



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
International Conference

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Part 1: Participants' reports in English

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**“Scientific research of the SCO countries: synergy
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这些会议文结合了会议的材料 – 研究论文和科学工作者的论文报告。 它考察了职业化人格的技术和社会学问题。一些文章涉及人格职业化研究问题的理论和方法论方法和原则。

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

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Foreword

We thank all participants of our conference "Scientific research of the SCO countries: synergy and integration" for the interest shown, for your speeches and reports. Such a wide range of participants, representing all the countries that are members of the Shanghai Cooperation Organization, speaks about the necessity and importance of this event. The reports of the participants cover a wide range of topical scientific problems and our joint interaction will contribute to the further development of both theoretical and applied modern scientific research by scientists from different countries. The result of the conference was the participation of 61 authors from 6 countries (China, Russia, Finland, Uzbekistan, Kazakhstan, Kyrgyzstan).

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

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

Fan Fukuan,

Chairman of the organizing committee of the conference

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

Full Professor, Doctor of Economic Sciences

前言

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

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

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

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

现代审计模式基于提高石油生产的运营效率和长期管理的概念
**THE MODERN AUDIT MODEL BASED ON THE CONCEPT
OF IMPROVING THE EFFICIENCY OF OPERATIONS AND
LONG-TERM MANAGEMENT IN OIL PRODUCTION**

Afonin Maxim Leonidovich
Candidate of Economic Sciences
KNK Auditing company, LLC

抽象。矿床开采最后阶段的石油生产技术与矿床早期开发条件有很大差异;它需要“复杂生产到最后一滴”的新创新技术。因此,实施考虑到旧油田石油生产细节的企业管理方法的创新方法尤为重要。

在间接规范商业实体之间关系的经济制度中,审计机构采取了重要的地位。

目前,传统的审计形式 - 财务审计主要是为了检查财务资源和会计分配的合法性和正确性,并通过审计积极补充,旨在确定财务和经济活动的效率,有效性和盈利性。公司。此类审计的主要目的是评估当前的管理机制,并为审计公司更有效,更有效和更有效的业务流程制定具体建议。

对投资活动有效性进行审计的发展是由于商业企业管理层希望控制投资成本,更有效地管理在此活动过程中产生的资金流动以及不断增长的需求。获取投资者和贷方之间可靠的财务信息。

考虑到目前俄罗斯石油生产企业活动的具体情况,在业务流程的有效性审计中,内部审计与外部相互作用方面缺乏全面的科学和实践发展。这方面的内部和外部审计可以相互补充。

在这方面,当使用综合和系统的方法来处理当前审计状况的特征时,需要基于改进绩效和长期管理的概念来开发现代审计的逻辑模型。

关键词: 审计;审计业务流程;投资活动;石油生产的长期管理;有效的管理。

Abstract. *The technology of oil production at the final stage of exploitation of deposits differs significantly from the conditions of development of deposits at an early stage; it requires new innovative technologies of "complex production to the last drop." Therefore, the implementation of innovative approaches to enterprise management methods that take into account the specifics of oil production from old fields is especially relevant.*

Among the economic institutions that indirectly regulate the relations between business entities, an important place is taken by the audit institution.

Currently, the traditional form of audit - financial audit, mainly aimed at checking the legality and correctness of the distribution of financial resources and accounting, is actively complemented by an audit aimed at establishing the

efficiency, effectiveness and profitability of the financial and economic activities of companies. The main purpose of such an audit is to evaluate the current management mechanisms and develop specific recommendations for more effective, provident and efficient business processes of the audited companies.

The development of an audit of the effectiveness of investment activity is due to the desire of the management of commercial enterprises to control investment costs, to more effectively manage the financial flows arising in the course of this activity, as well as the ever-increasing need for reliable financial information among investors and lenders.

The lack of comprehensive scientific and practical developments on the aspects of the interaction of internal audit with external during effectiveness audit of business processes, taking into account the current Russian specifics of the activities of oil producing enterprises. Internal and external audits in this regard can complement each other.

In this regard, when using an integrated and systematic approach to the characteristics of the current state of audit, there is a need to develop a logical Model of modern audit based on the concept of improving performance and long-term management.

Keywords: *audit; audit of business processes; investment activity; long-term management in oil production; effective management.*

Russia's budget largely depends on the level of oil production, its use both in the domestic market and on the volume of foreign supplies. Therefore, the effective management of oil companies necessitates the search for the most effective mechanisms for the development of the oil industry.

