational institution is largely due to the optimal organization of their educational and non-educational activities, in particular the creation of a special inclusive environment aimed at successful adaptation of students with special educational needs, which should be based on personality-oriented teaching methods that take into account their individual peculiarities and disabilities as much as possible. However, at the present stage there are certain contradictions: on the one hand, the needs of society and students in this type of education, involving the use of special forms, methods, means, methods for teaching, and on the other, the lack of scientific and methodological reasonable special forms, methods, means, and methods of teaching students with disabilities. The solution to this problem is not a matter of one day. Inclusive education is a long-term strategy that requires patience and tolerance, systematic and consistent, continuous, integrated approach to its implementation. Inclusion provides the involvement in the process of each object of the educational process

by adapting the educational program to his/her needs, to match his/her abilities, as well as meeting individual educational needs and providing special conditions in the form of creating a barrierless environment in teaching and professional training people with disabilities [1].

The inclusive approach in education is directly related to the concept of environmental approach, which is based on the recognition of three equal participants in the educational process: teacher, student and environment [8]. This set of measures implies both the technical equipment of educational institutions and the development of special professional retraining courses for teachers and other students aimed at developing their interaction with people with disabilities and disabled people, accepting them as equal participants in the educational process. At the same time Gaidukevich S. E. points out that the main task of the teacher is to turn the environment into an educational one, to make her an active ally and assistant [2]. From the point of the environmental approach, the educational environment can acquire a number of significant characteristics - it is developing, personally oriented, in case that the conditions, influences and opportunities provide stimulate the child's development process, take into account his various needs and interests, promote living self-determination and self-realization. The environment is adaptive if it provides the conditions and possibilities for each child to assign experience with his age characteristics, internal resources and individual abilities. The educational environment can be defined as a system of conditions and influences of the formation of a personality according to a given pattern, as well as opportunities for its development contained in a social and spatial environment.

The particular value of this approach is in the fact that it focuses the teacher's attention on the student as an active object of the learning process. It is the student who becomes the reference point in designing an educational environment and the whole pedagogical interaction. The practical realization of the environmental approach and inclusion in higher education allows each student to adapt in this environment successfully, to unveil and realize their professional capabilities and needs [6]. Education in the inclusive environment of the university involves the joint training of students with functional limitations with other students in groups. There should also be explanatory classes with such ordinary students in order to level their possible negative attitude towards cooperative education.

Nowadays the Inclusive Education in Russia is in progress. It is possible to list enough problems that prevent effective and fast implementation the idea of inclusion in educational practices: legal, economic, social, psychological and pedagogical.

The realization of the principles of inclusive education showed a series of problems that can be identified as a theoretical, methodological, axiological, praxeological. The group of theoretical and methodological problems includes the up-

dating of the conceptual mechanism, the methodological approaches to concepts that underlie the understanding of inclusion.

Axiological aspects of inclusion are not uniquely defined, since they imply fundamental changes in the value system in the new paradigm of “education for all” and overcoming social and cultural stereotypes in terms of perception of limited possibilities.

Praxeological problems suggest improvement of the regulatory base for the transition to inclusive education at any level of education, the creation of an accessible information and technical environment in an educational institution, psychological and pedagogical support and training of personnel for work with a special category of students. According to the majority of researchers and practitioners of inclusive education, the value changes are the most important and difficult: a change in the philosophy of education - from “education for education” to “education for development”; overcoming social and professional stereotypes in the perception of children with disabilities; the formation of a community that shares the ideas of equality and acceptance, which stimulates the development of all its participants, in which the value of each is the basis of common achievements. This applies to the whole society, and direct participants of the educational process. The ideas of an axiological approach are the foundation of inclusion and social integration. Axiology is engaged in the study of values as the basis of the meaning of human existence, which determines the direction and motivation of human life, activity and specific actions. The main goal of axiology is to show the place of value in the structure of existence and what are its relations to the facts of reality. Pedagogical axiology is an interdisciplinary field of knowledge, considering education, upbringing, tuition, and pedagogical activity as basic human values. The choice of an axiological approach as a methodological basis for inclusion allows us to consider education as a socio-cultural phenomenon that finds expression in the basic ideas: the universality and fundamental nature of humanistic values, the unity of goals and means, and the priority of the idea of freedom. One of the humanistic values of our time is the recognition of the right of every person to respect and acceptance of his individual characteristics - was embodied in the real possibility of people with disabilities to study in general education institutions. The principles of inclusive education include in their content the core values that should be used by the educational community: the value of a person does not depend on his abilities and achievements; every person is able to feel and think; everyone has the right to communicate and to be heard; all people need each other; genuine education can be carried out only in the context of real relationships; all people need the support and friendship of their peers; for all learners, progress can be made more likely in what they can do than in what they cannot; diversity enhances all aspects of human life [7].

Axiology as the basis of the philosophy of inclusive education in methodologi-

cal terms is logically supplemented by ideas of philosophical and pedagogical anthropology. The position of philosophical anthropology considering a person as a spiritual being, aware of, taking into account, overcoming vital and social assignment, and therefore free, open to the world and developmental possibilities, able to search for his vocation, comprehend his being, to self-determination (individual choice), self-realization, accepted today as a methodological basis of pedagogy.

Thus, the question of the introduction of inclusive education in universities is a complex multi-stage task. For its implementation, the efforts of all interested parties should be combined. These parties are students with disabilities, regular students studying with them, and, of course, teachers and university authorities. Certain methodological approaches to the educating of students with special educational needs should be developed. Special technical equipment and architectural accessibility of premises for such a category of students must also be present, which is an important component of the environmental approach to inclusive education. Inclusive education, based on the right principles, helps prevent discrimination against children and supports children with special needs in their right to be equal members of the student community and society.

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现代俄语中多动词的语义类  
SEMANTIC CLASSES OF MULTI-VERBS IN MODERN RUSSIAN.

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抽象。本文讨论具有不同效价的动词的语义类。基于对动词语义类的解释，在俄语教学过程中，使用语义表征，这是语法解释的分割结果，因此语义不变量 - 框架 - 被放入 与案件和动词的对应

从语义学的角度来看，第一个行动者是行动的主体，即行动者；第二个行动者是受直接行动对象影响的对象，直接对象；第三位代理人是间接或进一步的对象，对其有利或有害于进行间接补充。

关键词：分布 - 转换方案，框架，案例值，行为者，语义类，核结构，变换，动作动词，元素分布。

**Abstract.** *The article deals with semantic classes of verbs with different valences. Based on the interpretation of the semantic class of verbs, in the process of teaching the Russian language, semantic representations are used, which are the result of the segmentation of the gestalt of interpretation, so that the semantic invariants - the frame - are put into correspondence with the case and verbs*

*From the point of view of semantics, the first actant is the subject of action, i.e. the one who performs the action; the second actant is an object that is impacted by a direct action object, a direct object; the third actant is an indirect or further object to whose benefit or to the detriment of which an indirect complement is performed.*

**Keywords:** *distributional-transformational scheme, frame, case value, actant, semantic class, nuclear construction, transform, actant verb, element distribution.*

The theoretical meaning of transformational grammar lies in its enormous explanatory power. The core of the transformational grammar is the idea of the core of a language, consisting of the simplest linguistic structures from which all other linguistic structures of greater or lesser complexity can be derived. The problem of invariance, which is the central problem of modern structural linguistics, finds its most profound solution in transformational grammar.

Simple, narrative active sentences, the so-called nuclear sentences belong to the core of the language. In European languages, verb sentences are most common. They are, in order of decreasing use, followed by substantive, adjectival and adverbial sentences. In a simple sentence, the central node does not have to be a verb, but if there is a verb in the sentence, it is always the center of this sentence.

Verb semantics includes verbal and subject signs. The latter are the semantic base of the valence of the verb. Actants (subject, first and second objects, etc.) are hung on the valences of the verb, like hooks "depending on the greater or lesser number of hooks that he has to keep these actants on him," the verb actualizes the subject verses components in the message. The interpretation of the semantics of the verb is the institutionalization of the semantic classes of objects, between which the action takes place. Thus, the interpretation of the verb "вложить" in the predicative phrase "Андрей вложил письмо в конверт" should be: "Помещение кем-либо предмета во внутреннюю полость какого-либо другого предмета."

The analysis of semantic interpretation gives us the following semantic components:  $C^1_{\text{одн}}$  - the person performing the action;  $C^2_{\text{в}}$  is a separate item from another item;  $C^3_{\text{в}}$  - an object that has a cavity inside it and that exists separately from  $C^2_{\text{в}}$ ;  $\Gamma$  - placing the person in the cavity or container of the object of any other object.

As can be seen, fixing only the action ("помещение") is not enough for interpretation. The interpretation will be complete if all classes of actants are listed. In addition, you must specify: a) the presence of one of the actants cavity (capacity, etc.); b) the integrity of each of the actants; c) the value of the person in the subject of the action and the inanimateness of the first and second objects. This additional information, which can be called "selection discriminators", sets the prepositional-case forms – accusative case without preposition of an object having a cavity. Selection discriminators are, therefore, the semantic components of the case (prepositional case) form of each of the actants.

Distribution of the verb is represented by the actant surroundings of the subject and the complement (direct and indirect). The nuclear structure is formed by the  $C^1_{\text{н}} + \Gamma + C^2_{\text{в}}$  structure, and the optional structure is formed by the other  $C^3_{\text{в}}$  actants, etc.

The distributive - transformational scheme has the following indices:  $C^1_{\text{н}}$  – subject in the nominative case in the position of the subject;  $C^2$  - the first object;  $C^3$  is the second object;  $\Gamma$  - the verb. To the left of the actant index, the preposition is indicated; its absence is not specifically indicated, to the right, the case is indicated by the initial letter of its name, for example: в - accusative case, р - genitive, etc. Considered animate or inanimate actant, essential for the class of verbs being studied. When the verb is on the left, the prefix indicates.

A nuclear designation is a designation denoting obligatory information: a noun in the nominative case + a verb + a noun in the accusative case without a preposition; nouns in other prepositional - case forms denote optional information. The basis for the classification is the marked optional form representing the second object.

Variations of options are given by the pragmatic value of the actants, so that some actants of the left-hand transform designate mandatory information and refer to the unmarked nuclear design  $C^1_n + \Gamma + C^2_b$  whereas in the right transformation, actant  $C^2$  denotes optional information and is expressed not by direct addition, but by some other prepositional case; in turn, actant  $C^3$  is indicated by indirect addition to any prepositional form, except nominative case and accusative case without preposition, presenting optional information in the left transform, and in the right transform takes the position of direct supplement  $C^3_b$  and designates mandatory information in the unmarked nuclear design. The transformational attribute uniquely defines the semantic class of the form of the control phrase, so that the definition of the semantic class is equally true for any verb and its actants that have a distributive-transformational scheme of this transformational attribute.

The definition indicates the minimum meanings of the action of each of the three actants, and for this it is necessary "to search for each word a single nuclear" common "meaning covering all its meanings." Since the definition of the semantic class defined by the transformational attribute the minimum meanings of action and actants are indicated and the definition can be called minimal semantization. The establishment of correspondence between the elements of the definition and the significative meanings of the verbs and their actants belonging to the given distributional-transformational scheme is the operator of generating a variant of the correct predicative phrase and can be called cross-semantization.

The transformational feature of the verb is the sum of two environments that are equivalent in meaning. This means that the left transform is equivalent to the right transform in meaning. With some simplification, we can say that the left and right transforms are equivalent. In the transformations, in accordance with the prepositions of optional actants, the signs of the verbs change. Example: Рабочий отмывает с рук масло - Рабочий отмывает руки от масла.

The syntactic change of the transformation consists in the change of the syntactic complex: the elements of the obligatory and optional structures are interchanged. In the left transformation, the actant "масло" enters the obligatory structure  $C^2_b$ , and in the right "руки". Transformation means changing the pragmatic meaning. In the first case, the "масло" is essential, and in the second "руки".

Obligation and the necessity to characterize the verb of actants with the given semantics mean that the actants that surround the environment of the verb are

subject components of the verb attribute. Each actant corresponds to a set of nouns that have a common semantic component. Example: “руки” have a semantic component “object surface”, and “масло” - “substance removed from the object's surface”, and finally, the subject has the general meaning “a person making an impact on the object's surface in order to remove something”.

Any verb in accordance with its valence has objective components - potential actants, which form semantic classes. The verb itself has the hyperonym "remove something from the surface of the object." This means that we have - a class of verbs, which are characterized by a distribution containing classes of actants, which can be, like the verb itself, called the corresponding hyperonym. Then the semantic interpretation of the verb can be expressed by naming the hyperonyms of the verb and its actants. In our example, such an interpretation would be: "Некто устраняет что-либо с поверхности какого-либо предмета."

Transformation of a generator is the generation by the speaker of variants - transforms, based on the semantic invariant of the message and taking into account the pragmatic meanings of the transforms; the integrator transformation is the finding of the common part of the invariant and the difference of variants between the transformers with the subsequent identification of the semantic invariant.

The three-actant verbs form a syntactic structure, which are combined into semantic classes of verbs:

**«Переделывание кем-либо какого-либо предмета в какой-либо другой предмет»**

$$C^1_{\text{ОДИ}} + \Gamma + C^2_{\text{В}} + C^3_{\text{В}} \Leftrightarrow C^1_{\text{ОДИ}} + \Gamma + C^3_{\text{В}} + C^2_{\text{В}}$$

Verbs with the indicated signs include: воплотить (идеи в образы), обернуть (ребятишек в зайчат), обобщить (голоса природы и родные мотивы в нечто новое), обратить (воду в пар = пар в воду) объединить (два института в один), перевести (граммы в килограмм), перевить (гривы в косы), перевоплотить (действительность в образы), переделать (роман в пьесу), пережечь (дерево в уголь), переименовать (Петроград в Ленинград), перековать (гвоздь в подкову), перекрасить (желтую машину в зеленую), перекрестить (Петра в Михаила), перекроить (платье в юбку), перелить (колокола в пушки), переложить (поэзию в прозу), перемолоть (миндаль в порошок), переоборудовать (спортзал в мастерскую), переплавить (колокола в пушки), переработать (полуфабрикат в товар), перетереть (миндаль в порошок), перетолочь (миндаль в порошок), перестроить (полк в дивизию), перештамповать (сэкономленный материал в детали), превратить (воду в пар), преобразить (собаку в лошадь), преобразовать (переменный ток в постоянный), преобразить (добро во зло), претворить (воду в вино), раздробить (метры в сантиметры), трансформировать (атомную энергию в электрическую).

Position  $C^1_{\text{од}}$  and surrounded by the listed verbs is regularly expressed by animate nouns and designates the active producer of the action; The  $C^2_{\text{в}}$  position is indifferent to the category of animation / inanimation and means "the final form accepted by the variable object"<sup>1</sup>.

The specified transformation (more precisely, quasi-transformation) is possible only under the condition that the "right" participants of the situation designated by the verbs being analyzed are in symmetry relations. Comp. : превратить воду в пар = превратить уголь в дерево.

The verbs being analyzed have the meaning "to transform, that is, to transfer an object from one state to another."

Some verbs of this group admit a transformation, which implies convergence in the right transformation, for example: обратить воду в пар  $\Leftrightarrow$  получить пар из воды; пережечь уголь в дерево  $\Leftrightarrow$  получить уголь из дерева.

Simplexes of several "transform" verbs have a distributive formula, which coincides with the right transform of the verbs "create an object from a material" and the distributional formula of constructive verbs: переделать – делать (пьесу из романа), пережечь – жечь, перековать – ковать, перекроить – кроить, перелить – лить, перемолоть – молоть, перетереть – тереть, перетолочь – толочь, переформировать – формировать, перечеканить – чеканить, перешить – шить, перештамповать – штамповать, преобразовать – образовывать, претворить – творить.

Yu.D. Apresyan attributed to these verbs the meaning "to produce an object by transforming another object"<sup>2</sup>.

In the case of a valid transformation  $C^2_{\text{в}} \Leftrightarrow C^3_{\text{в}}$

Comp. Учитель физики превращает воду в пар  $\Leftrightarrow$  Учитель физики превращает пар в воду, there is no neutralization of the deep values of the  $C^3_{\text{в}}$  and  $C^2_{\text{в}}$  cases in the form of the accusative case without a preposition, but the identification of the semantics of the objects as a whole; in case of quasi-transformation, the depth value of the case of the  $C^3_{\text{в}}$  neutralization in the form of the accusative case is not subject without preposition.

**"Придание кем-либо предмету новой формы или внешности".**

$C^1_{\text{оди}} + \Gamma + C^2_{\text{в}} + C^3_{\text{в}} \Leftrightarrow C^1_{\text{оди}} + \Gamma + C^2_{\text{в}} + C^3_{\text{ТВ}}$

Verbs with the specified transformational signs include: вить (змея вьет хвост в кольцо = кольцом), вытянуть (дивизию в линию), вязать (вещи в узел), метать (сено в стога), метать (нитки в клубок), обернуть (малыша в зайчонка), перевязать (книги в пачки), переметать (солому в стога), перемотать (нитки

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<sup>1</sup>Z.D. Popova Use of case and prepositional case forms in the modern Russian literary language. Voronezh, 1971, 46

<sup>2</sup>Apresyan Yu.D. An experimental study of the semantics of the Russian verb. – Moscow, 1967, 130.

в клубок), переодевать (девочку в мальчика), прессовать (сено в квадраты), разворачивать (эскадрон в цепь), свалить (книги в кучу), свалить (тесто в шарики), свернуть (бумагу в трубочку), сваять (снег в сугробы), свить (хвост в кольцо), связать (концы в узелок), сгрести (сено в копны), сдуть (зерна в кучки), скатать (пластилин в шарики), скинуть (камни в кучу), скрутить (волосы в узел), сложить (сено в копны), сметать (сено в стога), смотать (нити в клубок), собрать (книги в стопки), составить (ружья в козлы), спрессовать (сено в квадраты), стаскать (мешки в кучу), стиснуть (пальцы в кулак), строить (взвод в двешеренги), умотать (всю пряжу в клубок), упаковать (вещи в тюк).

Position  $C^1_{\text{од}}$  and in the environment of the listed verbs is regularly expressed by animate nouns and designates the active producer of the action;  $C^2_{\text{в}}$  position is usually expressed by inanimate (less often - animate) nouns and has the meaning of a direct object, to which the subject gives a new form or appearance, denoted by the position,  ${}_B C^3_{\text{в}}$ ; The position of  ${}_B C^3_{\text{в}}$  is usually correlated with the position of  $C^2_{\text{в}}$  on the basis of animation / inanimation.

Thus, the verbs being analyzed have the meaning “to give the subject a new form or appearance”. They differ from verbs with the meaning “enclose the inside of the subject” by the semantic component of the object: “enclose the inside of the object” has the semantic component of the  ${}_B C^3_{\text{в}}$  deep meaning “environment”, and the syntactic-semantic class under consideration has the “form” in the same preposition-case construction.

Variations of options are given by the pragmatic value of the actants, so that some actants of the left transformation designate mandatory information and refer to the unmarked nuclear design  $C^1_{\text{и}} + \Gamma + C^2_{\text{в}}$  whereas in the right transformation, actant  $C^2$  denotes optional information and is expressed not by direct addition, but by some other prepositional case; in turn, actant  $C^3$  is indicated by the indirect complement of any prepositional form, except the nominative case and the accusative case without a preposition, presenting optional information in the left transform, and in the right transform takes the position of direct complement  $C^3_{\text{в}}$  and designates mandatory information as part of the unmarked nuclear design. The transformational attribute uniquely defines the semantic class of the form of the control phrase, so that the definition of the semantic class is equally true for any verb and ego of actors who have a distributional-transformational scheme of this transformational attribute.

The definition indicates the minimum meanings of the action of each of the three actants, and for this it is necessary to “search for each word a single nuclear “common” meaning covering all its meanings”. Since the definition of the semantic class defined by the transformational attribute indicates the minimum meanings of

action and actants, the definition can be called the minimal semantization. The establishment of the correspondence between the elements of the definition and the significative meanings of the verbs and their actants belonging to this distributional-transformational scheme is the operator of generating a variant of the correct predicative phrase and can be called cross-semantization.

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以十九世纪下半叶俄罗斯和日本为萨哈林岛斗争为例的政治目标解决方法  
**METHODS OF SOLVING POLITICAL GOALS ON THE EXAMPLE  
OF THE STRUGGLE OF RUSSIA AND JAPAN FOR THE ISLAND OF  
SAKHALIN IN THE SECOND HALF OF THE XIX CENTURY**

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注解。随着俄罗斯在17世纪进入太平洋，俄罗斯工业家，海员和远东地区研究和开发研究人员开始了一个新时代。这可以得到俄罗斯定居点稳定的粮食供应的支持。解决这个问题的最近国家之一可能是日本。但是，由于日本与外界隔绝，俄罗斯谈判代表无法与这个国家建立贸易关系。萨哈林岛位于通往日本的海上航线上，吸引了人们的注意力，有可能在那里组织俄罗斯定居点，并由于岛屿与东南亚国家的接近而积极发展贸易关系。从19世纪中叶开始，俄罗斯和日本之间为争夺岛屿而进行的竞争开始了一个活跃的阶段，作为一个靠近东南亚国家的战略重要领土。俄罗斯流亡工人在履行俄罗斯解决“萨哈林问题”的政治任务时，在萨哈林岛加入俄罗斯方面发挥了重要作用，但也为将该岛变为艰苦劳动创造了不可逆转的条件。

*Annotation. With the Russian access to the Pacific in the 17th century, a new era began for Russian industrialists, seafarers, and researchers in the study and development of Far Eastern lands. This could be supported by a steady supply of food for the Russian settlements being created. One of the closest countries in addressing this issue could be Japan. However, due to Japan's self-isolation from the outside world, Russian negotiators could not establish trade relations with this country. Sakhalin Island lay on the sea routes to Japan, attracting attention with the possibility of organizing Russian settlements there and actively developing trade relations due to the proximity of the island to the countries of Southeast Asia. From the middle of the 19th century, an active phase began in the rivalry between Russia and Japan for the possession of the island, as a strategically important territory close to the countries of Southeast Asia. A significant role in the accession of Sakhalin to Russia was played by the Russian exiled workers, who fulfilled the political task of Russia in solving the "Sakhalin question", but also created irreversible conditions for turning the island into hard labor.*

With the opening of the strait between Sakhalin and the mainland in 1849 and the discovery of rich open deposits of thermal coal on the island in 1852, Sakhalin quickly acquired not only economic but also military, strategic and political importance for Russia.