Oil industrial complexes, working mainly at the final stage of reservoir exploitation, currently make up a significant part of Russia's oil production. The technology of oil production at the final stage of exploitation of deposits differs significantly from the conditions of development of deposits at an early stage; it requires new innovative technologies of "complex production to the last drop." Such "old" fields account for about 80% of all fields in the country, which produce about 20% of all oil. Mining enterprises with existing taxation at the final stage of exploitation of deposits must pay a significant amount of taxes and at the same time maintain their profitability at the industry average level, which in turn will not stimulate them to introduce and apply innovations.

This circumstance leads to the fact that at a certain stage, an enterprise that has "old" deposits on its balance sheet is forced to stop developing their reserves, although a significant amount of fossil raw materials remains in the bowels. Therefore, the implementation of innovative approaches to enterprise management methods that take into account the specifics of oil production from old fields is especially relevant.

Administrative methods in the conditions of market relations are based on the legislative basis for limiting or developing certain types of innovative activity. State bodies create the legal basis for patent policy, standardization policy, etc.

Economic methods, which use economic levers and mechanisms, are fundamentally different from administrative methods of state regulation. Currently, the value of indirect methods of stimulating investment processes has increased in world practice and more attention is paid to creating favorable economic conditions for the development of the state economy. These methods are based on the fact that the state does not directly limit the independence of enterprises in the development of economic decisions. They are effective in the case when they contribute to the formation of social, rather than individual economic conditions.

It should also be noted that among the economic institutions that indirectly regulate the relations between business entities, an important place is taken by the audit institution. The word “audit” is of Latin origin. “Audio” in translation means “listener”.

Currently, the traditional form of audit - financial audit, mainly aimed at checking the legality and correctness of the distribution of financial resources and accounting, is actively complemented by an audit aimed at establishing the efficiency, effectiveness and profitability of the financial and economic activities of companies. The main purpose of such an audit is to evaluate the current management mechanisms and develop specific recommendations for more effective, economical and efficient business processes of the audited companies.

In relation to the activities of all organizations, the effectiveness audit is interpreted by scientists as a systematic, focused and organized process of obtaining and expert-analytical assessment of objective data on the effectiveness, efficiency and productivity of the economic activities of the audited company in order to establish the level of compliance of these data with certain criteria¹.

Bulyga R.P. introduces the concept of auditing the effectiveness of business processes, which, in his opinion, is a systematic process by which a competent independent person accumulates and evaluates evidence of information characterizing the business operations of an economic entity in order to determine and express in its conclusion the degree of effectiveness of implementation and coordination of business processes in terms of their impact on the creation of intrinsic value of a business².

Typical areas of research on performance audit are: the achievement of goals (program goals or activities of the governing body); regulatory compliance; cost-effective use of resources; reliability of performance data.

¹Bulyga, R.P. Business audit. Practice and problems of development [Text]: monograph / R.P. Bulyga, M.V. Miller; Ed of R.P. Bulygi. - Moscow: UNITY-DANA, 2013. p. 192

²Miroshnichenko, T.A. Audit: textbook for masters: p. Persianovsky: Donskoy GAU, 2016. P. 90

The objectives of an performance-oriented audit may include an assessment of: the level of productivity achieved by the auditee, program or activity against reasonable standards; the adequacy and reliability of systems or procedures designed to measure and report on productivity; the organization’s efforts to research and implement opportunities to increase productivity; do management processes, information and other operational systems help the organization of production methods to achieve high productivity.

The main purpose of an performance audit is to ensure that the objectives of an activity or program are achieved in the most effective, economical and productive way. Most often, a performance audit examines the issue of how the organization or program being audited used the available resources to achieve management objectives.³

In the economic literature, the following objectives of the audit of effectiveness and their essence are distinguished.

Table 1. The main goals of the performance audit and their essence

Goal	Essence
Evaluation and cost effectiveness security	The assessment is carried out using a system of indicators in relation to all types of resources available in the organization (physical, financial, human, informational, etc.). On its basis, measures are being developed to reduce costs for acquired and used resources, taking into account the required quality. The estimated operation is recognized as economical if the acquisition of resources, production, performance of work, and the provision of services are carried out in an appropriate amount at the minimum cost.
Evaluation and Productivity security	Evaluation of productivity is based on the determination of whether the activity ensures the receipt of the maximum of useful products from the available resources, work performed, services rendered.
Evaluation and performance security	An assessment of whether the activity provides the highest possible achievement of the desired result.

Achieving cost-effectiveness, productivity and efficiency of the activities or the implementation of the program depends on the existence of appropriate measures regarding the planning, evaluation, resolution and control of the use of resources. The task of the governing bodies, the leadership of organizations to establish these measures and ensure that they work properly. Typically, the implementation of these measures is assigned to the internal control (audit) service, the purpose of which is to help management monitor the implementation of the measures taken, establish such internal systems and procedures that could guarantee that the established measures are clearly observed and provide sufficient grounds for achieving

³Miroshnichenko, T.A. Audit: textbook for masters: p. Persianovsky: Donskoy GAU, 2016. P. 90

the specified price and quality ratio. The auditor, in turn, should independently of the governing bodies or the management of organizations verify that such measures are developed, implemented and ensure efficient operation.

The accumulated international experience indicates that the widespread use of the effectiveness audit methodology can significantly improve the quality of organizations' performance.

The concept of audit of performance (managerial, operational) is not fixed in the system of normative regulation of audit activity, since audit in the legal sense is focused on checking accounting and accounting (financial) statements. Performance audit can be considered:

- as one of the types of audit-related services of an external auditor;
- as one of the activities of the internal auditor in accordance with international standards of internal audit and the Regulation on the internal audit of a specific economic entity (providing guarantees or consulting services).

The audit of effectiveness is primarily focused on the needs of management, therefore the criterion for the quality of management information is the need, sufficiency and relevance of such information for making and monitoring the implementation of management decisions.

International Auditing Standards (ISAs) allow auditors to carry out any work in the field of economic services that is not expressly prohibited by any regulatory act. Audit of management effectiveness of the audited organization can be both internal and external. An audit of the area of enterprise management efficiency is possible on behalf of and in the interests of the owners of the enterprise.

The incentives for conducting an audit of efficiency include: the need for reforms related to cost reduction; the need to confirm their own assumptions about the reasons for the inefficiency of the enterprise; obtaining an assessment of the current effectiveness of business processes; search for sources of losses in management efficiency; preparation of measures to increase labor productivity; selection of priority measures to eliminate losses in efficiency.

Employing an auditor allows the manager to look at the processes objectively and to revise his position regarding the priority of steps to reorganize activities.

In this regard, an audit can be considered as a systematic process to identify the best processes and practices in the industry that can be applied at an enterprise to increase operational efficiency, namely, to reduce production costs, reduce duration of production cycles, and reduce inventory.

Of particular relevance at the present time is the audit of the effectiveness of investment activity as an independent type of audit or one of the stages of the audit of investment activity, since the main role in the development and successful functioning of any commercial organization belongs to efficient investment activity that can generate significant economic benefits in the future. As a rule, significant

own and (or) borrowed funds are used for its implementation. The effectiveness and efficiency of investment activities is largely ensured by competent management in the field of investments in the activities of mining enterprises and oil industrial complexes, working mainly at the final stage of exploitation of deposits. Mining technology here requires new capital-intensive innovative technologies.

The objectives of the audit of the effectiveness of investment activities are: the establishment of the main objects of investment activity and types of investments; assessment of the effectiveness of internal control over investment activities; development of criteria for assessing the effectiveness of investment activity for each type of investment; validation of data on investment activities reflected in the accounting and reporting system; determination of the feasibility and effectiveness of investments in fixed assets and R&D; analysis of the effectiveness of long-term and short-term financial investments of the organization; identification of reserves to improve investment efficiency depending on the investment object; development of recommendations for improving the efficiency of investment management.

At the initial stage of the audit of the effectiveness of investment activities, the auditor should familiarize himself with the activities of the client organization, obtain information about its organizational structure, internal and external factors affecting the client's activities. It is necessary to establish the main areas of investment activity of the organization. At this stage, the preparation and determination of evaluation criteria for the effectiveness of the investment activity of the enterprise is also carried out. The development of criteria for each type of investment can be based on generally accepted methods for assessing real and portfolio investments. Today, there are many methods for analyzing the effectiveness of an investment project. In practice, to assess the effectiveness of investment projects, the following methods are used: methods based on discounting; accounting valuation techniques.