Moreover, it became the subject of territorial rivalry with Japan for the complete possession of it.

However, the isolation of the island from European Russia, the lack of transport infrastructure and labor resources required the political leadership of the Russian Empire to decide how and by what means to achieve the transfer of Sakhalin Island under the jurisdiction of the Russian Empire and to start developing its rich resources.

After the end of the Crimean (Eastern) War of 1853-1856, questions of Sakhalin Island were referred to the introduction of the Governor-General of Eastern Siberia N. N. Muravyov, who "ordered the military team to be sent to Sakhalin for coal mining" and in August 1856 Rudanovsky<sup>11</sup> [1., 12-13] built the first building of the Duya post to house the team near the foreign village of Douai, and from 1861 "mining work on Sakhalin began to be carried out exclusively by exiles." At this point in time, Russia did not have ownership goals for all of Sakhalin.

But soon the goals for Sakhalin were changed.

### **1. South Sakhalin - the main goal of Russia after 1858**

The decision on the need to own the whole island arose after the conclusion of the Aigun Agreement of 1858. The Governor-General of Eastern Siberia N.N. Muravyov<sup>22</sup> wrote: "... after the Aigun Treaty, we not only have the right, but also the obligation ... to attend to the establishment of our dominion on Sakhalin" [2, 180-182].

N. N. Muravyev's trip to Japan in 1859 showed the unequivocal intentions of Russia to receive the entire island in possession, but Japan refused concessions and sharply intensified Japanese influence on it, directing labor and material resources there. A Russian scientific expedition aimed at Sakhalin in 1860 reported that "the number of Japanese on Sakhalin is increasing every day ..., their junks constantly come to Sakhalin, supply the villages with huge food supplies ..." [3, 20].

In 1862, Japan sent out its diplomatic mission to Russia to resolve the issue of drawing the border between Russia and Japan at 50<sup>0</sup> north latitude. But now Russia stood firmly on the border along the Strait of Laperouse, the negotiations ended in

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<sup>11</sup>Nikolai Vasilyevich Rudanovsky (1819-1882) - Rear Admiral, Researcher of Sakhalin. He voluntarily went to Sakhalin during the preparation of the expedition of G. Nevelsky, was the second officer in the Muravyevsky post. In 1856 he was sent to Sakhalin for coal work. In 1857, founded the Kusunai post. From 1858 - on the Baltic Fleet.

<sup>22</sup>Muravyov-Amursky Nikolai Nikolayevich (1809-1881) - Governor-General of Eastern Siberia (1847-1861).

nothing. Since that time, Russia began to strengthen its position, and the confrontation between the Russians and the Japanese in the south of Sakhalin began, with frequent incidents.

The plans of Russia was the creation of new military posts and villages in the south of the island. Japan, concerned about the actions of the Russians, sent a new embassy to Russia, which arrived in Petersburg in January 1967. The negotiations showed the intransigence of both parties and ended with the signing of the Interim Agreement on the Island of Sakhalin in March 1867. It was a document on the joint ownership of the island by Russia and Japan. Soon A. M. Gorchakov<sup>33</sup> sent the attitude to the Governor-General of Eastern Siberia M. S. Korsakov, in which he explained the specifics of the signed announcement and set tasks for the implementation of the tasks set by the country's leadership, which were as follows:

1. Fight for the border between Russia and Japan along the La Perouse Strait.
2. To weaken the centuries-old relationship of the Aborigines with the Japanese, to find ways of obtaining their support in the policy against the influence of Japan.
3. To resolve issues of resettlement policy.
4. Engage in the military strengthening of Russia's position on Sakhalin [4].

Since that time, all doubts about Sakhalin were rejected, the decisive stage of the struggle for the mastery of the island began.

At the meeting, A. Gorchakov reported, “that the question of the need of this island for Russia throughout its entirety has already been solved in theory, and that he was given a positive indication from the Sovereign Emperor ...” therefore, “there can be no other outcome in the present case, as taking measures so that **by the very circumstances** (highlighted - V. Ye.), the disputed part of the island passed into our possession”; “But it will facilitate the peaceful resolution of the disputed issue and will undoubtedly have an impact on bringing the Ainu population to our side; meanwhile, this influence will remain insignificant if **the Russian element** ( highlighted - V. Ye.) on the island will be limited to military troops alone”[5].

A long meditation on these two phrases: “**by the very circumstances**” and “**the Russian element**” forced us to stir up archive files in various archives with redoubled energy.

What “circumstances”, thanks to which “the question of the need of this island for Russia has already been solved in theory,” and what “Russian element” did Russian Chancellor A. Gorchakov talk about?

The flywheel of actions to fulfill the highest orders began to unwind. At this time, the initiative to retain Southern Sakhalin began to shift to Japan, and Russia lost “a favorable time to seize the island” [6].

<sup>33</sup>Alexander Mikhailovich Gorchakov (1798-1883) - from April 1856 - Minister of Foreign Affairs of Russia.

On October 16, 1868, M. S. Korsakov<sup>44</sup>, in a letter to the head of the Marine Ministry, N. K. Krabbe, writes: "... in view of the political necessity of developing our funds to Sakhalin to such an extent that, making possible Russian predominance on the island, **paralyzed** (highlighted – V.E. and I.L.) the influence of the Japanese, it is not enough to confine ... with the staffing of a military detachment .... Only with the development and consolidation of the Russian population on the island of Sakhalin, can the military teams on their posts gradually decrease and even be removed ... ”[7].

At the beginning of November 1868, A. Gorchakov already demanded “to increase the number of our settlers, to occupy all the most important points of the island and back up these measures with the presence of our military naval force, otherwise, we can gradually and permanently be ousted from the island” [8].

The anxiety for the fate of the island reached the emperor, who demanded the urgent establishment of the Special Committee of the Ministry of Internal Affairs to discuss the issue of the exile arrangement and hard labor, which met on December 5, 1868. The content of the talk on this committee shows no coincidence of this step, collected by the “Highest Command”. **The special circumstances** of the critical moment in the struggle for Sakhalin Island came, and now it was necessary to show **the strength of these circumstances**. On this basis, the Special Committee recognized that it was necessary **to begin the experience of setting in exile** to Sakhalin without any further delay [9].

It is **to experience, and not the organization of the hard labor camp itself!**

On this basis, the Committee proposed to transfer 800 exiled people to Sakhalin from the Nerchinsk Territory in the navigation of 1869 to use them in accordance with their purpose for hard labor. [Ibid.]

But it is clear that the flywheel of the convicts movement lagged behind the action of the Japanese side. Further, in the text of the document, it continues that "The above assumptions were credited with **the Highest allegation**, and at the same time the corresponding orders were made to bring them into action." When was the Highest allegation?

**It took place on April 18, 1869 under No. 46984 [10], to which all those who inscribed in the history of the Sakhalin region the phrase that “1869 is the year of the announcement of Sakhalin as a place of hard labor and exile” refer.**

However, in the document itself, which is called **the Highest Approved Regulation of the Committee on the organization of hard labor**, announced to the Senate by the Minister of Internal Affairs “On the question **of the future organization of hard labor and the temporary distribution of hard labor**”,

**firstly**, there is not a single phrase that concerns the establishment of a hard labor camp on Sakhalin;

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<sup>44</sup>Governor General of Eastern Siberia M. S. Korsakov (1826–1871), he is commander of the troops of the East Siberian Military District from 1861 to 1871.

**secondly**, this was carried out “in the form of experience”, which was also supported by the Special Meeting on the Affairs of the Amur Region.

A government commission for the colonization of the Amur Territory headed by Adjutant-General I. N. Skolkov<sup>55</sup> was formed next.

On May 6, 1869, Gorchakov in the “highly secret” instruction No. 1526 for I. Skolkov indicated the tasks on Sakhalin, which essentially reveal the plan of the political leadership of the Russian Empire, and the Commission’s task was to prepare the basis for the implementation of this plan:

1) the settlement of the island, i.e **resettlement of the exiled** and promotion of free colonization;

2) the development of coal mines in the broadest possible dimensions, through private enterprise or government funds;

3) **taking measures to counteract the Japanese and to gradually spread our influence throughout Sakhalin** [11] <sup>66</sup>.

And, most importantly, in this instruction A. Gorchakov indicated a fundamental change in the attitude of Russia towards the negotiation process with the Japanese<sup>77</sup>:

“The centuries-old experience has proved to us that in relations with Asians the first condition for success is **hardness and unswerving pursuit of a supposed goal**. With all the peace loving mood ... we will probably soon force the Japanese to finally abandon their claims ”[Ibid.].

Direct interest in the occupation of Sakhalin with the help of convicts can also be seen from the meetings of the Special Committee of the Ministry of Internal Affairs. For example, in the Journal of meetings of May 16, 19 and 24, 1871 it is written: “... concentration of convicts on Sakhalin represents benefits in terms of state benefit. The consolidation of our possession of this island can be achieved only through the imposition of Russian colonization on it. Meanwhile, the extreme remoteness of this island does not allow the possibility of expecting voluntary relocation to it ... ”[12].

As can be seen, in 1871, based on the experience of free resettlement in 1869, the authorities decided **to abandon the natural method of settlement, moving to the compulsory method of settlement**.

<sup>55</sup>Skolkov Ivan Grigorievich (1814-1879) - General Adjutant. In 1860 he was enrolled in the retinue of the emperor, carried out special assignments. In 1869 he headed a government commission sent to the Amur region.

<sup>66</sup>Fainberg E. Ya. In her dissertation, written in 1948, approved only in 1956 she pointed to F.4214 / 5. P.I. P. 321-328. Perhaps in the past time numbering has changed somewhat.

<sup>77</sup>The whole history of the international relations of Russia and Japan until the middle of the XIX century completely consisted of extremely humiliating and unsuccessful attempts by Russia to establish trade relations with Japan to support the Russian colonies in the Northeast part of the Asian continent and Russian Alaska with food resources. It becomes clear that Russia could not and did not have the right to suffer another defeat in negotiations with the state, which was not only isolated from the outside world, but also was in a very pitifully military state.

This document confirms the "placement of the convicts" as a way of **"paralyzing the influence of the Japanese."**

The Commission of I. Skolkov confirmed "the suitability of Sakhalin to exile", considered the possibility of "agricultural placement" (only one member of the commission spoke favorably for the Sakhalin penitentiary agricultural colonies for convicts, "and also it was decided to send Vlasov<sup>88</sup> to Sakhalin [13].

## **2. Results of the placement of the convicts to South Sakhalin and the transition of the island into the possession of Russia**

Vlasov V.I. arrived on the island on September 7, 1871. As a result of the trip, he prepared a "brief sketch of the disorders existing in hard labor camp" with the "confidential" stamp, in which he presented his views on what he saw in the hard labor system of the Amur Region, including Sakhalin; "A note on the organization of hard labor on Sakhalin island", which he submitted to the Special Committee of the Ministry of Internal Affairs; and "Report on the study of the island of Sakhalin and assumptions about organization on it of penitentiary colonies."

In it, he described in detail what he had seen and made suggestions on the organization of penitentiary colonies. He wrote that, because of the lack of prisons, they were placed in the barracks of the Korsakov and Kusunay military teams<sup>99</sup>, and about "the wooden, cramped and dirty barracks containing prisoners can be compared with barns rather than prisons. The inadequacy and inconvenience of these buildings interfere with the supervision of criminals, and allowing them to live in their homes and apartments cancels it at all. The people who make up the convoy and the guard, the soldiers of the Eastern Siberian army are mostly immoral and often participate together with prisoners in drunkenness, theft of gold and other crimes..." [14, p. 53].

Indeed, circumstances have created a "explosive mixture" that could paralyze the **influence of the Japanese**.

And, already in three (!) months, on October 30, 1869, Colonel De Witte<sup>1010</sup>, sent to Sakhalin, reported that "the arrival of new settlers or labor, like exiles, to the southern part of Sakhalin is extremely productive ..., the newly arrived Russian element noticeably increases our influence to the domination of the Japanese, and through productive labor will benefit the locality and the government with a certain benefit"[15].

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<sup>88</sup>Vlasov Vasily Ivanovich (1838-1915) - official of the Ministry of Internal Affairs. From 1866 - Head of the II Division of the Executive Police Department.

<sup>99</sup>In 1869, 250 people were sent to South Sakhalin; in 1970, another 250 were delivered to the island, and in 1871 - 165 convicts[8, p.64-65].

<sup>1010</sup>De Witte Valery Pavlovich (1832-1882) - Major General. In the years 1865-1868 chief of the Sakhalin detachment, lieutenant colonel, since 1867 - colonel.

The deployment of convicts in the south of the island near the Japanese sharply aggravated the situation in favor of Russia, the exile officers began to have a demoralizing effect on the Japanese, and from the second half of 1870 the rates of Japanese colonization began to weaken. Japanese colonists began to flee, explaining that they were not adapted to local conditions and harsh living conditions.

Due to the convicts, the number of permanent Russian population began to increase sharply, which was an additional psychological factor in the rivalry over Sakhalin. At the same time, the different level of supply of the Japanese and the Russians created the conditions for the emergence of various conflicts. The Japanese police officers of Kusunkotan were engaged in “not so much Japanese as they fought against the theft of Russian soldiers and the crimes of fugitive convicts” [16, p. 28-29], there were cases of thefts, murders, on both sides increased protection and search for criminals fleeing from custody.

The demoralized Japanese population rushed to leave Sakhalin. Some, desperate for the violence of the convicts, took measures on their own. In one of the reports, investigator of the 4th East Siberian Linear Battalion, Lieutenant Kostevich, wrote: “On May 31, 1873, a convict Iskander-Ogly was killed by the Japanese, who lived in a sawmill” [17.]<sup>111</sup>. Police forces could not save criminals from violence. Japan could not find opposition because it believed that sending troops to Sakhalin could allow Russia to seize Hokkaido.

By 1873, Russia had managed to get an indisputable advantage on Sakhalin, forcing Japan to search for options for the assignment of Sakhalin to Russia.

On February 5/17, 1873, E. Butsov wrote to the Russian Foreign Ministry that “if the Japanese government abandons southern Sakhalin, we will probably commit ourselves to protecting the safety of Japanese industrialists, the minister<sup>1212</sup> noted that the presence of our exiles makes it impossible to develop relations between the two people and that if we find Sakhalin suitable only for criminals, then the Japanese government will only settle their exiles there, since it is impossible for civilians to stay on the island” [18]

June 10, 1874 Enomoto<sup>1313</sup> stated that the Japanese government suspects that Russia created penal colonies on Sakhalin in order to survive the Japanese from the island [19. P. 634]. On April 25 (May 7), 1875, Russia and Japan signed the St. Petersburg Treaty, exchanging Japanese Southern Sakhalin for the Russian Northern Kuriles. The goal set by the Russian emperor was achieved.

### **3. Transformation of Sakhalin into hard labor camp.**

The law of May 23, 1875 introduced a exile to Sakhalin as the supreme penalty, but questions about the delivery of convicts to the island were not resolved.

<sup>11</sup>See. Elizariiev V.N. The history of Sakhalin and the Kuril Islands in the Russian-Japanese relations. - Yuzhno-Sakhalinsk, 2006. V.3. 582 p. Appendix <sup>1</sup> 3, documents <sup>11</sup>4596-001 - 4636-199.

<sup>12</sup>Soejima Taneomi

<sup>13</sup>Enomoto Takeaki (1836-1908) - Japanese admiral, from 1872 in the service of the Meiji government. As the Ambassador of Japan to Russia signed the St. Petersburg Treaty in 1875.

It is noteworthy that this law followed immediately after the signing of the consolidation of Sakhalin to Russia. From this it follows that government circles were the only way to begin the economic development of the island in the transfer of criminals here. But there was no official decision to turn the island into a penal servitude.

It should be noted that on Southern Sakhalin, which became Russian, from 1875 to 1879, life almost stopped. The fishing grounds previously occupied by the Japanese, who did not wish to remain on Sakhalin and returned to Japan, remained unclaimed, and the local population located close to these industries was also left to itself.

From 1871 to 1879, the Sakhalin convicts did not arrive. On the one hand, this was due to the sufficiency of the measures taken to create conditions for the transfer of the island to the possession of Russia. On the other hand, the delivery of convicts to the island and the duration of their transfer was ineffective.

Nevertheless, the question of the formation of penal servitude was already a foregone conclusion, and in 1879 people began to be delivered to Sakhalin on the ships of the Voluntary Fleet, which had a special vessel to transport the convicts, initiating a regular sea route to the Far East.

The final decision on Sakhalin as a place of exile and hard labor was considered in 1879-1882 with the organization of the HPA, and **in 1882 it was finally decided to organize the serving of hard labor on Sakhalin in order to colonize the island.**

Thus, the convicts settled on Sakhalin in 1869-1871 “fulfilled” **the state task** of settling the island with **the “Russian element”**, “**by force of circumstances**” created intolerable living conditions for the Japanese colonists, “**paralyzed**” the influence of the Japanese on Southern Sakhalin, which ultimately led to the transfer of Sakhalin Island into the possession of the Russian Empire. Along with this, the huge costs associated with moving a large mass of criminals to Sakhalin Island forced the leadership of the Russian Empire to decide on turning Sakhalin into a penal colony, into a place of serving hard labor and exile for thousands of criminal elements from different parts of the country, using their unproductive labor for economic island exploration.

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Abbreviations:

AFPRI - Archive of the Foreign Policy of the Russian Empire

SARF - State Archive of the Russian Federation

SAIR - State Archive of the Irkutsk Region

SHASR - State Historical Archive of the Sakhalin Region

RSA Navy - Russian State Archive of the Navy

RSA FE - Russian State Archive of the Far East

SRMLL - Sakhalin Regional Museum of Local Lore.

缺血性心脏病患者高凝状态发展的几种方法  
**SOME PATHWAYS FOR HYPERCOAGULATION STATE  
DEVELOPMENT IN PATIENTS WITH ISCHEMIC HEART DISEASE**

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抽象。这项工作的目的是检查高同型半胱氨酸血症 (HHcy) 在IHD患者高凝状态发病机制中的作用。

**Abstract.** *The aim of the work was to examine the role of hyperhomocysteinaemia (HHcy) in the pathogenesis of hypercoagulation in patients with IHD.*

**Materials and methods.** The study involved men with coronary artery disease, aged 40 to 60 years, with the diagnosis:

- stable angina pectoris of the III functional class, complicated by impaired blood circulation of the II A degree (22 people);
- acute coronary syndrome without ST segment elevation, complicated by circulatory disorders of grade II A, angina III functional class (21 people);
- Q-myocardial infarction in the acute stage (21 people).

Patients of the second and third groups were admitted to the hospital after the term average of  $5.2 \pm 1.0$  hours from the disease clinical manifestations development. The control group consisted of 36 practically healthy men aged from 39 to 59 years. The concentration of homocysteine (Hz) in serum was determined by the method of Dutov A.A. (2010). The activity of the hemostasis coagulation mechanism was evaluated by the values of prothrombin and thrombin clotting time, activated partial thromboplastin time (APTT), fibrinogen level, spatial growth of the fibrin clot. The level of expressed tissue factor (TF) on peripheral blood mono-

cytes was performed on a flow cytometer. The level of autoantibodies to thrombin was determined by the method proposed by N.N. Tsybikov. in 1982.

**Results.** The Hcy level in serum, autoantibodies to thrombin, the number of monocytes expressing TF in IHD patients is higher compared with the control group, with the highest rates in patients with acute myocardial infarction. A direct positive relationship was established between the content of Hcy and fibrinogen, Hcy and the level of autoantibodies to thrombin, which increases with the weighting process.

**Conclusion.** In patients with IHD, hypercoagulation develops, the main factor in the pathogenesis of which is hyperhomocysteinemia (HHcy). Hcy increases TF expression and initiates an external pathway for activating blood coagulation. Thrombinemia develops, accompanied by an increase in the of autoantibodies to thrombin level.

关键词: 高同型半胱氨酸血症, IHD, 高凝。

**Keywords:** *hyperhomocysteinemia, IHD, hypercoagulation.*

In recent years, an increase in mortality due to cardiovascular disease has been observed in 30% of cases as a result of the development of atherothrombosis [1, 2]. Currently, more than 100 factors of thrombogenic risk and conditions related to thrombophilia, which in their combination can lead to vascular catastrophes, have been described [8, 12]. One of these factors is hyperhomocysteinemia (HHC) [10].

One of the leading pathogenesis mechanisms of hypercoagulation in HHC is a developing endothelial dysfunction, leading to an increase in procoagulant and inhibition of the anticoagulant properties of endotheliocytes. In individuals with HHC, the levels of TxA<sub>2</sub>, vWF, plasminogen activator inhibitor 1, cell fibrinectin and C-reactive protein are significantly elevated.