The presence of effective internal control over investment activities in the organization creates real prerequisites for its successful development, since transparency is increased in terms of the implementation of investment costs and results, which means that additional opportunities appear on favorable terms to attract new funds for future investments.

The development of an audit of the effectiveness of investment activities is due to the desire of the management of commercial enterprises to control investment costs, to more effectively manage the financial flows arising in the course of this activity, as well as the constantly increasing need for reliable financial information among investors and lenders.

Currently, the scientific literature considers conducting an audit of effectiveness in its individual areas: either during an external audit, or in case of perfor-

mance of its functions by an internal audit. At the same time, there are no scientific studies in the field of interaction between external and internal auditors when conducting an efficiency audit, including an audit of investment activity efficiency.

The development of an audit methodology creates the basis for methodological developments that contribute to the improvement of incentives for enterprises, including the oil industry, and the development of conceptual provisions complements existing approaches in the direction of the scientific justification for improving the effectiveness of audit activities, and creates additional opportunities for improving the quality of audits that affect the rationale for managerial decisions regarding the reallocation of resources, diversification of activities, restructuring of companies, etc. In addition, the results of applying system analysis methods can be the basis for the development of qualitatively new approaches to the development of audit activities.

In this regard, when using an integrated and systematic approach to the characteristics of the current state of audit, there is a need to develop a logical model of modern audit based on the concept of improving performance and long-term management (Fig. 1).

When developing this model, it is necessary to introduce the concept of “Audit of efficiency for the implementation of stimulating the activities of the audited entity” - as a factor in the welfare of the state. We believe that the most adequate explanation of the concept “Audit of efficiency for the implementation of stimulating the activities of the audited entity” is “the process of interaction between internal and external auditors in conducting an audit of the effectiveness of business processes in order to provide a stimulating effect on the audited entity, taking into account the specifics of its activities. This is a process of consistent complementarity of various types of audits in the implementation of interaction with both management bodies and the external environment of the audited entity.

The initial element of the model is business processes that arise during the activities of the audited entity.

1-st level of interaction of model elements. The implementation of these business processes is primarily influenced by:

- external environment - administrative, financial and monetary, tax, supervisory and other areas. At the same time, interaction with the external environment is carried out within the framework of the current adopted legislative and regulatory framework.

- internal environment - all aspects of the organization’s activities, consisting in the interaction between different departments, directions, investment projects, sales, marketing and other areas);

2-nd level of interaction of model elements. The next level of influence on business processes is interaction with the management of the audited entity, as part of the implementation of organizational, administrative, management tasks