In addition, there is a depression of fibrinolysis system [14]. At the same time, Hcy stimulates platelet and leukocyte aggregation, which leads to additional release of cytokines and chemokines (MIP-1, MCP-1, IL-8) and expression of adhesion molecules (VCAM-1). All this leads to the hypercoagulation development [2]. However, J. Ray, based on the analysis of known data on HHC, summarized the lack of an independent role of HHC in the development of venous thrombosis [10, 11].

**The aim** of our work was to study the role of HHC in the pathogenesis of the hypercoagulation in patients with coronary artery disease.

#### **Materials and research methods.**

The study was conducted on the basis of the Federal State Budgetary Educational Institution of Higher Medical Education of the ChSMA with a preliminary examination of the study by the local ethics committee in compliance with all ethical principles. Clinical hemostasiological monitoring of the state of 64 males aged 40 to 60 years, suffering from IHD, receiving standard therapy, with the inclusion

of indirect anticoagulants (warfarin, heparin, etc.) was conducted. On the first day of hospitalization, blood was taken from the cubital vein.

All patients were divided onto 3 groups:

- stable angina pectoris of the III functional class, complicated by impaired blood circulation of the II A degree (22 people);
- acute coronary syndrome without ST segment elevation, complicated by circulatory disorders of grade II A, angina III functional class (21 people);
- Q-myocardial infarction in the acute stage (21 people).

The control group included 36 practically healthy men, whose average age was  $53.3 \pm 3.9$  years (railroad workers who underwent annual clinical examination at the base of the regional railway hospital in Chita). Patients with cardiogenic shock, acute inflammatory diseases of any etiology, acute stroke, and severe disorders of vital organs were excluded from the study.

The content of homocysteine in serum was determined by the method of Dutov A.A. (2010) [4]. The activity of the coagulation component of the hemostasis system was assessed by generally accepted indicators: determination of prothrombin time with the calculation of the international normalized ratio, thrombin clotting time, activated partial thromboplastin time (APTT), fibrinogen level.

With the help of the “T-2 Thrombodynamic Recorder” (HemaCore, Moscow) device, the fibrin clot spatial growth was observed [9]. The analysis included such parameters as: clot growth delay, its initial and stationary growth rate, as well as density.

The level of expressed tissue factor (TF - CD 142) on monocytes (CD 14+) of peripheral blood was determined by standard five-parameter immunofluorescent staining of whole blood using a panel of monoclonal antibodies CD16 - FITC, CD142 - PE, CD45-ECD, CD14-PC5, CD11b - PC7 and the corresponding isotypic controls (Beckman Coulter). Next, a five-color analysis was performed on a Cytomics FC 500 flow cytometer (Beckman Coulter). The number of cells with the CD14CD142 + phenotype was counted. The content of autoantibodies to thrombin in serum was determined by the difference in extinction between wells sensitized by thrombin and intact ones (method proposed by N.N. Tsybikov (1982)). Detection of autoantibodies was carried out using anti-IG antibodies labeled with horseradish peroxidase (Vector-best, Novosibirsk). The results were expressed in units of optical density (OD450) [13].

Analysis of the research results was performed using the Mann-Whitney test for independent variables. Correlation analysis conducted by the method of Kendall. The significance of differences was considered statistically significant at  $p$  values  $<0.05$ .

## Results.

In patients with IHD, the content of Hcy in the blood serum is higher compared with the control group. The maximum values of Hcy were observed in patients with Q-myocardial infarction in the acute stage. Moreover, there were no differences in the concentration of Hcy in the first and second studied groups (Table 1).

When studying the parameters of a coagulogram in patients with various forms of coronary artery disease, it has been established that the most pronounced changes in patient indices are observed on the first day of acute myocardial infarction (Table 2). The hypocoagulation registered by us can be attributed to the introduction of sufficiently high doses of indirect anticoagulants. The same, apparently, explains the absence of any changes in coagulogram indices in persons with stable angina and ACS. At the same time, if patients suffering from stable angina pectoris have a lengthening of the APTT, then with ACS, this indicator is normalized, which indicates an insufficient number of anticoagulants to correct hypercoagulation, developing on the background of myocardial damage.

However, the concentration of fibrinogen in all patients with IIPB was higher than in conditionally healthy volunteers and depended on the severity of the process (Table 2). A high level of fibrinogen can probably be explained by the current inflammatory process in persons suffering from atherosclerosis. The presence of inflammation in this group of patients is discussed by the international community, starting with Rayer P.F.O. (1825) [15]. It was found that the same cells, cytokines, are involved in both inflammation and atherosclerosis. As with the response of tissues to damage, so with atherosclerosis in response to the secretion of interleukin 6 by hepatocytes, the synthesis and secretion of the acute inflammatory phase proteins, which include fibrinogen, also increases in the bloodstream. In addition, hyperfibrinogenemia can be initiated by fibrin degradation products, an increase in the level of which in IHD patients has been registered by various researchers [3, 10, 11].

In the future, we have attempted a more in-depth study of the functioning of the hemostasis system by the method of thrombodynamics. Since in acute myocardial infarction and stable angina pectoris, the coagulogram indices depend more on the anticoagulants administered, this method was used only in the group of patients with ACS. As can be inferred from the presented indicators, an increase in the delay time of the growth of the clot, as well as the initial and stationary speeds, is noted in patients of this group. At the same time, the total size of the clot and its density increase, indicating a tendency to thrombosis (Table 3).

An increase in the level of autoantibodies to thrombin is due to the immunostimulating effect of this enzyme, which was previously recorded by N.N. Tsybikov [13]. At the same time, autoantibodies to thrombin act not only as a marker of thrombinemia, but also have an anticoagulant effect, as was demonstrated in the pure system of thrombin + autoantibodies + fibrinogen [13].

The next stage of our study was to determine the level of serum autoantibodies to thrombin and the number of monocytes expressing TF. It was shown that the studied parameters are higher in patients with IHD and depend on the severity of the process (Table 2).

**Table 3***Data on spatial clot growth in patients with ACS, (Me (25th; 75th))*

<b>Variables</b>	<b>Control group (N=36)</b>	<b>Patients with ACS (N=21)</b>	<b>Significance of Differences (p=)</b>
The clot formation delay, min	0,65 (0,50; 0,80)	2,45 (1,60; 3,90)	0,00001
Initial rate of bloodclot formation, $\mu\text{m} / \text{min}$	45,50 (44,00; 47,00)	49,00 (40,50; 57,00)	0,5
Stationary rate of bloodclot formation, $\mu\text{m} / \text{min}$	24,50 (23,00; 25,00)	62,50 (44,50; 83,50)	0,00007
Fibrin clot size after 30 min, $\mu\text{m} / \text{min}$	946,68 (922,44; 962,40)	1456, 56 (1068,18; 1853,58)	0,0004
Fibrin clot stiffness after 30 min, conv. / units	16040,00 (14258,00;16837,00)	31780,00 (30334,50;33616,00)	0,000001

*Note: p - the level of statistical significance of differences in groups of patients with ACS compared with the control group*

In previous studies, we have shown that the number of leukocytes that have tissue factor on the outer membrane increases sharply when aminothiols are introduced into a short-term culture of peripheral blood cells [5, 6]. At the same time, monocytes of patients with stable angina pectoris responded to the introduction of Hcy more pronounced than the cells of the control group. Thus, the number of cells carrying tissue factor on their membranes in cultures of peripheral blood relative to healthy volunteers increased 1.9 times ( $p = 0.001$ ), while in cell cultures of patients with coronary heart disease - 2.8 times ( $p = 0, 0004$ ).

Table 1 Total homocysteine in serum, (Me (25th; 75th))

Indicators / Groups	Control group (N=36)	Patients with IHD			Significance of differences					
		First group (N=22)	Second group (N=21)	Third group (N=21)	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	P <sub>6</sub>
Hey content, μM/L	6,95 (5,83;8,30)	11,56 (10,92; 13,11)	14,56 (14,05;16,57)	28,45 (23,68;30,00)	>0,0001	>0,0001	>0,0001	0,5	>0,0001	>0,0001

Table 2 The main indicators of coagulation, the content of autoantibodies to thrombin and CD142 positive monocytes in patients with IHD, (Me (25th; 75th))

Indicators / Groups	Control group (N=36)	Patients with IHD			Significance of differences					
		First group (N=22)	Second group (N=21)	Third group (N=21)	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	P <sub>6</sub>
APTT, sec.	28,5 (27,0;32,0)	43,5 (36,7; 47,9)	29,9 (27,7; 32,1)	66,1 (41,7; 90,4)	0,0006	0,8	0,0003	0,001	0,01	0,00001
Prothrombin time, sec.	10,5 (9,5; 11,6)	11,3 (10,0; 11,8)	10,7 (7,3; 11,3)	14,3 (14,1; 14,4)	0,5	0,7	0,00001	0,6	0,00001	0,00001
Thrombin time, sec.	19,0 (17,0; 21,0)	18,6 (16,0; 20,7)	19,7 (19,3; 20,1)	30,95 (28,1; 33,8)	0,8	0,8	0,00001	0,6	0,00001	0,00001
Fibrinogen mg / ml	261,5 (205,0;305,0)	323,0 (293,0; 332,0)	478,5 (332,0;503,0)	523,0 (460,0;586,0)	0,05	>0,00001	>0,00001	0,0004	0,00001	0,029
Autoantibodies to thrombin, units opt. density	0,064 (0,044; 0,081)	0,169 (0,163; 0,177)	0,273 (0,244;0,293)	0,529 (0,458;0,532)	>0,00001	>0,00001	0,00001	0,0001	0,00001	0,00001
CD <sub>14</sub> CD <sub>142+</sub> % of total monocyte population	12,00 (10,96; 16,13)	36,36 (30,77;41,67)	50,24 (49,32;51,16)	70,18 (51,16;80,91)	0,00001	>0,00001	>0,0001	0,06	0,06	0,0009

Note: p<sub>1</sub> - the level of statistical significance of differences between groups of patients in group 1 compared with the control group, p<sub>2</sub> - the level of statistical significance of differences between groups of patients from group 2 compared with the control group; p<sub>3</sub> - the level of statistical significance of differences between groups of patients 3 groups compared with the control group; p<sub>4</sub> - the level of statistical significance of differences of group 1 with the second; p<sub>5</sub> - the level of statistical significance of differences of group 1 with the third, p<sub>6</sub> - the level of statistical significance of differences of the second group compared with the third

This fact can explain the high values of TF expression by monocytes in patients with atherosclerosis, obtained in our study.

During the correlation analysis, a direct positive relationship was established between the average strength and the content of homocysteine and fibrinogen: in the control group (0.477,  $p < 0.05$ ), in patients suffering from stable angina - 0.659 ( $p < 0.05$ ), 0.768 in patients with ACS ( $p < 0.05$ ). In patients with acute myocardial infarction, a direct positive relationship is observed between the concentration of Hcy and the level of autoantibodies to thrombin (0.494,  $p < 0.05$ ).

Thus, the conducted study allows us to conclude that hypercoagulation develops in IHD patients, one of the leading links of which is HHc. Hc increases TF expression and initiates an external pathway for activating blood coagulation. Thrombinemia develops, accompanied by an increase in the level of autoantibodies to thrombin. In turn, the emergence of thrombin leads to the activation of factors V, VIII and others, which inevitably leads to the occurrence of thrombosis, and as a consequence the development of myocardial infarction.

The found correlations, firstly, confirm that Hcy is an endogenous toxicant causing the development of the response of the acute phase of inflammation, and secondly, a factor independently causing the development of hypercoagulation.

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阿尔汉格尔斯克地区胎儿和新生儿死亡的体模测量和器官测量参数  
**SOMATOMETRIC AND ORGANOMETRIC PARAMETERS OF  
FETUSES AND NEONATAL DEATHS IN ARKHANGELSK REGION**

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注解。远北的环境因素在生活中形成特殊的激素 - 代谢特征,其可显著影响发育中的胎儿的形态发生和器官发生。因为这些条件影响到生命第一年的孕妇和儿童,他们特别容易受到破坏性环境因素的影响。伴随妊娠进展的显著激素和代谢变化与慢性应激相当。发育的特征,器官,系统和整个身体的形成是由遗传和环境因素介导的。由于欧洲北部是一个生态病理学风险较高的地区,因此确定需要研究胎儿身体发育的年龄参数。

关键词: 环境因素, 体表和器官指标, 生态病理学, 妊娠期, 平均指标。

**Annotation.** *Environmental factors of The far North form a special hormonal-metabolic profile in the living, which can significantly affect the morphogenesis and organogenesis of the developing fetus. Because these conditions affect pregnant women and children of the first year of life, who are particularly vulnerable to damaging environmental factors. Significant hormonal and metabolic changes accompanying pregnancy progression comparable to chronic stress. Features of development, formation of organs, systems and the body as a whole are mediated by genetic and environmental factors. Since the European North is a region of high risk of ecopathology, it determined the need to study the age parameters of physical development of the fetus.*

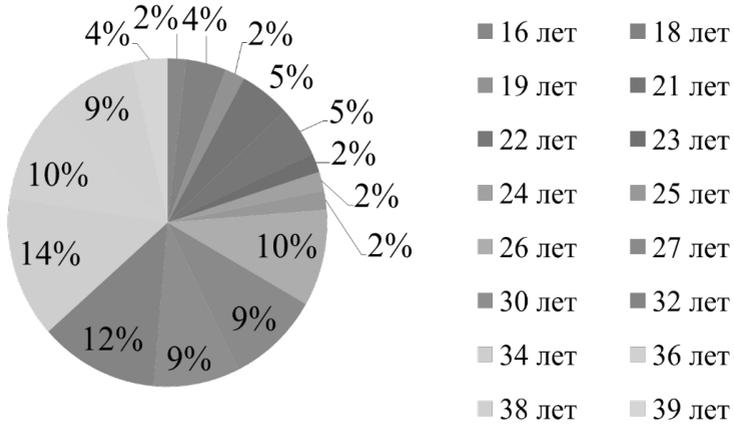
**Keywords:** *environmental factors, somatometric and organometric indicators, ecopathology, gestation period, average indicators.*

The aim of our study was to study some parameters of fetuses and deceased newborns depending on the stages of ontogenesis under the influence of environmental factors and the risk of developing perinatal pathology. To accomplish it, the tasks were to determine the dynamics of somatometric indicators, such as weight and length of body, head and chest circumference, and organometric indicators: mass of brain, pituitary, thymus, thyroid, adrenal glands and pancreas.

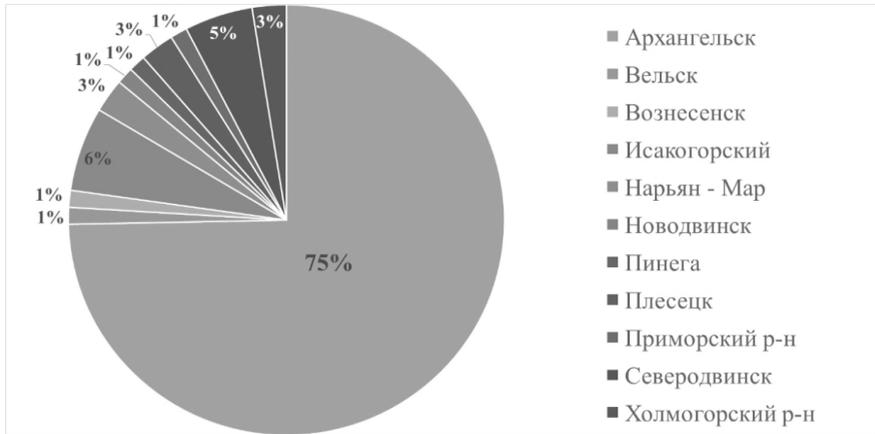
The research material was 640 autopsies of fetuses and newborns. The dynamics of somatometric parameters and organometric parameters of the endocrine glands of 640 fetuses from 14 to 41 weeks of gestation and deceased newborns were studied. The material was grouped into three groups: the first group included the fetus at 14-22 weeks of gestation (early fetal period) - 31, group II - 23-31 weeks of gestation, which corresponds to the mid-period period (299), group III included fetuses 32-40 gestational week (41), which corresponds to the late-fetal (perinatal) period (310). Early termination of pregnancy was medically indicated (fetal CRF is incompatible with life) induced miscarriage or miscarriage. In the Late period, the induced labor is either prenatally or intrapartum-lost fetus. The causes of death of fetuses and newborns in the first week of extrauterine life were separate conditions arising in the perinatal period of 453 cases, and congenital developmental anomalies of 18 cases. The age of the dead was taken from medical records (birth history and developmental history of newborns). When analyzing anthropometric indicators, gender was not taken into account, since a wide range of data is due to individual anatomical variability.

Statistical processing of the data was carried out using a computer software package SPSS, version 18, using non-parametric methods. The average values (M), standard deviations (SD) were taken into account.

The mother-fetus data indicates that the average age of mothers at the time of the study was (M ± SD) 26,459 ± 5,934 years (min 16; max 39), the most common age was 34 years, then 32 and 36 ... the number of pregnancies and births 2,779 ± 2,138 (min 1; max 10) and 1,713 ± 1,201 (min 0; max 10), respectively. [3]



Were investigated the history of childbirth 640 women. The diagram shows that 75% of women are from Arkhangelsk, and the remaining 25% are from other settlements of the Arkhangelsk region. This is explained by the fact that Arkhangelsk is the most populous city.



The study of somatometric parameters of the fetuses indicates a positive increase in weight with an increase in gestation in the early fetal period from 14 to 22 weeks of gestation by 1.5 times, in the medium plenum by 2.34 times and late-fetal from 32 to 41 gestation weeks by 2.03 times. The weight of the fetuses increased with an increase in the gestation period by 1.89 times in srednefetalnom compared with early catheter and in 3.45 times in the late. It was also noted an increase in the length of the fetus by 1.5 and 1.4 times with an increase in the duration of pregnancy. [own data after preparation of 10 fruits]



The masses of the endocrine glands also gave a positive trend: thus, the mass of the pituitary gland increased by 3.21 times during the transition from early fetomatal to medium palatal, and in late feumatitis it gave the maximum weight gain (6.02 times). A similar pattern was observed in the adrenal glands 4.16 and 1.1 times; thymus - 6.78 and 1.18 times; the thyroid gland is 3.55 and 1.2 times. That is, the greatest increase in the mass of the studied glands was observed from 14 to 31 weeks of gestation and minimal to late-fetal. While the increase in pancreatic mass occurred evenly 2.9 times, 2.77 times; we also compared all data regarding glands with the average indicators according to WHO and UNICEF.

Thus, in the conditions of the Extreme North, the body needs additional adaptation capabilities, which affects the formation of the morphofunctional systems of the fetus. This condition is possible to implement only by increasing the functional activity of the endocrine system, which should affect the structure of the glands and their development during the period of embryogenesis in the European North. The study also revealed that the dynamics of indicators of somatometric and organometric indicators is stable compared with the average WHO and UNICEF indicators, and this in turn makes it clear that most of the fruits developed in the norm in all indicators.

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实验性D-半乳糖胺肝炎的植物疗法  
**PHYTOTHERAPY OF EXPERIMENTAL  
D-GALACTOSAMINE HEPATITIS**

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摘要。目的是确定新的复合药物补充剂对急性D-半乳糖胺毒性肝炎大鼠模型的药物治疗效果。

**Summary.** *The aim was in determining pharmacotherapeutical effectiveness of new complex medicinal supplement on a rat model of acute D-galactosamine toxic hepatitis.*

**Materials and methods.** *The pharmacotherapeutical effectiveness of complex plant supplement, consisting of *Hypecoum erectus* L., *Hedysarum dauricum*, *Glycyrrhiza uralensis* Fisch., *Calendula officinalis* and *Scutellaria baicalensis* was studied after inducing acute hepatitis in rats by D-galactosamine infusion. The chosen model of acute liver damage is known to be close to viral hepatitis in its morphological and biochemical features. The functional state of liver was determined using biochemical tests, evaluation of peroxidation intensity and morphological analysis.*

*The results of our experiment demonstrated that the use of the studied supplement had lead to a decrease of AST, ALT, GGTP, ALP and a slight increase of cholesterol. Additionally, morphological study showed improvement of the liver microscopical structure as well as the decrease of malondialdehyde and conjugated dienes.*

**Discussion.** *The studied supplement due to its complex of biologically active*

compounds is capable of decreasing lipid peroxidation and general pathogenetic syndromes of liver damage including cytolysis and cholestasis with clear effectiveness on 7<sup>th</sup> and 14<sup>th</sup> days of the experiment.

**Conclusion.** The use of the complex plant supplement containing flavonoids, saponins and alkaloids resulted in hepatoprotective effect manifesting in the correction of the main pathogenetic syndromes of liver damage and lowering lipid peroxidation combined with morphological structure improvement.

关键词：急性实验性肝炎，保肝作用，药用植物复合药物。

**Key words:** acute experimental hepatitis, hepatoprotective effect, complex drug of medicinal plants.

**Introduction.** A necessity in finding new hepatoprotective drugs and supplements is dictated by the growing demand: increasingly widespread liver pathologies tending to chronic forms being caused by viruses, toxic agents including some medication. [2, 6, 11]. Under these conditions, medicinal plants are of interest considering the wide range of their therapeutic effect, low toxicity and the possibility of gaining amplified effect by combining active components of complex plant supplements. [1, 3, 4, 5].

The aim was in determining pharmacotherapeutical effectiveness of new complex medicinal supplement on a rat model of acute D-galactosamine toxic hepatitis.

**Materials and methods.** The researched plant supplement is a dry extract consisting of dry extracts of *Hypocoum erectum* L.; Papaveraceae grass, dry extract from *Hedysarum alpinum* L.; Leguminosae grass, dry extract of *Glycyrrhiza uralensis* Fisch.; Leguminosae roots, dried flower extract of *Calendula officinalis* L.; Compositae and dry root extract of *Scutellaria baicalensis* Georgi; Lamiaceae in proportion of 5:5:4:4:2.

Compounded preparations were performed using HPLC with UV-detector on MiLiChrom A-02 by ECONOVA (Милихром А-02, Эконова), Novosibirsk, Russia with column ProntoSIL-120-5-C18 AQ (2 × 75 mm, Ø 5 µm; Metrohm AG, Herisau, Switzerland); mobile phase: 0.2 M LiClO<sub>4</sub> with 0.006 M HClO<sub>4</sub> (A), MeCN (B). During the separation process profile of gradient elution was set to 0–40' 5–100% B, 40–43' 100% B with speed of 100 µl/min, temperature set to 35°C with UV-detection at a wavelength of 210 nm. Concentration of substances was measured with commercially available samples (Sigma-Aldrich). Detected components included: glycyrrhizic acid 2.06 ± 0.04%, baicalin 1.85 ± 0.04%, protopin 1.09 ± 0.03%, mangipyrin 0.68 ± 0.02%, typhaneoside and narcissin combined 0.27 ± 0.01%.

The pharmacotherapeutical effectiveness of complex plant supplement was studied after inducing acute hepatitis in rats by D-galactosamine infusion. The chosen model of acute liver damage is known to be close to viral hepatitis in

its morphological and biochemical features. [7]

D-galactosamine was injected intraperitoneally in dose of 400 mg/kg. The researched supplement was injected intragastrically in doses 100 mg/kg, 200 mg/kg, 300 mg/kg one hour before D-galactosamine injection and then daily for 14 days. *Carsil (Silibinin)* obtained from the milk thistle plant *Silybum marianum (L.) Gaertn.* was used as a reference agent in a dose of 100 mg/kg daily likewise. Control group of white rats was injected with D-galactosamine but instead of pharmacological agents received an equal volume of distilled water. Intact group received only distilled water.

Functional state of the liver was evaluated by biochemical markers: Alanine aminotransferase (ALT) and aspartate aminotransferase (AST), alkaline phosphatase (ALP), gamma-glutamyl transpeptidase (GGTP), cholesterol, total protein (reagents “Abris” and “Vital” on ana-lyser “VitaRay”). Lipid peroxidation intensity was determined with Malondialdehyde (MDA) and conjugated dienes in serum [9]. In order to analyze the morphofunctional state of liver a set of histological, histochemical and histoensymological methods was applied. [7].

The pharmacotherapeutical effectiveness of complex plant supplement was studied on 7th, 14th and 21st days of experiment. Data were analyzed using MedCalc version 18.5 statistical software [10]. Values were considered statistically significant when  $P < 0.05$ .

*The results.* The use of D-galactosamine model did not cause acute lethality in experimental animals. General condition, reaction and moveability, appetite of the rats remained intact. There was no weight loss during first 7 days of the experiment in D-galactosamine groups while the animals of the intact group have gained 20-25 g.

Biochemical tests performed on D-galactosamine-exposed groups demonstrated drastic changes of the functional state of the liver (Tab. 1). A significant deviation of biochemical parameters was observed in the groups of rats with D-galactosamine-induced liver toxicity pointing to the development of the main pathogenic syndromes of liver damage: cytolysis, cholestasis, mesenchymal inflammatory reaction combined with hypoalbuminemia and hypocoagulation. The intensity of lipid peroxidation was evaluated by malondialdehyde and diene conjugates concentration in blood serum of the experimental animals [9] wherein in the experimental groups signs of lipid peroxidation were significant.

On the 7th day of the experiment in the control group of the animals activity of AST and ALT was amplified by 3,1-3,3 in comparison with the intact animals testifying to the expressed cytolysis that had developed from an early date. Albumin concentration was decreased by 14,9% (down to 31,4-34,0 g/l in 6 rats of the control group) reflecting remarkable change in the functional state of hepatocytes while the level of total proteins remained on the same levels due to globulin frac-

tion growth. Furthermore, level of fibrinogen and prothrombin index dropped by 18,9% and more (Tab. 1).

In the comparison group (Carsil) on the according dates ALT and AST decrease was 7,32-10,25% . In the groups of rats receiving the studied plant supplement there was a more pronounced decrease of the activity of aminotransferases.

The degree of cholestasis severity was measured by complex evaluation of cholesterol concentration, ALP activity and GGTP in blood serum. As it is known, lipid metabolism values in rats' serum are lower than in human serum due to the functions of  $\alpha$ -muricholic, and  $\beta$ -muricholic acids that force cholesterol metabolism [9]. However, despite that fact in the experiment cholesterol level was still slightly growing because of the liver damage. In the comparison group on the 7th day of the trial ALP activity and GGTP level dropped by 9-10%. As a result of using the complex drug supplement a decrease in cholesterol levels was more compelling than a decrease of it in the comparison group (Tab. 1). Additionally a decrease by 17,5-18,5% of ALP and GGPT was demonstrated in the tested drug supplement group. Furthermore in the group of the drug supplement in dose 200 mg/kg demonstrated more substantial decrease in ALP, GGTP and cholesterol levels (in 6 out of 8 animals). In the given period of the experiment after injection with the studied supplement relevant suppression of peroxidation intensity manifested in a decrease of malondialdehyde and diene conjugates concentration by 18-24%

Pathomorphological study showed that in liver of animals from the control group on the 7th day of the observation after injection with D-galactosamine changes, characterized by dys-trophic and necrobiotic transformation of hepatocytes, mesenchymal-inflammatory effect coupled with activation of macrophages, accumulation of lymphocytes in portal tracts and deterioration of bile tract cells were present. The use of the complex drug supplement in doses from 100 mg/kg to 300 mg/kg and the comparison drug Carsil had limited the grade of necrobiotic processes and mesenchymal-inflammatory effects induced by D-galactosamine. Thus, in the observation group on the 7th day moderate granular degeneration of hepatocytes prevailed. In the group of dose 100 mg/kg hepatocytes affected by hydropic dystrophy accounted for 2/3 of periportal lobe while in other drug supplement groups fractions of transformed hepatocytes were scarce and situated periportal. The data of morphometric research demonstrated that number of necrotic hepatocytes was lower in 1,9 times in average (compared to the data of the control group).

On the 14th day of the experiment after D-galactosamine-induced damage the animals demonstrated weight loss in comparison with the intact group by 7-10%, lowered appetite and moveability. Biochemical parameters reflected persistence of the main features of liver damage in experimental animals. After injection with Carsil a remarkable decrease of aminotransferases was observed.

During the second week of the experiment signs of cholestasis were still ap-

parent. As a result of ingestion with the complex drug supplement ALP, GGTP and cholesterol were lower than that of the comparison group: the group of the studied supplement demonstrated decrease in ALP by 15,2% in dose 100 mg/kg and by 17,84% in the group of the dose 200 mg/kg while in Carsil group ALP was decreasing by 9,16%. On the 14-th day of the experiment hypoalbuminemia in the groups of the studied supplement was significantly less expressed than in the control group while coagulation parameters were normalizing as a result of increased synthetic ability of the liver. The grade of lipid peroxidation was decreasing.

On the 14-th day of the observation in animals' liver of the control group the expression of structural changes decreased in comparison to the previous control point. Dystrophic hepatocytes were found locally but not diffusely. In three specimens of the control group moderate hydropic dystrophy was still observed. In liver of the animals from experimental groups was observed moderate expansion of sinusoidal spaces, local veno-capillary erythrosthosis, increased blood filling of some vessels and granular degeneration of hepatocytes. Hepatocytes with lipid degeneration were scarce in the several portal tracts. In the results of morphometric research the number of fatty transformed hepatocytes was 5 times lower than that of the control group. As a result of delayed destruction of hepatocytes in the experimental groups significant signs of repairation was observed. Thus, in the group of studied supplement injected in dose 100 mg/kg and in the comparison group was found increased number of hypertrophic hepatocytes and binucleate hepatocytes (by 22%), while in groups with doses 200 mg/kg and 300 mg/kg the increase was 31% in comparison with the control group.

On the 3rd week of the experiment in the control group deviation of biochemical markers was less evident than that of the intact animals with ALT and AST close to those of the intact group. At the same time in the groups treated with the studied plant supplement relevant decrease in cholestasis was observed. The pathomorphological study of the specimens taken on the 3rd week of the trial showed no insignificant deviations.

*The conclusion.* After experimental D-galactosamine induced liver damage use of the comparison drug influenced the pathological processes by decreasing cytolysis and cholestasis on the 2nd week of the experiment while levels of albumin and globulin and parameters of coagulation remained constant. The use of the studied complex plant supplement had led to decrease of biochemical markers deviations. The grade of cytolysis in the experimental group №2 (dose of the complex drug supplement 200mg/kg) was significantly lower starting from the first control point (7 days after the beginning of the experiment) with ALT and AST dropping by 15-18% compared to the comparison drug at 7-10%. Based on the complex evaluation of cholesterol, ALP and GGTP levels the experiment had shown that the use of the drug supplement leads to significant growth of albumin,

fibrinogen and prothrombin index levels evident of the improvements in synthetic function of the liver starting from the first point of the control. The use of the studied plant supplement contributed to a decrease in lipid peroxidation, inhibited the accumulation of malonaldehyde and diene conjugates with significant differences observed in the early periods of the experiment, on the 7th and 14th days of the observation.

Combined with ability to inhibit lipid peroxidation and apparent limitation of dystrophic and necrobiotic signs and lowered inflammatory intensity, improved reparation was observed. Consequently, the researched complex drug supplement demonstrated pronounced hepatoprotective effect in D-galactosamine-induced liver damage. Dose elevation to 200 and 300 mg/kg did not lead to the significant improvement.

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**Table 1.**

Blood serum biochemical markers dynamics in D-galactosamine induced liver damage on rat model on the 7<sup>th</sup> day of the experiment ( $M \pm m, n=8$ ).

№ №	Markers	Intact group	Groups with D-galactosamine induced liver damage				
			Control+ H2O	Comparison group + Carsil	Group 1 + 100 mg/kg complex supplement	Group 2 + 100 mg/kg complex supplement	Group 3 + 100 mg/kg complex supplement
1.	ALT, U/l	58,6±5,4	152,9±9,2	141,7±9,7	132,6±8,2	123,5±7,9*	125,4±6,9
2.	AST, U/l	73,5±4,7	242,7±10,2	217,8±17,1	205,7±9,1*	198,5±11,3*	203,3 ±9,2*
3.	Cholesterol, μmol/l	1,82±0,13	3,52±0,19	3,05±0,12	2,97±0,13	2,63±0,14*	2,90±0,12
4.	ALP, U/l	308±21	742 ±41	667±43	612,0±27	604,7±25*	619±21*
5.	GGTP, U/l	7,13±0,31	23,94±2,10	21,83±1,34	19,45±0,89*	19,75±0,94*	18,38±1,25
6	Albumin, g/l	42,5±2,2	33,5±1,4	37,3±2,1	38,5±1,3*	39,2±1,2*	38,9±1,7*
7	Total protein, g/l	72,9±3,9	63,3±2,8	65,7±5,1	68,7±4,9	69,7±4,7	68,8±2,1
8	Globulin, g/l	30,4±2,9	29,8±1,7	28,4±2,6	30,2±2,1	30,5±1,9	29,9±2,1
9	Fibrinogen, g/l	2,43±0,13	1,51±0,11	1,82±0,19	1,97±0,12*	2,03±0,14*	1,99±0,11*
10	Prothrombin index (PI) %	84,4±4,7	50,3±2,4*	57,1±3,7	59,9±2,9*	64,7±3,8*	63,8±3,4*

Note. Here and below: \* - the differences are statistically significant between the control and experimental groups at  $P < 0,05$ ;  $n$  is the number of animals in the group.

Table 2.

*Blood serum biochemical markers dynamics in D-galactosamine induced liver damage on rat model on the 14<sup>th</sup> day of the experiment (M±m, n=8).*

№.№	Markers	Intact group	Groups with D-galactosamine induced liver damage					
			Control+ H2O	Comparison group + Carsil	Group 1 + 100 mg/kg complex supplement	Group 2 + 100 mg/kg complex supplement	Group 3 + 100 mg/kg complex supplement	
1.	ALT, U/l	58,6±5,4	128,2±6,9	116,7±5,3*	103,6±5,4*	104,1±5,8*	105,1±4,9*	
2.	AST, U/l	73,5±4,7	207,0±9,4	189,7±7,1*	172,9±8,7*	169,9±8,3*	170,5±8,2*	
3.	Cholesterol, μmol/l	1,82 ±0,13	2,97±0,16	2,52±0,11*	2,44±0,15*	2,41±0,14*	2,43±0,15*	
4.	ALP, U/l	308±21	585,5±25	532,4±17*	496,5±18*	481,5±24*	497,7±17*	
5.	GGTP, U/l	7,43±0,31	18,82±0,8	16,80±1,19	15,8±0,82*	15,43±0,72*	15,15±0,76*	
6	Albumin, g/l	42,5±2,2	35,3±1,7	38,8±1,9	40,9±1,2*	40,5±1,1*	40,8±1,3*	
7	Total protein, g/l	71,8 ±3,9	63,8±4,2	65,6±6,1	67,5±3,6	67,0±4,2	67,8±2,1	
8	Globulin, g/l	29,34±2,9	28,5±1,7	26,8±2,6	26,6±2,1	27,5±1,4	27,0±2,1	
9	Fibrinogen, g/l	1,93±0,11	1,97±0,11	2,05±0,10	2,51±0,12*	2,47±0,13*	2,53±0,12*	
10	Prothrombin index (PI) %	84,4±4,7	50,3±2,4	57,1±3,7	59,9±2,9*	64,7±3,8*	63,8±3,4*	

天鹅绒鹿茸蛋糕和maral骨头的生化成分

## BIOCHEMICAL COMPOSITION OF VELVET ANTLER CAKE AND MARAL BONES

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注解。天鹅绒鹿茸蛋糕和马拉骨是一种新的材料来源，可用于生产功能性食品，并用有助于预防食欲疾病的产品丰富人们的日常饮食。在研究过程中测试了一种天鹅绒鹿茸饼回收方法，该方法涉及用基于枯草芽孢杆菌的细菌蛋白酶对材料进行酶处理。在各种温度条件下 ( $t$  45–50°C;  $t$  60–65°C) 用超声波进行水解。在工作过程中获得了两种生物物质 – 天鹅绒鹿角的固体部分和液体部分（上清液）。固体部分的特征在于高含量的钙 (192–194g / kg)，磷 (124–156g / kg) 和诸如铁和锌的微量元素。鹿茸蛋糕水解产物的液体部分由可溶性低分子量化合物代表，这些化合物易于消化，进入细胞并开始参与细胞代谢过程。这是一种减肥产品，可用作功能性食品的成分。结果发现，最适合通过酶处理将组分转变为可溶形式的温度条件是在超声波范围内在60–65°C水解，这可以通过较少量的蛋白质和脂肪来证明。干渣。该研究考虑了从扁平管和管状骨骼中获得的天然材料的生化特性，以确定其在食品工业中应用的机会。据发现，100公斤鹿茸鹿骨头可以产生高达32.0公斤的蛋白质和高达19公斤的脂肪。最重要的成分是矿物质，其含量在52%至64%之间，即1千克骨组织含有高达190克钙和90克磷，这使得利用这种生物物质生产食物的机会此外，丰富的微量元素，广泛的其他元素是解决其人体缺陷问题的独特方式。

关键词：生产技术，发酵，水解，水解产物，超声波

**Annotation.** *Velvet antler cake and maral bones are a new source of material that can be used to produce functional foods and to enrich people's daily diet with a product that would help prevent alimentary diseases. A method of velvet antler cake recycling which involved enzyme treatment of material with bacterial protease based on bacillus subtilis was tested in the course of the study. Hydrolysis was conducted with ultrasonic waves in various temperature conditions ( $t$  45–50°C;  $t$  60–65°C). Two biosubstances – a solid fraction and a liquid fraction (supernatant) of velvet antlers – were obtained in the course of the work. The solid fraction was*

*characterized by a high content of calcium (192-194 g/kg), phosphorus (124-156 g/kg) and such microelements as iron and zinc. The liquid fraction of the velvet antler cake hydrolysate is represented by soluble low-molecular-weight compounds that get easily digested, enter the cell and start participating in the processes of cell metabolism. This is a diet product that can be used as an ingredient in functional foods. It was found out that the temperature conditions most suitable for the transition of the components to the soluble form through enzymatic treatment would be hydrolysis at 60-65°C in the ultrasonic range, which is evidenced by a smaller amount of protein and fat in the dry residue. The study considered the biochemical properties of native materials obtained from flat and tubular bones of marals in order to establish the opportunity of their application in the food industry. It was found out that 100 kg of velvet antler deer bones can produce up to 32.0 kg of protein and up to 19 kg of fat. The most significant components are the minerals, which amount varies between 52 and 64%, namely, 1 kg of bone tissue contains up to 190 g of calcium and 90 g of phosphorus, which creates an opportunity of using this biosubstance for the production of foods rich in microelements, moreover, the wide range of other elements is a unique way of solving the problem of its deficit in the human body.*

**Keywords:** *production technology, fermentation, hydrolysis, hydrolysate, ultrasound*

### **Introduction**

The production of functional foods of dietary properties and therapeutic and prophylactic effect is one of the challenges facing the food industry, since the decline in health of the population of Russia by 75–85% is due to poor nutrition. All this requires urgent measures to increase the production of mass-consumption products with high biological value, enriched with vitamins, dietary fiber, microelements (A.A. Kilmaev, 2007).

Antler reindeer herding is a branch of animal husbandry specializing in the breeding of red deer and spotted deer, which at the present stage of development of the Russian Federation, that can enter the top ten leading industries that provide the population of the country with ecologically healthy food.

One of the rapidly developing and promising areas of the maral industry is the development of new formulations and technologies using deep processing of raw materials, which can help improve the efficiency of using macro-, microelements, protein-containing raw materials, expanding the range of food products and solving environmental problems.

Based on the above, the goal was set to study ways of extracting nutrient biologically valuable substances from raw marals with the aim of expanding the range of functional products containing unique natural ingredients that promote rejuvenation and health improvement of the population.

### **Materials and research methods**

The possibility of recycling antler cake has been studied. Repeated fermentation was carried out using bacterial protease bacillus subtilis. The hydrolysis was carried out in the field of ultrasound in two temperature regimes, in the first case at  $t$  45-50 ° C, in the second at  $t$  60-65 ° C. The resulting hydrolysates of antler cake was divided into fractions using centrifugation. To obtain a biosubstance from the bone of antler deer, the flat bones of the skull, tubular bones of the deer and red deer were used. Raw materials were pre-crushed using a bone crusher. A dry method was worked out - a conductive method using infrared drying of native raw materials at  $t$  45 ° C for 16 hours with further grinding into powder.

The evaluation of the obtained samples was carried out according to the yield of biosubstances, the time spent on its manufacture and the biochemical composition.

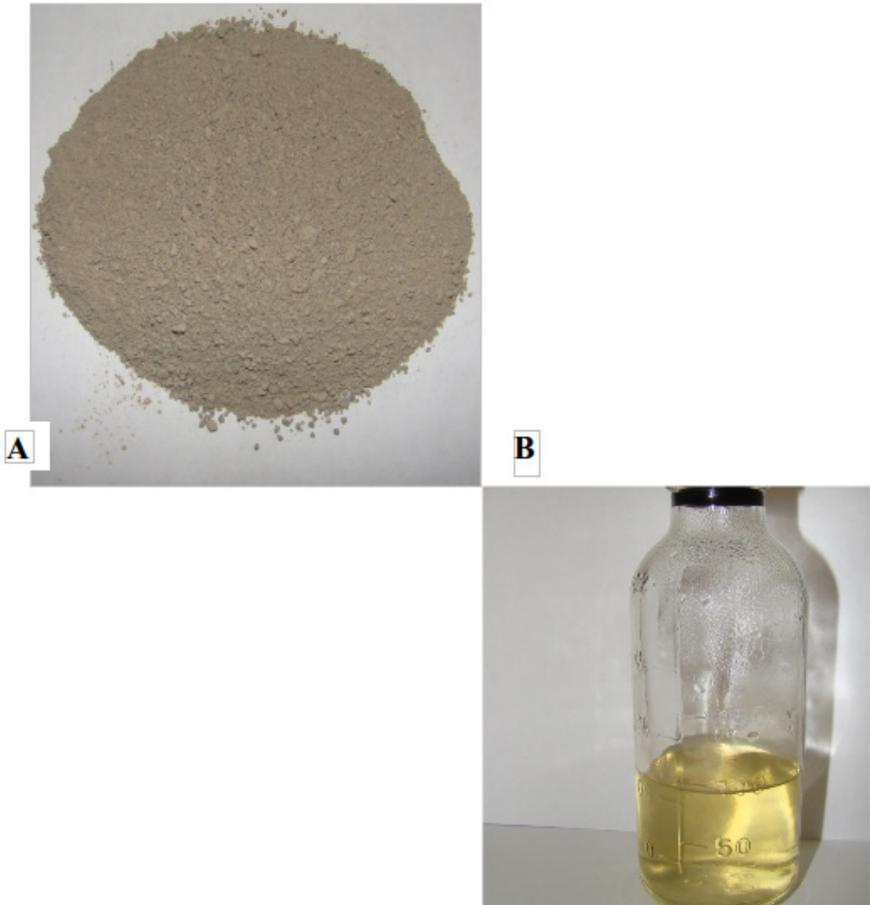
### **Research results and discussion**

To increase the bioavailability of components from maral raw materials, processing methods have been developed, including physical and enzymatic processing, which causes the hydrolytic components of the raw materials to decompose. Also, high-temperature extraction (V.G. Lunicyn, 2014, 2016; I. Grishaeva, 2011). Numerous studies on the processing of raw materials with the use of various enzymes of plant, animal and microbial origin were conducted.