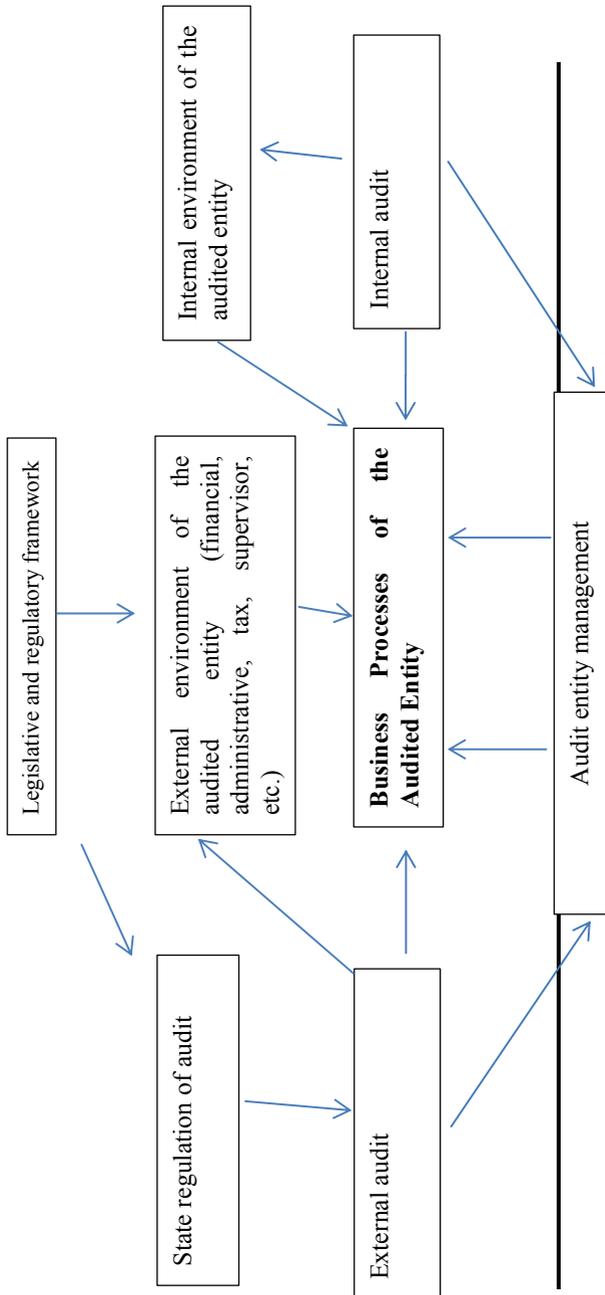


Fig. 1. The model of modern audit, based on the concept of improving performance and long-term management

3-rd level of interaction of model elements. The decisions made by management are directly affected by:

- the results of the internal audit, carried out as part of the tasks for the provision of guarantees and consultations.
- the result of an independent external audit as part of the total audit, and in the scope of other services related to the audit activity.

4-th level of interaction of model elements. In turn, the results of external and internal audit influence:

- both the the external environment - trust of investors, counterparties to the results of financial and economic activities reflected in the accounting (financial) statements;
- and the internal environment - audit control over the use of resources, professional competence of employees, areas of investment, pricing, sales policy, etc.

Therefore, in general terms, the formation of the elements of the modern audit model, based on the concept of increasing the efficiency of activities and long-term management, is based on their interaction and mutual influence on each other.

At the same time, the results of external and internal audit have an impact on ongoing business processes:

- both a direct influence through conclusions and recommendations based on the results of inspections and consultations;
- and indirect influence through changing the parameters of the external and internal environment, as well as the adjustment of decisions made by management.

This influence is reduced to the economic value of this concept, which is revealed through a complex effect on all elements of this model.

In turn, this approach to identifying the impact of performance auditing on model elements was carried out with the aim of highlighting the main prerequisites and further substantiating the concept of increasing the efficiency of oil production companies and long-term development when interacting with audit components.

财产理解的哲学和经济方法
**PHILOSOPHICAL AND ECONOMIC APPROACHES
TO PROPERTY UNDERSTANDING**

Khodzha Kava

*Postgraduate at the Department of economic theory
Plekhanov Russian University of Economics*

抽象。所有权概念一直是科学界分析许多世纪的主题。在此期间，积累了一定数量的关于财产，其功能和任务在人们社会经济生活中的作用的知识 and 想法。尽管如此，仍然没有单一的方法来理解它。各种研究人员以不同的方式解释这个概念：对于一些人来说，财产是一种挪用，而对另一些人来说则是异化。一些科学学校将财产权理解为整体和不可分割的东西，并认为有必要将所有财产权集中在一个所有者手中，考虑将几个人的权力分散为封建残余的案例。其他人 - 分享盎格鲁 - 撒克逊的法律传统，允许将对象的所有权分割为几个人权威的可能性。本研究的目的是在分析科学家的经济 and 哲学观点的基础上，确定所有制机构的演化阶段和主要起源因素。

关键词：所有权，财产，所有权，挪用，异化，国家，合同。

Abstract. *The concept of ownership has been the subject of analysis by the scientific community for many centuries. During this time, a certain amount of knowledge and ideas about the role of property, its functions and tasks in the socio-economic life of people was accumulated. Despite this, there is still no single approach to understanding it. Various researchers interpret this concept in different ways: for some, property is an appropriation, for others it is alienation. Some scientific schools understand property rights as something whole and indivisible and consider it necessary to concentrate all property rights to an object in the hands of one owner, considering cases of dispersal of powers among several persons as feudal remnants. Others - share the Anglo-Saxon legal tradition, allowing the possibility of fragmentation of ownership of an object to the authority of several persons. The purpose of this study is to identify the evolutionary stages and the main origin factors of the ownership institution based on an analysis of the economic and philosophical views of scientists.*

Keywords: *ownership, property, ownership, appropriation, alienation, state, contract.*

Property is one of the most complex theoretical concepts. In the ordinary sense, the term "property" is understood as "object of ownership", i.e. assigned elements of production conditions and people's performance. This leads to the need to highlight another concept - "property rights", i.e. systems of legal rules governing relations on the ownership, use and disposal of property ”.