The developed technology of processing raw materials made it possible to obtain concentrates soluble in water and organic solvents, which can enrich food products, giving them desired properties.

The best results in concentrate yield, organoleptic properties and biochemical composition were obtained using bacterial and fungal enzymes.

It was established that during the primary fermentation of maral antlers, even when using the most modern enzyme preparations, up to 65% of the dry matter of the raw material passes into the soluble form of the concentrate, while 35% of the components remain in the form of cake. According to available studies, the average protein sample of antlers in the content of protein contains up to 28% of protein components and up to 1.3% of fat. Based on the data obtained, the possibility of recycling antler cake was studied. The resulting hydrolysates of antler cake after re-fermentation was divided into fractions, presented in figure 1.



**Figure 1** - Hydrolyzate fractions of antler cake: A - solid fraction, insoluble in water; B - liquid fraction (supernatant)

According to the biochemical composition of the solid fraction of antler cake, presented in Table 1, the process of transition of components into a soluble form more intensively took place through enzymatic treatment in the ultrasound field at a hydrolysis temperature of 60-65°C, as evidenced by the lower protein and fat content in the dry residue.

*Table 1 - Biochemical composition of the solid fraction of antler cake after secondary processing*

Indicators	Hydrolysis at t 45-50°C	Hydrolysis at t 60-65°C
Water, %	2,8	4,0
Protein, %	15,1	13,6
Fat, %	2,3	1,2
Ash, %	72,7	74,1
<b>Mineral composition</b>		
Calcium, g/kg	194	192
Phosphorus, g/kg	124	156
Chlorine g/kg	28	28
Magnesium g/kg	11	16
Sulfur, g/kg	0,7	2,6
Iron mg/kg	14,6	5,8
Zinc, mg/kg	17,4	20,3

The mineral composition of the dry residue is represented by a complex of macro- and microelements. A high percentage of calcium, phosphorus, iron and zinc determines the possibility of using this biosubstance for enriching human food. The liquid fraction of the hydrolyzate of antler cake is represented by low molecular weight compounds in dissolved form, which are easily absorbed, penetrate into the cell and are involved in the processes of cellular metabolism. This kind of product is dietary and can be used as a composite component in the composition of functional foods. Along with antlers from marals, meat and collateral (secondary) products are obtained - blood, tails, veins, reproductive organs, embryos, which are used in folk and traditional medicine, as well as in cosmetology. In addition, the third part of the body of red deer (21-27%) is bone tissue, which at the present stage is practically not used in the diet of people despite the significant content of highly digestible fat, protein and phosphate salts. In this regard, the full use of the bones of antler deer would allow not only to significantly increase the yield of nutrients, but also to create new biologically complete enriched products. The use of bone as a food product was studied by scientists in many countries. So, the research of Soviet scientists headed by A.Sh. Sharpenak showed a good digestibility of the bone preparation by the human body. Calcium from these preparations is absorbed similarly to milk calcium (A.K. Kakimov, 2006). And bone collagen in animals is represented mainly by the first type and at the present stage it is widely used as a wound healing component or as a carrier of drugs. It has low immunogenicity, participates in the process of calcification of the organic matrix (A.N. Nakoskin, 2016). For example, in the USA and Great Britain, the food bone product - "Lenphos" - is used as an additive to products for baby and dietary food,

as well as for the enrichment of salt, sugar, flour. In turn, waste-free processing of bone can allow processing enterprises to reduce labor and energy costs, more efficient use of production space.

Employees of the laboratory of processing technology and certification of antler products of the All-Russian Scientific Research Institute of Velvet Antler Deer Breeding (FSBSI FASCA) have developed methods for obtaining biosubstances from antler deer bone. When testing the methods, electro-physical methods were used, which allowed to preserve the properties of the native product. The extraction of all valuable components from raw materials and their further rational use is an important condition for increasing production efficiency and extending production of antler reindeer husbandry. The developed method of processing antler deer bone allows to get up to 40% of the finished product yield, depending on the production technology. It is established that the native powder of the bone of red deer and spotted deer contains a large number of nutritional components, presented in Table 2.

*Table 2 - Biochemical composition of antler deer bones*

Indicators	Maral		Spotted deerflat bones	
	flat bones	long bones	flat bones	long bones
<b>Protein</b>	24,8±2,3	26,4±1,9	32,0±4,0	26,3±3,6
<b>Fat</b>	18,6±3,1	17,2±1,8	18,4±1,7	17,2±1,9
<b>NFE</b>	3,8±1,1	2,7±0,1	2,6±0,9	2,6±0,8
<b>Water</b>	8,6±2,5	5,6±2,1	7,8±1,5	4,2±1,7
<b>Ash</b>	52,4±6,3	60,1±5,6	56,2±4,8	64,7±9,0
	Minerals			
<b>Calcium, g/kg</b>	15,4±3,1	18,9±4,2	18,3±3,9	14,4±2,9
<b>Phosphorus, g/kg</b>	7,1±1,9	8,7±3,0	8,9±2,5	7,6±2,1
<b>Magnesium g/kg</b>	1,0±0,1	1,5±0,2	1,3±0,09	1,2±0,1
<b>Sulfur, g/kg</b>	2,1±0,2	2,9±0,3	3,4±0,2	3,1±0,3
<b>Chlorine g/kg</b>	2,6±0,3	1,2±0,24	1,0±0,1	2,4±0,2
<b>Iron mg/kg</b>	5,3±0,4	7,2±1,5	6,3±3,4	5,1±1,9
<b>Zinc, mg/kg</b>	12,4±0,2	14,6±3,6	16,4±2,1	16,1±3,2

Analyzing the biochemical indicators of the composition of the native raw materials of the maral deer and spotted deer bones, it can be concluded that no significant difference in the studied parameters has been established. At the same time there is a high level of protein. So, from 100 kg of bone of antler deer it is possible to get up to 32.0 kg of protein, fat up to 19 kg. The most important components are minerals, the amount of which varies from 52 to 64%.

The strength of the bone tissue of people depends on the content in the bone matrix of macro - and micronutrients. Thus, the daily need of an able-bodied person according to WHO standards in calcium is 1000 mg per day. In this regard, 100 g of antler deer bone contains up to 19 g of calcium and 9.0 g of phosphorus, which is quite enough to produce a product with a high content of macronutrients. At the same time, a wide range of other macro-and microelements is unique for filling the deficit of these substances in the human body. At the moment, one of the methods for processing maral bones is being examined at the Federal Institute of Industrial Property for the grant of a patent of the Russian Federation.

### **Summary**

1. Powder of the solid fraction of antler cake and biosubstance from the bones of antler deer, having in its composition a large complex of mineral and protein substances can be used to create products of functional orientation, as well as for the prevention of nutritional diseases.

2. The hydrolyzate liquid fraction containing low molecular weight compounds can be one of the most important components in the dietary composition.

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土壤形成技术条件下细菌的变异性 (以西西伯利亚的采矿和加工废物为例)

**VARIABILITY OF BACTERIA IN THE TECHNOGENEOUS  
CONDITIONS OF SOIL FORMATION (ON THE EXAMPLE OF MINING  
AND PROCESSING WASTES OF MINERALS IN WESTERN SIBERIA)**

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注解。这个问题涉及从表面上存在数十年的硫化物矿石中提取有价金属的老龄煤和废物的生物开采问题。值得注意的是, 这些物体参与成土作用是一个长期过程, 因为金属和非金属性质的有毒物质会影响微生物定殖者的生命活动。已经确定, 在老年倾倒中, 存在具有环境意义的可行和重要的微生物, 显示出可变性, 为它们提供适应性活动。在某些情况下, 在固氮菌中检测到形态学和生物化学修饰。固氮菌菌落的生长性质由运动细胞的年轻阶段的持续时间决定。一些菌株表现出抗真菌特性。显然, 通过固氮菌的遗传记忆提供了具有高毒性物质的废物中微生物的毒性。在为再生技术物体创造新的生物技术时, 必须考虑积极繁殖细菌菌株。

关键词: 变异性, 细菌, 废物, 土壤形成, 有毒物质。

**Annotation.** *The problem of the biogenic mining of old-age dumps of coal and waste from the extraction of valuable metals from sulphide ores, which have been on the surface for decades, is covered. It is noted that the involvement of such objects in pedogenesis is a long-term process, since toxicants of a metallic and non-metallic nature affect the vital activity of microbial colonizers. It has been established that in old-age dumps there are viable and vital microorganisms at an environmentally significant level, showing variability, providing them with adaptive activity. In some situations, morphological and biochemical modifications were detected in azotobacteria. The nature of the growth of azotobacter colonies is determined by the duration of the young stage of cells that are motile. Some strains exhibit antifungal properties. The toxicity of microorganisms in wastes with a high*

*content of toxicants is provided, apparently, by the genetic memory of azotobacter. Actively breeding bacteria strains must be considered when creating new biotechnologies for the recultivation of technogeneous objects.*

**Key words:** *variability, bacteria, waste, soil formation, toxicants.*

Within the south-east of Western Siberia there is a large amount of minerals, the extraction and processing of which is accompanied by the loss of valuable soils and the formation of industrial wastes. They slowly undergo hypergenesis and biogenic soil formation, because they contain high concentrations of toxic elements. The chemical composition of samples of old-age coal mining and ore processing (50-100 years), determined by the method of XRF-MI (Institute of Nuclear Physics SB RAS, Novosibirsk) and ICP-MS on a high-resolution mass spectrometer (in the chemical analytical center «Plasma», Tomsk), indicates the presence of certain ecotoxicants of metallic and nonmetallic nature in quantities exceeding the clarke values in the lithosphere and the maximum permissible concentrations in the soil. Our long-term studies of coal mining wastes and ash and slag, as well as iron ore dressing, cyanidation of gold-bearing ore, recycling of sphalerite concentrate clinkers during copper extraction showed that all of them are lifeless. They contain soil aerobic microorganisms in a viable state in quantities corresponding to environmental significance, judging by the fouling of mineral lumps of fine earth. At the same time, microorganisms exhibit morphological and biochemical variability, which ensures their survival in technogeneous conditions.

A similar phenomenon was discovered in the past century in Russia and abroad. It has been identified among the entomopathogenic bacteria *Bacillus tuviensis* under the influence of physical and chemical mutagens: UV rays and ethyleneimine, as well as in *Penicillium chrysogenum* strains producing penicillin in the process of fermentation. Variability was found among streptomycetes and bacteria of *Bacillus mesentericus fuscus* in the presence of herbicides, as well as algae and cyanobacteria under the influence of chemical mutagens and radiation.

An analysis of the literature showed that with high doses of mutagens, entomopathogenic bacteria showed a change in the shape and structure of colonies, color, intensity of spore and crystal formation, a decrease in the number of R-form colonies and a significant increase in the content of dwarf and branchy forms, inhibition of the biosynthesis of spores and crystals. Along with changes in the morphology of the colonies, the morphology and cytology of the cells changed, including cell evacuation, and cell pathology was diagnosed. But moderate doses of mutagens contributed to the growth of highly virulent bacteria with the activation of physiological and biochemical properties. In the case of penicillin mushroom producer with insufficient aeration, low pH, overheating of nutrient media, the process of formation of ball-shaped colonies, different in density and

size, was observed. In this case, the ball formation was transmitted to the following generations of fungi. Against the background of herbicides in bacteria, R-, S- and rhizoid types of colonies were formed, differing in size and pigmentation. In the presence of herbicides, the morphological properties of the R- and S- variants were hereditarily established. Cell sizes and some biochemical properties changed. In turn, cyanobacteria were negatively affected by some toxicants more than bacteria. Under the action of nitroso compounds, morphological, pigment, and antibiotic-resistant mutants appeared in cyanobacteria. But the radioresistance of Cyanophyta exceeded that of *Escherichia coli* and *Bacillus subtilis*. The resistance of cyanobacteria to radiation and some chemical agents is explained by the presence of protective systems: photoreactivation and repair (recombination type). They entrenched as a result of their selection in remote periods, maintaining a high level of genetic stability of cyanobacteria - one of their most important biological properties, providing that archaic, relict preservation of many modern species of this group, which differ little from the fossil Precambrian forms found by paleomicrobiologists.

At the beginning of the current century, studies of the evolutionarily established features of the vital activity of microorganisms, contributing to an increase in the diversity of their morphophysiological forms, including within the same species, turned out to be in demand in soil science.

Deciphering the evolutionary and ecological aspects of the diversity of prokaryotes turned out to be a new strategy for identifying and studying the adaptive capacity and intraspecific structural diversity of prokaryotes in different soil environments. While it is completely obvious that new cell types, both dwarf and giant, including cyano and azotobacteria, both evolutionarily close to each other and constantly found in soils of different genesis, significantly complicate the identification of species in situ, in particular, free living and symbiotic. But an understanding of the naturalness of the morphological heterogeneity of individuals in populations of soil microorganisms is extremely important for theory and practice, including for recultivation, but requires deep interdisciplinary research.

In our complex long-term observations, microbial populations constantly found heterogeneity in a number of morphological, physiological and biochemical properties of their constituent cells under technogenic living conditions. On the surface of overburden, ash and slag and ore dumps of the Kuzbass (Kemerovo region), viable microorganisms of different physiological groups were present in an amount corresponding to ecological significance. At the same time, dwarf colonies of oligotrophic microbes, both oligocarbophilic and oligonitrophilic microbes, dominated. For example, the share of colonies of psychrophilic oligotrophic bacteria with a diameter of less than 0.2 mm was more than 83.4% of viable bacteria on coal waste (Artamonova, Androkhanov, Sokolov et al., 2011). The maximum

of dwarf colonies of mesophilic oligotrophic bacteria was detected on the ore sludge from the Abagur tailing - 95.9%. Cyanobacteria developed on overburden in the form of films and in a free-living state. The films of cyanobacteria accumulated many chemical elements, including Zn, Pb, Cu, Cr, As, Th, U in quantities exceeding the clarke values. The membranous form of growth of cyanobacteria in such a geochemical environment, of course, is an effective adaptation of cyanobacteria. This adaptation is also inherent in azotobacter developing on the waste from the processing of polymetallic ore, where it showed antagonistic properties with respect to micromycetes.

Azotobacter developing on weathered anthracite waste (Gorlovskoye deposit, Novosibirsk region) and in soils adjacent to the sub-basement watercourse was characterized by colony variability, which also indicates the manifestation of adaptive reactions of the bacterium, its adaptive capabilities. On the surface of dumps, represented predominantly by loess-like carbonate loams, where U, Th, As were absent, colonies with mycelial type of growth prevailed. In weathered anthracite, where these elements were present, luscious colonies of flat growth type with pronounced layering dominated. In samples with a high arsenic content, predominantly mucous colonies of the rhizoid type of growth were encountered. In the latter two cases, the colonies are colored probably with melanoid pigments. The presence of endometabolites of yellow, red, orange, possibly carotenoid nature was noted around the colonies. The highest growth rate of the bacterium occurred in loam and under the plant communities: sorrel and grasses, the lowest growth rate - in areas with weathered loam (Artamonova, Bortnikova, 2018). In the course of the sub-tail stream (at the source, geobarrier and estuary), heterogeneous colonies also developed in the soils. At the source of the watercourse, where the highest content of Ni, Zn, Cd, Co, Cu, Rb, Y was detected, lysing pigmented colonies prevailed, registered in a day. Here, the amount of Ni, Zn, Sr, Zr and As exceeded their clarks in the crust. The growth rate of the colonies was minimal compared to the distant from it plots and plots located on the dump. As far from the source, azotobacter colonies dominate, in morphology and physiology, close to those in the original control soil. The reduction of ecotoxicants in the soil at the geobarrier and near the mouth is caused by their partial sorption by algae, mosses, roots and leaves of rogocea, as was previously reported (Artamonova, Bortnikova, 2016).

On the 100-year-old dump of sulfide-containing gold cyanidation wastes (Belklyuchevskoye deposit, border of Kemerovo and Novosibirsk regions) and in the adjacent soils of the sanitary protection zone under the *Azotobacter chroococcum* birch forest were present everywhere, as well as the ammonifying bacterium *Bacillus mycoides*, which indicates the nitrogen-fixing activity of azotobacter. At the top of the blade, colonies with a flat type of growth, pigmentation around the colonies, and mucus production prevailed. In the dump cone, where the maximum

values of Fe (24.6%), Cu (1100 g/t), Pb (1600 g/t), As (680 g/t) exceeding their clark values are registered, colonies with slow growth (4 times compared with the top position). At the same time, young mobile (due to flagella) cells aggregated, became slow-moving, which led to their accumulation, the formation of layered colonies of the “swarming” type. In technologically polluted soils of the SPZ colonies of flat and mycelial type of growth were encountered equally with pronounced production of mucus around the colonies, despite the presence of Mn (480 g/t), Zn (116 - 204 g/t), Cd (0.48 - 0 , 64 g/t). Their content exceeded that of the dump. The accumulation of manganese could contribute to the formation of durable complexes with humic acids, as well as fallen birch, which belongs to the mangalophilic plants. The accumulation of zinc and cadmium in soils, apparently, is associated with penetration through the leaves from the atmosphere and subsequent migration from litter to the soil. However, in such a geochemical environment, the duration of the young stage of the azotobacter provided the moving cells in the presence of mucus to multiply and spread in a “sliding” manner with the formation of mycelial growth, which contributes to the development of new econiche in nature.

We assume that adaptive polymorphism, which ensures the survival of bacteria in technogeneous conditions, is achieved in part by the utilization of sulfur, which is present in the pyrite minerals of coal and ore bearing rocks of the Siberian region against the background of phosphorus deficiency. It is known that sulfur, as a high-energy element, retains “key” positions in the energy metabolism of phylogenetically ancient chlorophyll-containing and chlorine-free organisms. Therefore, it is quite possible to implement the adaptive activity of azotobacter under the anthropogenic conditions of habitat, embedded in the “biochemical memory”. The development of cyanobacteria and azotobacter on the planet initially occurred in the presence of an excess of sulfur. And it is possible that with a deficiency of phosphorus in the environment or any disturbance of phosphorus metabolism, when there is a mobilization of the whole complex of adaptive reactions aimed at the survival of microorganisms, sulfur is involved in the energy transformations of these microbes. Considering also that both bacteria developed in the distant times in the presence of excess nitrogen in the air of the planet, retained in the Holocene the ability to fix atmospheric nitrogen, it is difficult to overestimate their participation in modern soil formation on waste mining and processing of minerals. Moreover, the growth of bacteria contributes to a neutral and alkaline environment, a high content of Ca and Mo in it.

It should also be said that the adaptive polymorphism of azotobacter in technogeneous habitat conditions is fixed in the genetics of the bacterium: as the cultures age, the number of chromosomes in the cells and the DNA content increases — in the stationary growth phase, cultures can contain more than 100 copies of the chro-

mosome per cell. When you transfer to fresh nutrient medium, the original DNA content (one copy) is restored. In addition to chromosomal DNA, plasmids were found in representatives of the genus *Azotobacter*, and the possibility of transforming the genus *Azotobacter* with exogenous plasmid DNA was also proved. Such features provide the genus, in which only 6 species, survival in extreme conditions, including technogeneous. The reasons for the modification changes, especially adaptive modifications, should be sought, apparently, in the regulation of the action of the azotobacter genes. The definition of the chromosome nucleotide sequence has not yet been completed. Nevertheless, there is a scientific interest in identifying the genes whose expression is induced or repressed by various types of stress exposure of the external environment in order to use this information in the development of new biotechnologies for the remediation of technogeneous objects with azotobacter with specified properties to speed up modern soil formation on various waste materials processing of minerals. Thus, the presence of cyanobacteria and azotobacteria in the vital state in industrial wastes is a good reason to expand the fundamental knowledge about the diversity of adaptive reactions of bacteria and to develop new extraordinary approaches to optimize modern soil formation.

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中里海盆地的地貌特征  
GEOMORPHOLOGICAL CHARACTERISTICS  
OF THE MID-CASPIAN BASIN

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注解。 本文讨论了影响里海地貌结构的因素，确定了里海中盆地各部分的某些浮雕，深度和底部沉积物的发生。 注意到与里海北部的水文条件有关。

关键词：地貌构造，陆源沉积物，水文条件，生物堆积，底部沉积物。

**Annotation.** *The article discusses the factors influencing the geomorphological structure of the Caspian Sea, determining the occurrence of a certain relief, depth and bottom sediments of various parts of the Middle Caspian basin. The connection with the hydrological conditions in the north of the Caspian Sea is noted.*

**Keywords:** *geomorphological structure, terrigenous sediments, hydrological conditions, biogenic accumulations, bottom sediments.*

The geomorphological structure of the Caspian Sea is most fully described in the works of O.K. Leontiev [1, p.45], [2]. Sedimentary rocks composing the bottom of the basin of the Middle Caspian are characterized by the following features: the main part of the sediments is represented by clastic material that comes from rivers from the west bank [3, p.22]. The catchment basin of these rivers lies predominantly in the field of the development of Mesozoic rocks (Jurassic and Cretaceous), represented by thick strata of shale. This largely determines the lithological features of the terrigenous material entering the basin of the Middle Caspian. In general, the suspension entering the Caspian Sea corresponds to fine aleuritic and silty clayey silts [3, p.23]. Another important source is dust from the surrounding arid territories, the masses of such transport are estimated at tens of millions of tons per year [3, p.24], which is comparable to the drift of any of the

following rivers: the Volga, Terek, Sulak, Samur. In the Middle Caspian, there are several zones with characteristic lithological types of sedimentary facies. In the central part there is terrigenous material (clays and silts). In the west and south-west it is terrigenous-carbonate, in the east it is biogenic-carbonate. It is noticeable that the terrigenous sediments are also confined to the wellhead parts of the major rivers (Sulak and Terek).

Clay minerals are mainly represented by hydromica (more than 50% of all clay minerals). Montmorillonite from 10 to 40%, the maximum content is confined to the deep parts of the Derbent depression, and kaolinite is contained in an amount of about 15%. In the estuarine zones of the r. Terek and Samur, its content increases to 25%. The content of chlorites and mixed-layer minerals is not more than 15%.

In general, the structure of this basin is as follows (Fig. 1): a steep western slope, a relatively gentler northwestern, eastern and southern and leveled bottom of the basin [4, p.446].

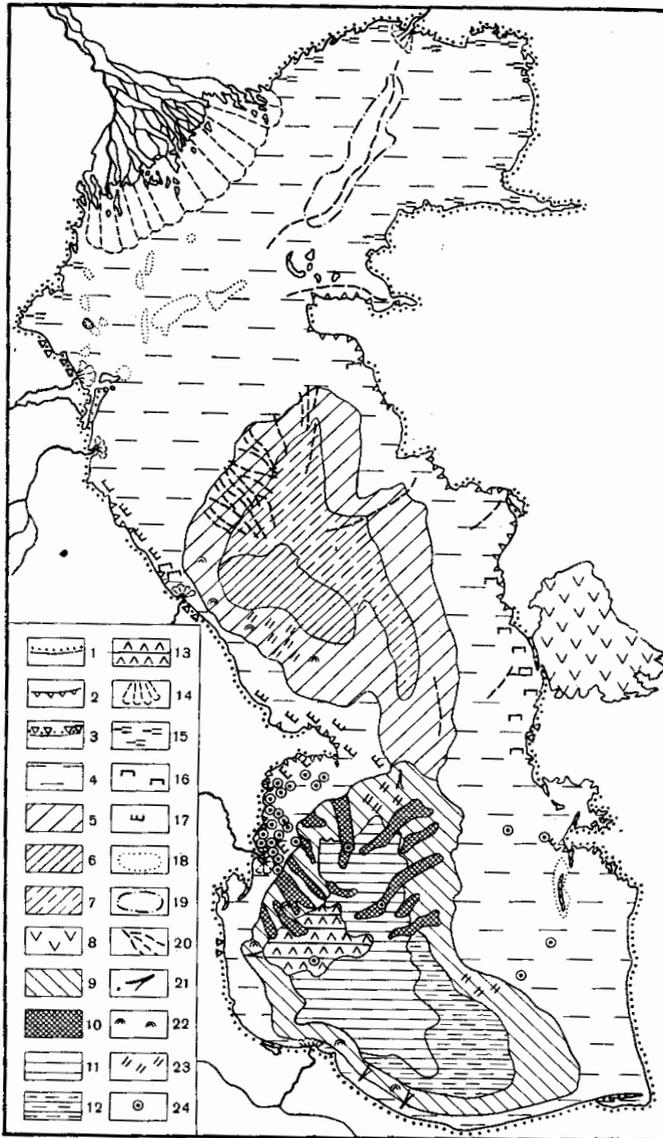


Figure 1. Geomorphological scheme of the bottom of the Caspian Sea according to [2]

**Types of shores:** 1 - accumulative; 2 - abrasion; 3 — abrasion-accumulative.

**Shelf zone:** 4 - plains of the coastal shallow; 5 - wavy and sloping shelf plains; 6 - subhorizontal plains of the bottoms of the shelf hollows; 7 - sloping plains of the bottoms of the shelf hollows; 8 - plains of chemogenic-terrigenous accumulation of detached bays.

**The zone of the continental slope:** 9 - sloping plains; 10 - ramparts ("mountain ranges").

*The zone of the abyssal plains of the South Caspian basin:* 11 - sub-horizontal flat abyssal plains; 12 - hilly abyssal plains.

**Forms and complexes of the underwater relief:** 14 - avandelta; 15 - wind drying; 16 - speed bench; 17 - bed bench; 18 - large underwater accumulative forms (banks); 19 - furrows; 20 - river valleys and other flooded erosion forms; 21 - submarine canyons; 22 - a complex of underwater landslide forms; 23 - erosion associated with the activity of suspension currents; 24 - mud volcanoes.

**The western slope** has an average slope of about  $2^\circ$ , but in some areas, especially in the upper part - up to  $6^\circ$ . The greatest steepness was recorded in the zone of the minimum slope width for the Middle Caspian, narrowing in places to 20 km. In the upper part of the slope, a terrace-like step was found with a width of up to 25-30 km, which is especially clearly visible to the south. The step surface has a small slope (not more than  $0.5^\circ$ ) towards the coast, i.e. opposite to the general incline of the slope. The step is a relic of one of the ancient regressive stages of the sea.

Within the western part of the slope exogenous landforms are widely developed. Due to the significant steepness of the slope and the abundance of clay sediments, underwater landslide deformations are widespread, formed on the slope and, in places and at the foot, gentle scaly-like elevations with a relative height of 5-10 m. Along with them there are canyon-like erosion indentations created by turbid streams accompanying underwater landslides. These landforms create a significant small dissection of the western slope of the Middle Caspian depression.

**The northwestern slope** of the depression is considerably in the western one; slopes within it vary from  $0.5$  to  $2.5^\circ$ . Here the most developed network of erosion valleys with a V-shaped profile. Valleys up to 1-2 km wide and relative depth from 5 to 40 m [4, p.450]. The valleys are characterized by terraced slopes and boundary shafts. The valleys traces the beds of the Volga, Terek and Sulak rivers into the regressive stages of the Caspian Sea.

**The eastern slope** is most pronounced in its central part. Here it has a width of about 40 km and a gradient of  $0.5-1^\circ$ . In the north, where it joins the northwestern slope at an acute angle, and in the south, where it joins the Absheron threshold, the slope is smoothed and the incline does not exceed  $0.5^\circ$ .

**Absheron threshold** closes the Middle Caspian basin from the south. The lowest “pass” point of the threshold lies at a depth of about 200 m. The northern slope of the threshold is gentle and flattened. The South Caspian slope is somewhat steeper (up to 2-3°) and is heavily dissected. Along the upper edge of the southern slope of the threshold, a shaft clearly expressed in relief extends up to 50-70 m, with a base width of about 5 km.

**The bottom** of the Middle Caspian depression includes a sloping plain occupying the northern and eastern parts and a small subhorizontal flat plain in the west. The sloping plain represents the foot of the eastern and northwestern slopes. One can trace the continuation of the channels of some underwater valleys. The flat plain adjoins the western slope. This section of the bottom, on which the maximum depths of the Middle Caspian are marked (up to 800 m), is called the Derbent Basin. In the marginal parts of the plain at the base of the western slope, forms are developed that owe their origin to underwater landslides and turbid flows. The presence of a flat plain and a dissected western slope is due to uniform processes. The composition of the precipitation of a gentle plain [5, p.118]. Here there are breccias (arising from landslides), as well as gradation stratification, typical of turbid flows [2]. These streams, producing enormous erosional work on the western slope, fill the beds of the depression with sediments, forming a flat plain within it. The next factor determining the occurrence of a flat plain is the neotectonic movements. This plain is located in the axial (most descending) part of the Terek-Caspian trough.

**Bottom sediments.** The formation of precipitation in the Caspian Sea takes place in extremely difficult conditions. The current bottom sediments in the Caspian differ significantly in their genetic properties, as well as in material and mechanical composition. In their works, the authors [6, p.58] [7, p.43] [8, p.58], [9, p.26] [10, p.216] [2] note the predominance of such a sea in the northern region type of marine sediments like large silt. The deposition of coarse-grained terrigenous sediments such as silty sand or sand is also noted here to a greater extent. This can be explained [13, p.11] by the hydrological conditions in the north of the Caspian Sea, such as wind currents, small bottom slopes and disturbances in shallow water. Salmanov [14, p.28] notes the occurrence of silts and sandy silts in the Ural Borozdina area. In addition, terrigenous sediments are deposited in the southwestern region, which is influenced by the Volga runoff.

The central zone of the northern part of the Caspian Sea is the area of mainly nutrient accumulation. Thanks to the nutrients carried out by the Volga, favorable conditions were created for the life of the organisms there. In the central part, there is a lot of deposits in the form of a calcium carbonate crust, which is formed due to the cementation, which falls to the bottom of the broken shell.

In the Middle Caspian, there is a regular change in the types of precipitation

from the shallow coast to great depths. In the coastal part, in the zone of active action, the bottom is covered with sand with the inclusion of shells, pebbles and gravel. Further, under the influence of river outflows, the sands are replaced by sandy silt with separate silt spots located against the entries of the rivers or in places of erosion of ancient clays. On the eastern slope of the Middle Caspian in the absence of river flow, according to [15, p.128] [16, p.249], [4, p.450] [17, p.1029], carbonates of predominantly biogenic origin play the main role in sedimentation .

In the last decade, due to the rapid development of diatoms, especially *Pseudo-solenia calcar-avis*, diatom deposits are also found in the Caspian Sea. They were found mainly in the northwestern part of the Middle Caspian and in the Apsheron threshold region [18, p.344]. The bottom of the central deepwater part of the Middle and South Caspian is covered with thin silts [19, p.906]. In the southern part of the Caspian Sea, on the slope of the east coast, the same soils remain as in the middle part. According to [20, p.315] [21, p.15], [22, p.9], the bottom to a depth of 50-70 m is covered with coarse-grained carbonate sediments - shell-eolitic sand mixed with shells.

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在奥伦堡乌拉尔地区的条件下有希望的草莓品种  
**PROMISING VARIETIES OF STRAWBERRIES IN THE CONDITIONS  
OF THE ORENBURG URAL REGION**

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Plant Breeding*

注解。 本文介绍了乌拉尔全俄育种和园艺和植物育种技术研究所草莓园育种新品种的收集研究结果（以奥伦堡地区为例）。 大多数研究的品种都很好地适应了该地区的条件，并且能够在最佳条件下以及在存在不利因素的情况下最大化生产力潜力。 对奥伦堡乌拉尔的条件承诺有以下品种：Bereginya, Desnianska Kinskaya, Tsaritsa, Rosinka, Studencheskaya, 以良好的适应性，高生产力（超过0.2-0.3公斤/灌木），大果（平均重量超过9.0）而著称 G）。 新品种已超过生产力，这表明他们在该地区种植的前景。

关键词：园林草莓，品种，抗寒性，抗旱性，生产力，奥伦堡乌拉尔。

**Annotation.** *The article presents the results of the collection study of new varieties of strawberry garden breeding of the All-Russian Breeding and Technological Institute of Horticulture and Plant Breeding in the Urals (on the example of the Orenburg region). Most of the studied varieties are well adapted to the conditions of the region and are able to maximize the potential of productivity in optimal conditions, and in the presence of adverse factors. Promising for the conditions of the Orenburg Urals are the following varieties: Bereginya, Desnianska Kokinskaya, Tsaritsa, Rosinka, Studencheskaya, distinguished by good adaptation, high productivity (more than 0.2-0.3 kg/bush), large fruit (average weight more than 9.0 g). New varieties have surpassed zoned in productivity, which indicates the prospect of their cultivation in the region.*

**Keywords:** *garden strawberry, variety, winter hardiness, drought resistance, productivity, Orenburg Urals.*

In recent years, we have observed instability of weather conditions, which negatively affects the condition and productivity of strawberry plantings. Researchers in Russia and abroad pay great attention to the problem of the stability of garden plants, the cultivation of varieties with a high level of adaptation to damaging factors [1, 2, 3].

The most important integral feature of the variety is yield. It reflects the adaptive potential of a variety in the area of its cultivation, the genetic level of its productivity components [4].

In the harsh conditions of the Orenburg region, the main reasons for the decrease in yield are insufficient resistance of the cultivated varieties to environmental and climatic stresses, and low potential productivity. In this connection, the selection of varieties that are able to maximize the potential of productivity in both favorable and unfavorable extreme environmental conditions becomes very relevant [5,6,7,8].

The purpose of the work is the study of new varieties of strawberries on the main practical and important adaptive characteristics and the selection of valuable for breeding and promising for cultivation in the Orenburg Cis-Urals.

Research on the assessment of varieties performed in 2016 - 2018 years on the collection site of the FSBSI «Orenburg ESHV ARHIBAN» under the specific conditions characteristic of the Orenburg Cis-Urals. Objects of research: strawberry varieties of the breeding of the All-Russian selection and technological institute of gardening and plant breeding. Zoned varieties — Zenga-Zengana, Orlets were used as controls. Land was irrigated. Agrotechnology of experimental plots was common for the Orenburg region. Field experiments, surveys and observations were carried out in accordance with generally accepted methods [9,10].

Winter hardiness is a complex trait that is of great economic importance. Insufficient winter resistance of existing varieties inhibit the development of strawberry culture in the Orenburg region. Winter 2015/2016 was moderately cold. The beginning of winter was favorable for wintering strawberries. The steady snow cover was established from the end of December and in winter time was 30-40 cm. In 2017-2018 overwintering of plants took place under adverse conditions. Especially severe was the winter of 2017/2018. In December 2017, long-lasting frost was established: -15... -23 °C with complete lack of snow. A little snow fell only at the end of December. In January 2018, there were severe frosts (at night up to -25°... -30°C) with a snow cover of only 7-9 cm. The soil froze through 121 cm.

After a harsh winter, freezing of the leaf apparatus, the generative organs and the root system was revealed. The degree of freezing of bushes for growth and development amounted to 1.5-3.0 points. Among the new varieties, the least frosting (1.5-2.0 points) had the following varieties: Bereginya, Rosinka, Studencheskaya, Tsaritsa. In the control varieties, the degree of freezing of the bushes to grow was 2.0–2.5 points.

One of the environmental factors limiting the yield of strawberries is drought. The arid and moderately arid conditions were observed annually during crop formation (May-June) and the setting of fruit buds (August). The following varieties showed high field drought tolerance: Bereginya, Rosinka, Studencheskaya.

Varieties by productivity and its individual components have been evaluated. There was a decrease in productivity due to freezing of plants, high temperatures against the background of low humidity during crop formation. There are differences between varieties. Some of the new varieties have surpassed zoned in terms of productivity, number of fruits, weight of the fruit and showed a good level of adaptation.

The first component of productivity is the number of flower stalks per bush. This figure in our studies ranged from 2.4 to 5.5 per bush. By the high level of this component, the varieties Bereginya, Rosinka, Studencheskaya and control Zenga-Zengana varieties stood out. Even after unfavorable wintering conditions, dry summer, these varieties formed from 4 or more flower stalks per bush.

*Table. Productivity and components of strawberry varieties (2016-2018)*

Variety	Productivity, kg/bush	Fruit weight, g		Quantity, pcs / bush	
		first harvest	average	flower stalks	fruits
Bereginya	0,30	16,9	10,4	5,5	29,0
Desnianska Kokinskaya	0,24	20,0	10,1	3,9	24,1
Zenga-Zengana (st)	0,20	14,0	8,2	4,5	24,0
Orlets (st)	0,17	11,6	8,8	2,4	19,3
Rosinka	0,25	15,1	9,0	4,3	27,5
Studencheskaya	0,26	15,8	10,1	4,1	25,4
Tsaritsa	0,24	19,0	10,6	4,0	22,6
HCP <sub>05</sub>	0,032	0,59	0,56	0,003	1,5

The second component of productivity is the number of fruits per bush. Depending on the genotype, the number of fruit began to vary from 19.3 to 29.0 pcs. More than 25 fruits per bush formed varieties Bereginya, Rosinka, Studencheskaya.

The mass of fruits is one of the main components of productivity. The average weight of the berries depended on many factors: the biological characteristics of the variety, weather conditions. The mass of berries of the first harvest was the highest and reached in our research 11.6 - 20.0 g. On average, all the harvests amounted to 8.2...10.6 g. Large fruits (average weight more than 9.0 g) formed varieties Tsaritsa, Bereginya, Desnyanka Kokinskaya, Studencheskaya. The remaining varieties, including the control Zenga-Zengana, Orlets, were of medium size - from 8.2 to 9.0 g.

When comparing varieties by productivity, on average for 3 years, the following varieties stood out: Bereginya (0.30 kg/bush), Rosinka, Studencheskaya (0.25 kg/bush), Desnyanka Kokinskaya, Tsaritsa (more than 0.24 kg/bush). The productivity of the control variety Zenga-Zengana was 0.20, Orlets - 0.17 kg from a bush.

Studies have shown that most of the studied new breeding varieties of the All-Russian Selective and Technological Institute of Horticulture and Plant Breeding are well adapted to the conditions of the region and are able to maximize the potential of productivity in optimal conditions and in the presence of adverse factors.

The results of statistical data processing showed that a number of varieties exceed the control with a 5% level of significance in the number of flower stalks, fruits, average fruit weight and productivity. The remaining varieties are not significantly different from the control.

Perspectives for the conditions of the Orenburg Urals are the following varieties: Bereginya, Desnyanka Kokinskaya, Tsaritsa, Rosinka, Studencheskaya, characterized by good adaptation, high productivity (more than 0.2-0.3 kg/bush), large fruit (average weight more than 9.0 g). New varieties have surpassed zoned in productivity, which indicates the prospect of their cultivation in the region.

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气候变化对北方农业发展的影响 (以科米共和国为例)

**IMPACT OF CLIMATE CHANGE  
ON THE AGRICULTURAL DEVELOPMENT  
OF THE NORTH (ON THE EXAMPLE OF THE REPUBLIC OF KOMI)**

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注解。政府间气候变化专门委员会 (IPCC) 于2018年10月发表的关于全球变暖对1.5° C (全球变暖1.5° C) 的影响的特别报告引起了科学界, 专业人士, 政治家和普通民众的共鸣。所提出的材料需要国际社会作出认真决定, 以尽量减少联合国通过的17项可持续发展目标的影响和成就。在这方面, 该研究的特殊意义是由北部和北极地区气候变化的影响造成的。观测到的北方和北极气候变化的影响不仅影响人类健康, 还影响在那里运作的经济部门。正在发生的变化需要采取某些措施来减少最小的负面影响。有必要确定哪些风险和潜力可以承担这些后果。该项工作致力于评估气候变化对俄罗斯北部地区农业的影响, 以科米共和国为例。分析了该地区农业部门发展的风险和潜在机会。拟议措施, 以适应气候变化对科米共和国农业的影响。

关键词: 气候变化, 北方, 北极, 农业, 潜力。

**Annotation.** *The special report of the Intergovernmental Panel on Climate Change (IPCC) published in October 2018 on the effects of global warming at 1.5°C (Global warming of 1.5°C) caused another resonance among the scientific community, professionals, politicians and ordinary people.<sup>1</sup> The presented material requires serious decisions from the world community to minimize the implications and achievement of 17 sustainable development goals adopted by the UN.<sup>2</sup> In this regard, the special relevance of the study is caused by the effects of climate change in the northern and Arctic territories. The observed effects of climate change in the North and the Arctic affect not only human health, but also the sectors of the economy that operate there. Changes that are taking place require certain measures to reduce the minimum negative impact. It is necessary to determine what risks and*

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<sup>1</sup>Special Report on Global Warming of 1.5°C (SR15) <http://www.ipcc.ch/index.htm>

<sup>2</sup>17 Goals to Transform Our World <https://www.un.org/sustainabledevelopment/>

*potentialities bear these consequences. The work is devoted to assessing the impact of climate change on agriculture of the northern region of Russia, on the example of the Komi Republic. Analyzed the risks and potential opportunities for the development of the agricultural sector in the region. The proposed measures to adapt the effects of climate change on agriculture of the Komi Republic.*

**Keywords:** *climate change, North, Arctic, agriculture, potential.*

Agriculture is among those sectors of the economy that are most sensitive to climate change. The following phenomena are dangerous for agriculture: droughts, dry winds, frosts, overmoistening of soil, hail and some others, as well as complexes of adverse hydrometeorological phenomena causing lodging of crops, a sharp decrease in their productivity, death and hindering the conduct of field work, especially harvesting. The hydrometeorological phenomena of the cold period of the year, leading to freezing, soaking and sweating crops, as well as damage to perennial plants are also dangerous. Crop production as a food base also determines risks in animal husbandry. Indirect risks in the field of livestock, due to changes in climatic conditions, may be associated with a shortage of drinking water, diseases, etc. direct risks include overheating of animals under abnormal weather conditions (abnormally hot weather, dry winds). Livestock in the context of climate issues is primarily considered as a source of greenhouse gases (nitrous oxide and methane), i.e., it refers to the issues of mitigating the impact on the climate system.<sup>3</sup> The determining climate-dependent factors for agriculture (animal husbandry and crop production), depending on the natural and climatic zones of the region, are different. For the northern and humid regions, vulnerability factors include the invasion of cold air masses from the north, excessive moisture, and freezing.<sup>4</sup>

Consider the example of one of the northern regions of Russia, the Republic of Komi (RK), how climate change affects agriculture. The region is located in the northeast of the European part of the Russian Federation and enters the non-black earth zone, the length from north to south reaches about 1000 km. A regular change of the soil-climatic and socio-economic conditions takes place over the extended territory of the region. The climate is temperate continental. Climate continentality rises from southwest to northeast. During the growing season, frost is possible throughout the country. There are three vegetation zones: taiga, forest-tundra and tundra. At the beginning of the 90s. XX century after conducting a series of studies, the republic was divided into four agroclimatic regions and their specialization (Table 1). Note that this development currently requires revision and improvement in connection with the new changed conditions for the functioning of agriculture in the North.

Climatic changes in weather conditions do not allow for sustainable agriculture in the North, which already operates in harsh climatic conditions. The risks associat-

<sup>3</sup>Report on climate risks in the Russian Federation. St. Petersburg.2017. 106. (p.52)

<sup>4</sup>Roshydromet, 2014.

ed with shaft losses and crop yields are evident here. Risk can be defined as the likelihood of expected losses from crop yields due to adverse meteorological conditions.

Until 2000, the State Station of the Syktyvkarskaya Agrochemical Service prepared reports for the Ministry of Agriculture and the consumer market of the Republic of Komi, which included a section on the climatic features of the development of agricultural production for each of the past year.

*Table 1 - Agroclimatic areas of the Komi Republic*

<b>Agroclimatic area</b>	<b>The structure includes municipal districts</b>	<b>Feature (suitability to agriculture)</b>
<i>The first (I)</i>	Usinsk, Pechora, the predominant part of Ust-Tsilemsky, Izhma regions and the south-western part of Inta.	Natural conditions do not allow widespread farming. The main branch of agriculture is dairy and beef cattle, reindeer herding. The forage base for animal husbandry consists of natural hayfields, sowed perennial and annual grasses. Here it is possible to grow early ripe varieties of potatoes and vegetables, but the harvest is not received annually, since the frequency of frost in the summer period is 6-7 years out of 10. The district is cold, located in the northern part of the republic.
<i>The second (II)</i>	Udora district, northern part of Knyazhpogost district, most of Ukhta, southern part of Izhma region and Pechora, north-eastern part of Troitsko-Pechora district.	The conditions of this agro-climatic region are more favorable than the previous one for the development of agriculture. Mainly grow fodder crops, potatoes, vegetables. Meadows located in the floodplains of rivers can produce high yields. The area is moderately cold.
<i>The third (III)</i>	Troitsko-Pechora region (except the north-east), the northern part of Ust-Vymskogo, Kortkerossky, Ust-Kulomsky, the southern part of Knyazhpogostsky regions and the south-western part of Ukhta.	The main branch of agricultural production is dairy and meat cattle breeding. Agriculture here is better developed than the above described areas. Most of the arable land is sown with feed crops. Cultivated potatoes, vegetables.
<i>The fourth (IV)</i>	Priluzsky, Sysolsky, Syktyvdinsky areas, the southern half of Kortkerossky, Ust-Kulomsky and Ust-Vymsky areas.	These territories are distinguished by the highest heat supply of the vegetation period in the republic. Agriculture of the regions has a dairy and cattle breeding direction with the most developed agriculture in the republic. This area is moderately cool.
Source: The system of agriculture of the agro-industrial complex of the Komi USSR for 1991-1995. Syktyvkar, 1991. 208 p.		

Currently, due to the reduction of funding for the study and study of the characteristics of agriculture, the reports provided are reduced to minimal data, and there is no section on natural and climatic features. The risks associated with climate change should be minimized.

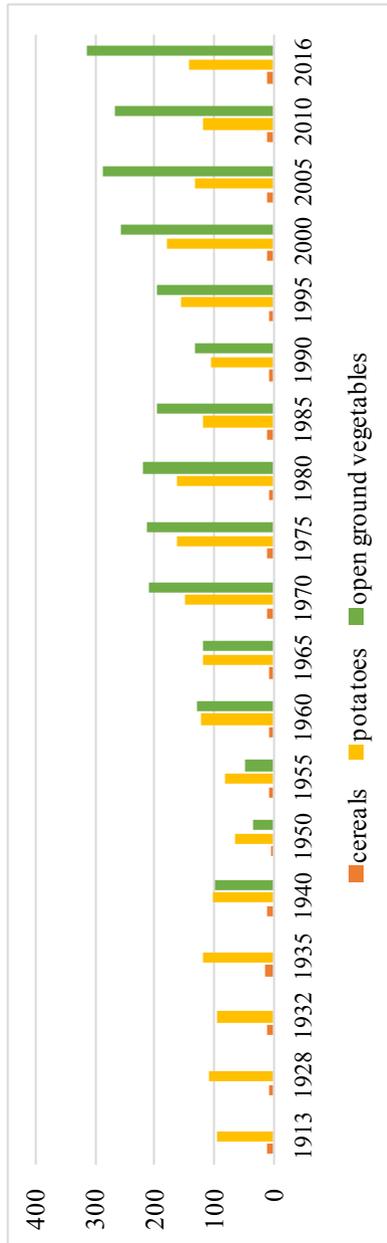
For the Komi Republic, the main types of crop production are cereals, potatoes and vegetables of open ground (Fig. 1).

From Fig. 1, it is clearly seen that crop yields in recent decades tend to increase yields, especially for vegetables, which reached a level of 316 c / ha in 2016 against 36 c / ha in 1950. This fact proves that there is a climate change in the direction of warming, which has a positive effect on crop yields.

Let us consider in more detail the climatic indicators that affect the yield of the main agricultural crop, most of which is grown in the capital of the Komi Republic, Syktyvkar. The share of crop production in agricultural products in Syktyvkar is 73% for 2017.

Correlation analysis to identify the relationship between these climate indicators in the table. 4 and the potato yield in Syktyvkar showed that a direct relationship was revealed.

The gross yield for cereals, potatoes, vegetables, fodder and silage crops for the period 1913-2016 has been analyzed. shows that during the period when the climate-dependent indicators were favorable, the gross yield was rather high for the northern region from 1960-2000, especially for potatoes and silage crops. The fact that after the 1990s. gross yield decreased due to the fact that the period of reforms in this period in Russia was accompanied by a sharp reduction in all agricultural production, including the acreage (Table 5).



**Figure 1** - The yield of cereals, potatoes and vegetables by categories of farms of the Republic of Komi (c. from 1 hectare of harvested area)

**Table 4 - Climatic indicators affecting the yield of potatoes in Syktyvkar for the period 1989-2016**

years	Average temperature during the growing season, °C	The deviation of the average temperature from the norm, °C	Amount of precipitation during the growing season, mm	The amount of precipitation in % of normal	Potato yield, c / ha
1989	13,9	1,5	380	118	166
1990	13,0	0,6	302	94	91
1991	12,7	0,3	346	108	91
1992	11,5	-0,9	247	77	102
1993	13,2	0,8	395	123	71
1994	10,8	-1,6	393	122	69
1995	14,0	1,6	338	105	151
1996	13,3	0,9	347	108	139
1997	11,3	-1,1	301	94	136
1998	14,1	1,7	283	88	186
1999	13,1	0,7	292	91	168
2000	13,3	0,9	242	75	182
2001	12,9	0,5	320	100	182
2002	11,1	-1,3	307	96	148
2003	13,3	0,9	351	109	135
2004	13,1	0,7	401	125	105
2005	13,7	1,3	208	65	125
2006	13,2	0,8	307	96	131
2007	13,1	0,7	363	113	75
2008	11,8	-0,6	407	127	120
2009	13,3	0,9	388	121	106
2010	13,0	0,6	247	77	85
2011	13,8	1,4	262	82	123
2012	12,4	0,0	567	17	132
2013	14,6	2,2	190	59	157
2014	13,3	0,9	333	104	156
2015	13,4	1,0	304	95	160
2016	13,8	1,4	475	148	144

*Source: Compiled according to the branch of FGBU of Hydrometeorology and Environmental Monitoring and the statistical compilations on agriculture of the Republic of Komi*

Head of the branch of FGBU Northern UGMS "Komi TsGMS" Kozel O.G. claims that for the Republic of Komi climate change is expressed in an increase in air temperature by 0.6-1.4°C over the past 60 years, which are more pronounced in the autumn and winter periods, but practically absent in the spring and summer

periods. In general, the warming rate is  $0.1-0.2^{\circ}\text{C} / 10$  years. An increase in annual precipitation is noted, although so far more or less confidently we can talk about some increase in precipitation only in the spring period of time. The most adverse effects of climate change on the region are currently marked by degradation of permafrost. Expected climate change predictions in RK suggest that these changes will intensify and the effects of these changes will lead to changes in natural ecosystems. For example, reducing the area of moss deers, which is the main food supply for welded deer, increasing the duration of its recovery, the disappearance of certain animal and plant species, the spread of agricultural and forest pests, the expansion of the tick-borne borreliosis and encephalitis vectors.

In the southern regions of the Republic of Komi over the past 3-5 years, the appearance of the Colorado potato beetle has been observed on potatoes, which is generally not characteristic of the northern territories, spread it from the south to the north. This factor influences the yield of the main agricultural crop and proves that climate change is taking place in the direction of warming. At the same time, this condition provides new potential opportunities for agriculture in the North to grow new types of crops.

Note that the Deputy Chairman of the Government and the Minister of the Ministry of Agriculture and Food Market of Komi Knyazev A.P. attempts to grow new types of crops in the region. It can be assumed that the Ministry still understands that the changes that are taking place can be used as potential opportunities for growing new types of crops, thereby diversifying the list of the production of basic foodstuffs that produce the local food base. It also makes it possible to orient the agricultural producers of the North to produce organic food products that are in demand around the world today and the demand for them is increasing annually, for 200–2016 it has increased five times and by 2022 should reach 200 billion dollars.

In 2018, the Ministry of Agriculture and Food Market of the Republic of Komi conducted a large-scale experiment on growing corn as a highly nutritious silo in the Priluzsky, Syktyvdinsky and Sysolsky districts. For the sowing of maize, 50 hectares were allocated, with a total area of sowing of feed crops of 9,200 hectares. As a result, this year the experiment failed in two regions of the RK, except in the Yuzhnoye private farm in the Priluzsky region. Because of the cold summer, the green mass was received, but the cobs did not wait. Analysis of the cultivation of corn in the Priluzsky region of RK showed that corn seeds of most varieties and hybrids germinate at a temperature of  $8-10^{\circ}\text{C}$ , but more vigorous germination and growth of the vegetative mass is observed at temperatures above  $10-12^{\circ}\text{C}$ . A short frost ( $-2, -3^{\circ}\text{C}$ ) damages shoots, but before the 3rd leaf phase they are able to recover in a week if up to 25% of the leaf surface is damaged, if 50% of the leaf surface is damaged, the plants die.

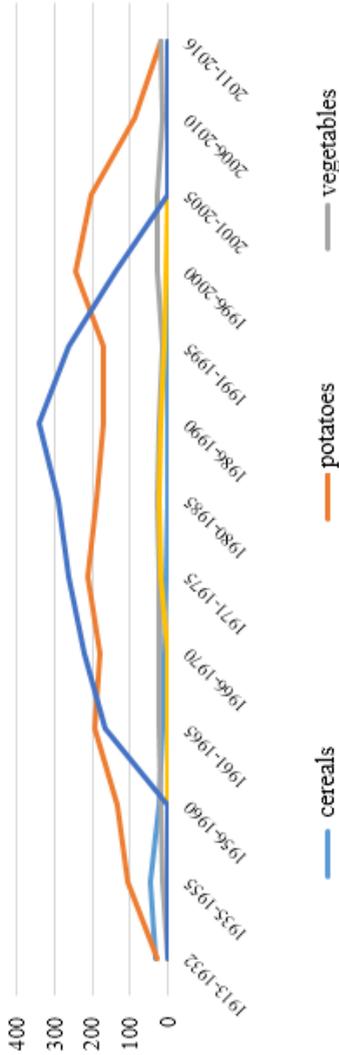


Figure 2 - Dynamics of the gross harvest of crops in the Komi Republic for the years 1913–2016 (thousand tons).

Table 5 - Crop areas of crops in farms of all categories (thousand hectares)

Years	1913	1922	1932	1940	1950	1960	1970	1980	1990	2000	2016	Area change 2016/1913
Cereals	25,4	24,2	42,6	57	63,8	25,3	9,6	1	0,6	0,5	8	- 17,4
Potatoes	1,4	1,5	5	12,4	12,4	13,2	12,7	12,8	12,1	14,8	6,7	-5,3
Vegetables	0,2	0,1	1,2	1,9	3,7	1,6	1,3	1,2	1,1	1,3	0,6	-0,4
Feed crops	0,3	-	3,4	12,8	15,1	48,7	60,4	78,7	86,8	66,6	32,0	- 31,7

Source: 1. The collection of agriculture in RK. Stat.collection Comstatat. - Syktyvkar, 2017 236 p.

2. Agro-industrial complex of the Republic of Komi: history and modernity: statistical collection / Comstatat. - Syktyvkar, 2011. 133p

An important criterion for assessing the suitability of a locality for growing corn is the average daily temperature for re-generation from May to September or the sum of active temperatures above 10°C (only days with an average daily temperature of 10°C and above are taken into account). Table 5 is given, in which temperatures are indicated that are necessary for different groups of ripeness (according to D. Shpaar).

Corn requirements for soil is interrelated with climatic conditions. In the northern regions with a lack of heat and high humidity, well-cultivated, light loamy, sandy and sandy soils, which warm up faster in spring, are more suitable for growing corn. Analysis of the average annual data on average daily air temperature over three decades from May to September was 13.2°C, and the sum of temperatures above 10°C for the same period was 1533°C. The growing season with temperatures above 10°C and above is 105 days, which is suitable for growing this crop for silage. As a result, the cultivation of corn for grain is not advisable, and for growing it for silage it is better to use early ripe hybrids. In general, due to climate change over the past decades, the Priluzsky district has made it favorable for growing a new crop.

*Table 5 - Suitability of hybrids of different groups of ripeness depending on average daily temperatures and temperature totals for May-September*

Group of ripeness / number FAO	average daily temperature, May-September, °C		the sum of effective temperatures, May-September, °C		Silage content	
	corn for silage	corn for grain	corn for silage	corn for grain	in the whole plant	In grain
Early maturing ≤220	12,5	13,5	1450 1500	1580	32-35	65
Mid-season 230-250	13,5	15,5	1490 1540	1630	32-35	65
Medium ripen 260-290	15,5	15,5	1540 1590	1680	32-35	65
Late-ripening ≥ 300	15,5	16,0	1600 1640	1730	32-35	65

Source: Compiled according to the branch of the Northern Directorate of Hydrometeorology and Environmental Monitoring.

It should be noted that the agricultural organizations and peasant farms of the near-arctic Ust – Tsilma region of RK noted climate change in the direction of warming, as they attempted to grow flax. Analysis of agrometeorological data on the growth conditions of flax in Ust-Tsilemsky district in terms of productive moisture reserves in the soil, sums of effective air temperatures over the period of average daily temperature above 10°C and the length of the growing season with temperatures above 10°C in days showing that this area not suitable for growing this crop. But Ust-Vym and Syktyvdinsky districts, which are located in the central part of the region, are suitable for growing flax.

Summing up the work, we can conclude that climate change for the northern region, on the example of the Komi Republic, carries both risks and potential opportunities. The risks are that new types of pests are emerging for the main crops grown in the region, which are harmful to crop yields and their gross harvest. Potential opportunities are revealed in the cultivation of new types of crops, which will provide local people with more diverse fresh food products, as well as strengthen the production of fodder base for animal husbandry and the development of organic agriculture. Undoubtedly, the considered risks and opportunities in agriculture are subject to a comprehensive assessment at the regional level.

质量管理体系人员配置问题  
**PROBLEMS OF STAFFING OF SYSTEMS  
OF QUALITY MANAGEMENT**

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注解。 本文讨论了确保产品质量和可靠性的各个方面，确定了解决该问题的主要方向。 结果表明，确保质量管理体系(QMS)充分运作的最重要任务是组建一支训练有素的专业团队。 介绍了质量管理体系人员配置分析的研究结果。

考虑了Almaz-Antey关注培训QMS专家的经验，为工作场所的高级培训创造条件，支持专业和行政增长以及建立人员储备。

提出了一个专业的再培训计划“质量管理专家”。

关键词：质量管理体系，质量，质量管理，过程管理，人员配备

**Annotation.** *The article discusses various aspects of ensuring the quality and reliability of products, identifies the main directions for solving this problem. It is shown that the most important task of ensuring the adequate functioning of the quality management system (QMS) is the formation of a trained and professional team. The results of studies on the analysis of the staffing of the QMS are presented.*

*The experience of the Almaz-Antey Concern in the training of QMS specialists, the creation of conditions for advanced training in the workplace, the support of professional and administrative growth, and the creation of a personnel reserve are considered.*

*A professional retraining program “Quality Management Specialist” was proposed.*

**Keywords:** *quality management system, quality, quality management, process management, staffing*

**Introduction**

The quality management system (QMS) of products is a set of management bodies and objects of management, measures, methods and means aimed at estab-

lishing, ensuring and maintaining a high level of product quality.

The most important role in the QMS is played by two factors: regulatory and staffing.

If we consider the system of regulatory support of QMS, then it can be noted that it is well developed, almost all actions are regulated, and their observance gives the management the opportunity to organize both the enterprise structure and the QMS as a whole, and to develop and implement a quality assurance system for every workplace. The founder of the system of training specialists in the field of quality was O.P. Gludkin and the staff of employees [1].

Currently, many state standards have been developed and introduced into production in the following areas: statistical quality management methods in general, statistical acceptance control, Shewhart control charts, process management, quality management system, "Lean Production", the Six Sigma system. They allow in any enterprise to create an adequate and reliable quality management system.

At the same time, many Russian enterprises face problems with ensuring the quality and reliability of products. They are caused by the following factors.

The first and most important thing is the distrust of the leadership towards these methods. Despite the fact that the use of statistical methods of quality control and management, a systematic approach to solving relevant problems has shown high efficiency in achieving goals, they are often perceived as something divorced from reality.

The second is the reluctance to invest money and efforts to introduce the methods noted above, despite the fact that international experience has shown: the systematic introduction of QMS can significantly improve production efficiency and competitiveness of products.

The third is the lack of qualified personnel.

From the point of view of the author, it is necessary to begin with staff development. This way is the main one when solving the problem of product quality improvement. The basis for such a statement is the ideas expressed and approved by such scientists as L.E. Basovskiy and V.B. Protas'ev [2] and the founder of the system of defect-free labor B.A. Dubovikov [3, 4, 5]. Currently, the books by B.A. Dubovikov are bibliographic rarities and are not available for most specialists.

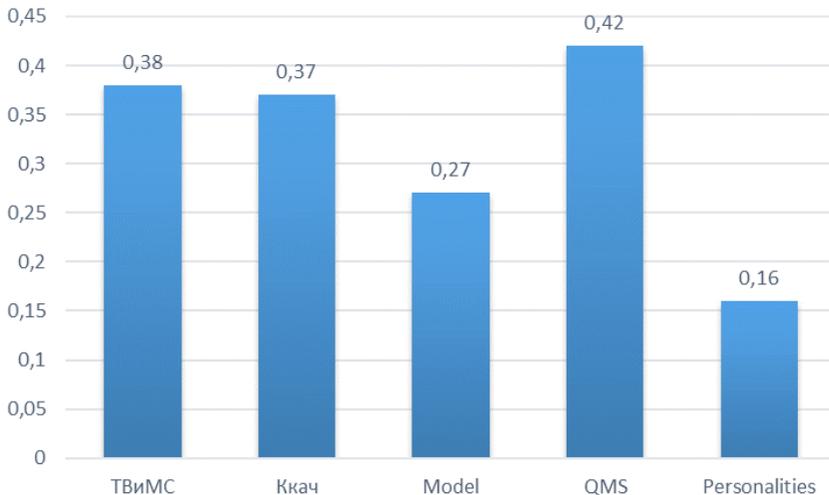
### **Staffing QMS**

As part of the research work performed by the research team of the Tula branch of the REU. G.V. Plekhanov, research has been conducted on staffing of enterprises in various industries. The studies used the requirements of the Federal State Educational Standards of Higher Education in the direction of preparation "March 27, 2002 Quality Management" and professional standards "Product Certification Specialist", "Product Quality Control Specialist", "Product Quality Specialist",

Liu components in the rocket and space industry "and others.

An anonymous questionnaire was developed for research, containing the following groups of questions:

1. Position;
2. Experience in the direction of "Quality Management";
3. Education (higher special. higher technical. economic. etc.):

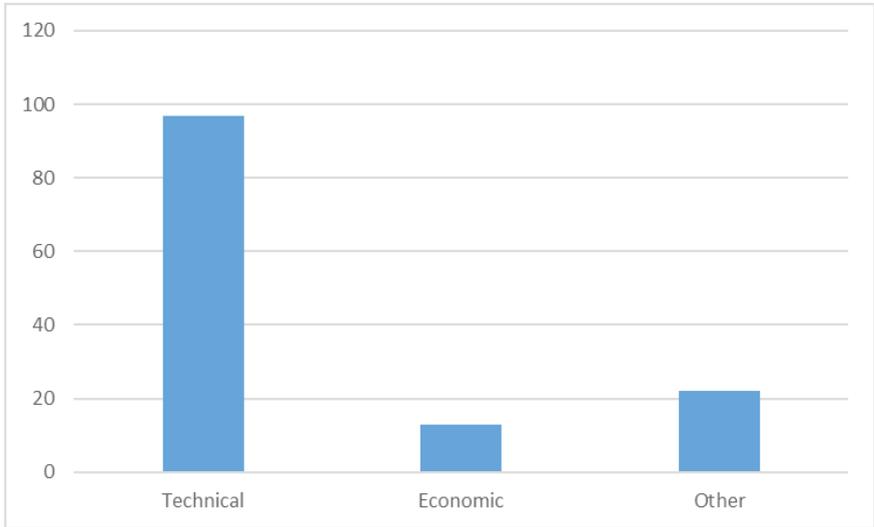


**Figure 1** - Average ratings of respondents by groups of indicators

Consider a diagram of the level of education (Fig. 2).

Of the 132 respondents, only 97 (73.5%) have a technical education. Of these, about 30% have an education that does not correspond to the profile of the enterprise.

The most striking example of inadequacy: Work experience - 0; Work experience in specialty - 0; Education - legal; Position - Head of Enterprise Quality Department (engineering!)



*Figure 2 - Education QMS staff*

The reason for this state of affairs is primarily due to the underestimation of the entire quality management system, ignoring the requirements of professional standards, and the low level of training of university graduates. So one of the respondents holds the position of quality auditor at an enterprise, but does not know a single standard for his professional work.

Back in the middle of the 20th century, the founder of the Saratov system of defect-free labor, B.A. Dubovikov [3, 4, 5] focused on the organization of labor and the system of personnel training. The development of this system can be considered TQM (Total Quality Management), the systems "Kanban", "Six Sigma", "Lean Production" and others. In the US, an analogue of the Saratov system was called the "Zero Defects program".

### **Professional retraining**

The easiest way to solve basic problems is to hire university graduates in the specialty March 27, 2002 - Quality Management. However, there are many obstacles along the way, one of which is as follows.

In the Russian Federation, there are 134 universities producing education in this specialty [8]. The total number of places for training is no more than 5,000, respectively, a diploma in this specialty is received by a significantly smaller number of graduates. Given the need for specialists of this profile, which amounts to

tens of thousands of people, it can be noted that in the near future the problem of a shortage of qualified QMS employees cannot be solved in this way.

In the Concern VKO Almaz-Antey, the management made the following decisions, based in part on the results of research and development [6, 7]:

1. Employees of QMS with basic technical education, corresponding to the profile of the enterprise, and work experience of at least 1 year, must pass professional retraining courses at the base of the training center ANO DPO "REC EKO Almaz - Antey"

2. Employees of the QMS, having education in the specialty of March 27, 2002, must pass an internship at the enterprise in the shops and departments.

3. Employees of QMS who do not have basic technical education should undergo an internship at the enterprise in the workshops and departments and undergo professional retraining courses at the base of the training center ANO DPO "REC VKO Almaz - Antey".

The curriculum for the courses of the additional professional retraining program "Quality Management Specialist" was compiled with the direct participation of the author.

It is designed for 360 study hours, the form of education is by correspondence with two installation training fees, each for 4 days (24 + 24 ac. hours). The result of the training is the final qualifying work, made on the basis of your enterprise.

The program contains 8 main sections:

1. Product quality management. The main provisions. Quality management system of products in an integrated structure.

2. Statistical methods in quality management.

3. Mathematical modeling of technological processes.

4. Methods and means of measurement, testing and control.

5. Qualimetry and quality management.

6. Total Quality Management (TQM).

7. Certification of quality systems.

8. The concept of "6 Sigma" as a tool for quality management: from design to sale.

Doctor of Engineering Sciences, Professor, full member of the Academy of Quality Problems V.B. Protasiev, Ph.D., Associate Professor A.S. Yudin, Ph.D., professor, full member of the Academy of Quality Problems S.V. Yudin participated in the compilation of the program and the lecturing.

In compiling the program and lecturing widely used copyright materials [9, 10, 11].

Currently, over 150 people have passed training, who defended the highest qualification works, which were mainly practical. A number of them were rated

quite high, and their authors were invited to enroll in graduate school at ANO DPO "REC EKO Almaz - Antey" in the specialty 05.02.23 - Standardization and product quality control. They are also included in the formed personnel pool of Concern's quality inspectors.

### **Conclusion**

Based on the above, we can conclude that the main problem in improving the quality and reliability of products, building an effective quality management system is the poor system of training and staffing for QMS of enterprises, as well as insufficient attention of enterprise management to this issue.

A way out of this situation may be a retraining and staff development program, including top management.

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煤炭储量提取永久性条件的定性研究  
**QUALITATIVE STUDY OF PERMANENT CONDITIONS  
OF EXTRACTION OF COAL RESERVES**

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注解。 根据煤层发生条件指标的扩大构成,煤的主要定性特征,加工方法和消耗方向,考虑改进永久性条件的地质和采矿技术证明方法。 考虑到条件证实的主要采矿和地质及采矿指标采用了每种条件选择的数值,因此,其理由的任务具有限定性质。

关键词: 煤矿, 条件, 损失, 采矿和地质特征, 采矿参数, 综合评估, 资格测量

**Annotation.** *The procedure for improving the methodology of the geological and mining technical substantiation of permanent conditions based on the expanded composition of indicators of the conditions of occurrence of coal seams, the main qualitative characteristics of coal, the directions of its processing and consumption is considered. The main mining and geological and mining indicators taken to account for the substantiation of conditions take on numerical values for each of the options of condition, thus, the task of their justification takes on a qualimetric character.*

**Keywords:** *coal mine, condition, loss, mining and geological characteristics, mining parameters, integrated assessment, qualimetry*

### **Introduction**

The main distinctive feature of the mining of coal deposits of the Russian Federation is a wide range of technological conditions of mining and occurrence of coal seams, the main quality indicators of coal and the directions of its use and processing. Even within the same mining allotment, thin and thick layers, flat and steeply inclined, ash and low-ash, seasoned and broken, etc. can lie down.

In these conditions, the technical means and technology of coal mining, and, ultimately, the technology associated with the consumption of coal, a priori, cannot be involved in single-variant and constant setting across all the seams being mined. At the same time, the desire for the most efficient extraction and consumption of coal products requires the unification of the use of mining and consumption technologies. However, the existing scale of variability of conditions inevitably leads to a decrease in the unification of the used mining equipment involved in the extraction and processing of coal. Thus, in this area there are significant costs of material resources, and ultimately the economic damage, which can be reduced by establishing standards for the main qualitative properties and fundamental characteristics of occurrence [1].

Historically, the main tradition in setting conditions has been to consider the prevailing conditions for underground mining and coal consumption to be fundamental factors. On this basis, the standards for the condition of reserves were established only for the minimum removable thickness of the seams.

Coal consumption was mainly represented by energy, metallurgy and coke chemistry. Ash content has a decisive effect on these uses. Thus, the standards for rock content in coal seams were formed by means of conditions for maximum ash content.

Separately environmental justification of conditions was allocated. This aspect requires an assessment of the existing state of the environment components in the area of the object being assessed and an assessment of the scale, as well as taking into account the danger of all the negative factors affecting the environment of the economic activity during the operation of the mining enterprise.

The results of the assessment allow to reflect the qualitative and quantitative level of damage, which at this stage of development of scientific and technical progress in the field of coal production and environmental measures is taken by the environment [2].

At the same time, the adopted parameters of operational conditions must of course be differentiated by the use of the mined field to the individual areas taken into account, differing in their characteristics, occurrence and mining conditions, significantly affecting the level of operating costs, which requires the use of a qualimetric integral approach.

**Rationale for target function**

**Integrated condition assessment**

The presented task of qualimetric integral assessment of TEA conditions can be formalized taking into account the following components [3]. In the original formulation, the mine project is characterized by a set of indicators and criteria of technical and economic quality:

$$\{J\} = \{J_1, J_2, \dots, J_m\} \tag{1}$$

Evaluated  $n$  projects that are evaluated using a set of performance indicators  $A = \{J_1, J_2, \dots, J_m\}$ . Taking into account the general methodological requirements, a matrix of project indicators of size  $m \times n$ , where  $m$  is the number of indicators taken into account and  $n$  is the number of projects evaluated:

$$A = \{J_{ij}\} = \begin{pmatrix} J_{11}, J_{12}, \dots, J_{1j}, \dots, J_{1n} \\ J_{21}, J_{22}, \dots, J_{2j}, \dots, J_{2n} \\ \dots \\ J_{i1}, J_{i2}, \dots, J_{ij}, \dots, J_{in} \\ \dots \\ J_{m1}, J_{m2}, \dots, J_{mj}, \dots, J_{mn} \end{pmatrix}, \tag{2}$$

where  $J_{ij}$  is the value of the indicator  $J_i$  of  $j$ -r project (for example, if  $J_i$  is the profitability of the mine, then  $J_{i1}$  is the profitability value of the first technical project).

To make a final decision on a generalized assessment of the effectiveness of projects, a calculation for each of them of the evaluation functional  $K_{unmi} = f\{J_{ij}\}$  is required, which aggregates a set of particular indicators, according to the quantity of which the ranks of the compared projects are formed:

$$K_{unm1} \leq K_{unm2} \leq \dots \leq K_{unmj} \leq K_{unm n}. \tag{3}$$

In this work, we use the “method of total rms weight deviations” [4]. Mining geological and mining technical indicators of the completed project of one or two approved and implemented projects are used as initial data.

Thus, together with the completed project, the matrix of mining geological and mining technical indicators will include 5 or 4 (without foreign mines) columns. The advantage of this method of integrated quantitative evaluation of mine projects is the ability to include in the series of compared projects any number of objects, regardless of some difference in the geological conditions. The main condition should be a high progressiveness of the parameters of the mine and profitability indicators. For a more complete and objective analysis of the technical and economic indicators of the matrix  $A$  are divided into three complexes: production and technical, economic indicators and mining and geological characteristics of the mine project.



a number of methods can be applied, in particular, the method of expert assessments. Thus, reliable values of utility functions were obtained for all technical and economic indicators  $\varphi_i$ .

Accounting for the unequal degree of national economic importance of indicators when calculating the integral indicator of project quality is most convenient in the form of specific importance coefficients. The specific coefficients of importance are calculated from the utility functions obtained by an expert using the formula:

$$\varphi_{iyy} = \frac{\varphi_i}{\varphi_{cp}} = \frac{\varphi_i m}{\sum_{i=1}^m \varphi_i} \quad (7)$$

This eliminates the dependence of the level of importance coefficients on the scoring range: from 0 to 1; from 0 to 20, etc. The formula for calculating the integral indicators of the quality of projects:

$$K_{iymj} = \sqrt{\sum_{i=1}^m (\delta_{ij} \frac{\varphi_i}{\varphi_{cp}})^2} = \frac{1}{\varphi_{cp}} \sqrt{\sum_{i=1}^m (\delta_{ij} \times \varphi_i)^2}, \quad (8)$$

$$K_{iymj} = \frac{m}{\sum_{i=1}^m \varphi_i} \sqrt{\sum_{i=1}^m (\delta_{ij} \times \varphi_i)^2},$$

where  $\varphi_i$  is the utility function of a specific  $i$ - indicator of project efficiency or importance of the geological characteristics;

$$\varphi_{cp} = \frac{\sum_{i=1}^m \varphi_i}{m} \quad (9)$$

where  $m$  is the average value of the utility function for all indicators (characteristics) of the project efficiency or technological effectiveness of the geological conditions;  $m$  is the number of differentiated indicators of project efficiency or the technological effectiveness of the geological conditions adopted for a comprehensive assessment;

$\frac{\varphi_i}{\varphi_{cp}}$  - the relative weight of the utility function of the  $i$ - indicator compared

with the average utility of one of the  $m$  indicators adopted for a comprehensive assessment.

The formulated and substantiated mathematical methods for calculating integral conditional functionals were translated into the algorithmic language BASIC, and as a result, computer software was formed. At the same time, the integral index is determined separately for each complex of mining, geological and mining indicators  $K_{umj}^{zz}$  and  $K_{umj}^{zm}$ .

### Conclusion

1. Taking into account the methods of the theory of decision making and qualimetry, the theory of utility, a technique has been developed for evaluating condition variants, based on the fact that particular indicators and evaluation criteria are reduced to a comparable form, then taking into account importance and utility, using the symmetric root-mean-square function of variables, are minimized a single functional, which is called integral.

2. A procedure has been developed, which allows judging standardized reliability of reserves and coal mining technology.

3. A procedure has been developed to optimize the mining parameters of coal mining for given geological conditions.

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开发有效性解释并接受东苏尔古特地区Sortymsky套房的一个对象的压力维持系统分析

**DEVELOPMENT EFFECTIVENESS INTERPRETATION AND ACCEPT PRESSURE MAINTENANCE SYSTEM ANALYSIS ON ONE OF THE OBJECTS OF SORTYMSKY SUITE OF THE EAST-SURGUT FIELD**

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抽象。 本文考虑了东苏尔古特油田BC10 / 0矿床的地质构造和主要特征。 还进行了储层压力系统的开发分析和可接受的维护。 拒绝了从预测指标中拒绝实际指标的原因。 提供了许多用于更有效地操作对象BC10 / 0的动作。

关键词: 物体, 开发阶段, 技术, 储层压力维持, 倾斜定向井, 侧干, 水平井。

**Abstract.** *In this article is considered the geological structure and the main characteristics of rocks and fluids BC10/0 deposit from the East Surgut field. The analysis of development and the accepted maintenance of reservoir pressure system are also carried out. Reasons for rejection the actual indicators from predicted ones are specified. A number of actions for more effective operation of object BC10/0 are offered.*

**Keywords:** *an object, development stages, technology, maintenance of reservoir pressure, the inclined directed well, a side trunk, the horizontal well.*

At the present stage of development of the oil and gas extraction, Siberian complex and Northern deposits are the main regions on which lay great hopes in respect of providing Russia with oil and gas. A relevant task, is implementation of innovative technologies in oil production, improving the actual maintenance of reservoir pressure system and accumulation the development of industrial oil and gas reserves in these regions [1, 2].

The East Surgut oil field considered in this work is situated in Western Siberia within the license area of the same name located in the territory of the Surgut region of KHAMAO-Yugra[4].

The considered field is located in a southeast part of the Surgut arch. For a geological structure it is considered as multisheeted and difficult, and in size of recoverable reserves - large deposit [4,5].

The East Surgut field is found in 1977, and is developed since 1985. Within the field terrigenous deposits of sortymsky suite of Lower Cretaceous age (BC10/0, BC21, BC22 layers), the Vasyugan suite of Jurassic age are oil-bearing (YuC1/1 layer) and productive deposits of the Tyumen suite of middle Jurassic age (YuC2/1 layer). In this layers 26 deposits of oil are revealed.

The second in initial geological and recoverable reserves object of this field is BC10/0 object in which six deposits of oil are revealed.

The thickness of BC10/0 layer is put by sandstones with pro-layers of aleuro-lites and soapstones. The general thickness of layer on average in wells is 7.4 m, petrosaturated changing on wells from 0.3 to 11.7 m.

Layer in a productive part is presented by two benches, the average size of sandiness index is 0.56, and is characterized by average values on permeability (0.165 mkm<sup>2</sup>) and porosity – 0.23 [4].

Oil of the considered object can be characterized as easy, slightly viscous, sulphurous, paraffinic, low-resinous and gas concentration is 42 m<sup>3</sup>/t.

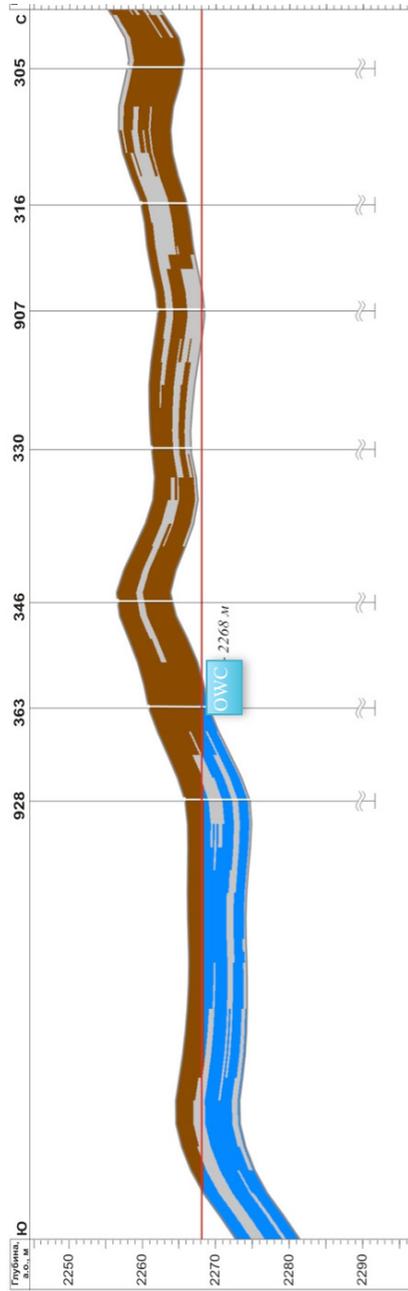
Deposits of the object can be described as layer-arch (1 deposit), layer-arch lithologic bounded (2 deposits), and floating (3 deposits). Reservoir type is porous. In fig.1 we can see the axial section of the main part of the analyzed object.

Development of object BC10/0 began in 1985, so far the object is on 3 stages of development now, the maximum selection of oil was reached in 2006. For a long time (1985-2008) object BS10/0 was the main developing area on the field. During the present period drilling is continued, the technology of horizontal trunks is applied, oil selection from the deposit – 86.1% at water content of 89.1%, the current oil extraction index - 0.348 at approved 0.405.

The approved well stock of on the object is realized for 86%, the operational stock is made by 269 wells including: extracting – 163, from them extracting – 150, and forcing – 117, from them under injecting – 98. So, on the considered object wells of various profile are operated: sloping and directional, horizontal and wells with the lateral hole.

More than 70% of wells on an object are sloping and directional, the accumulated production received for the account of their operation was 80% of the general production. On the object 16 horizontal wells are also drilled and 129 wells with the lateral hole are injected, so the oil production which is accumulated up by them made, respectively - 3% and 17% of the general production [4].

In general it should be noted that development of object BC10/0 is conducted very efficiently and for the last 5 years the actual indexes, on key parameters of development, corresponded and even exceeded approved parameters.

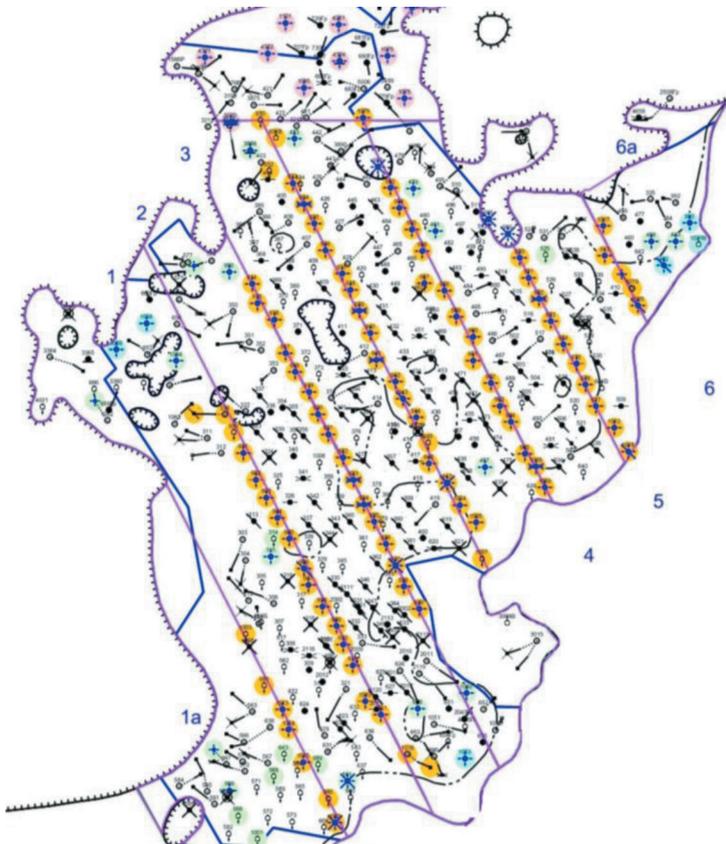


*Fig. 1 –Geological section of BC10/0 layer ,the main deposit East Surgut field*

The deviation was generally caused in the large volume of the held geological and technical actions and specification of a geological structure on a number of deposits.

Initial reservoir pressure on deposits of BC10/0 layer is 22.6 MPas. Water injection on an object began with the second year of development, the system of the maintaining of reservoir pressure (MRP) was introduced at first on the main deposit, later flooding applied on four deposits of the object, one deposit is developed on the natural state [4].

The main deposit consists of 9 blocks, eight of them (1a, 1, 2, 3, 4, 5, 6, 6a) represent the three-row system of influence in combination with focal and peripheral flooding, in a northern part of a deposit block 4a with pattern flooding located – the five-dot system of development is realized [3,4,6]. In fig. 2 is shown the placement of the wells under downloading on the main deposit object BC10/0 .



*Fig. 2 Placement of Wells, under injection on the main deposit of the object BC10/0, East Surgut field*

Since the beginning of formation pressure maintenance, wells of the cutting ranks provided the main part of water injection – 85% of the accumulated injection on the object. Now, in connection with intensive leaving of the extracting well stock and carrying out large volume of actions for development regulation, the role of a line system of flooding decreases and the role of focal flooding increases. In general the power condition of object BC10/0 can be characterized as satisfactory, current reservoir pressure is at the level the close to initial.

Considering the development stocks of the main deposit it should be noticed that initial effective petrosaturated thickness in blocks change from 0.8 to 10.8 m. Average current petrosaturated thickness is from 0.5 to 1.3 m. The coefficient of coverage of petrosaturated thickness development makes from 0.9 to 0.96. Flooding source is generally the break out of the front flood water and also low oil saturation and pulling up of reservoir water in the border zones. Development of reserves of oil happens on all thickness of layer, the advancing flooding of thickness of layer happens generally in its bottom. The maximum residual petrosaturated thickness of BC10/0 layer is concentrated on a deposit near well No. 190P and on the main deposit within the block 4a [4].

To conclude, the system of development realized on an object is effective – development on blocks happens evenly, the system of influence allows to support the current reservoir pressure at the level the close to initial. To achieve the approved oil extraction index will be possible when: additional actions directed to increase in oil recovery from the layer, for example, such as drilling in regional sites of deposits, improving the system of influence: due to consolidation the a grid of wells, including with application of separate layers operation [6-10].

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