The first rules that determined property rights arose in a primitive society. These rules determined the boundaries of the territories on which primitive tribes hunted animals and gathered edible plants and berries. Within the borders of the territories, the tribe could freely engage in gathering and hunting, while outside the territories there could be a conflict with another tribe over who owns the benefits found. Thus, the “territory rule” was one of the first economic rules to promote the emergence of such a thing as property rights.

One of the founders of institutionalism, Thorstein Veblen, held an interesting point of view regarding the emergence of the institution of property. T. Veblen understood the Institute of Property as a stereotype of thinking that regulates the joint activities of people on the basis of ideas about the fair and due that arose in the previous era. In his opinion, the reason for the emergence of the institution of ownership was originally the instinct of envious comparison, and not at all deficiency of resources, as most scientists believe.

According to Veblen, the very first objects of ownership were prisoners, primarily women. They could carry out routine work that was inappropriate for a warrior, and also showed "reliable" evidence of the success and valor of a warrior. Thus, such an institution as property arises during the transition of society to the predatory phase.

“The product of rivalry in conditions of predation in this way was, on the one hand, the emergence of a form of marriage based on coercion, and, on the other hand, the custom of owning property. These two institutions are indistinguishable at the initial stage of their development, they both arise from the desire of successful men to present something reliable as evidence of their valor The concept of property extends from women and captives as objects of ownership to the products of their labor; thus, ownership arises of both people and things ...

As predatory activity is supplanted by productive activities in the daily life of the community, as well as in the way people think, trophies of predatory raids as a generally accepted indicator of success and superiority in power are gradually, but increasingly replaced by accumulated property ... As soon as possession of property becomes the basis for respect towards people, it thereby also becomes necessary for that self-satisfaction, which we call self-respect”[1].

The English scientist John Locke took a different view of the origin of the institution of property. He believed that property comes from God. So he argued in the book - "The Second Treatise on Government", published in 1690. Locke

argued that in the pre-state period there was a time when people lived, as he called it, in a natural state. According to Locke, God granted all people three independent rights - the right to personal inviolability, the right to individual property, and the right to punish those who violate the first two rights.

The first right, according to Locke, is the right of personal inviolability, or as Locke understood it, the right to own one's body. This meant that no one could be sold into slavery and no one could own another person. T. Jefferson - a supporter and follower of Locke's views - considered this right to be inalienable, that is, even if a person wanted to sell the right to personal integrity, he would not have been able to. The right to personal inviolability is accompanied by the right to own thoughts and speech - as a product of the brain which is a part of the body. That is, since we possess the body, then the part of the body — the brain — means that we also possess everything that the brain generates — that is, words and thoughts.

The second right that God, according to Locke, granted each person in a natural state - the right to individual property, and it appears in a person as a result of a certain process. At first, according to Locke, there was an abundance of resources available to everyone that did not belong to anyone. But how to turn them into property then? Locke's answer is this: individual property arises when a person applies his labor to a natural resource in order to create something useful. God created the tree, and man, as a result of the application of labor to nature, created an orchard. Such a combination of labor and natural resources creates a product that can become a commodity for consumption and sale.

Third law, in modern terms, means the authorized right to violence. Without a third law, the first two make little sense. Therefore, Locke says, God gave people a third right - the right to punish those who violate the first two rights. Locke emphasizes that it is rather difficult for people to defend their rights. Locke proposed to implement the protection of the rights of all citizens through a system of social contract. The essence of his idea was to select representatives from society and give them the right to punish violators - i.e. essentially create a state.

According to Locke, citizens do not transfer all their rights to the state. The first two rights - to personal inviolability and property - are reserved by citizens, because these rights do not come from the state, but from God. They are granted to people from above, and people can oppose them even to the state. Locke's theory that God gave people natural rights, and people based on them entered into a social contract that gave rise to the state, creates the basis for further study of the role of the state in the formation of property relations.

Thus, the main conclusions of Locke's theory are as follows:

1) Property appears before the state, since it comes from God, and not from the state. And people retain their rights even in the face of the state. The state cannot take away these rights without the consent of the citizens themselves. The state

has no independent interest or goal other than protecting personal freedom and property of citizens. If the state violates the social contract, then citizens can take the third right back from the state and establish another state that is trusted more than the previous one.

2) According to the "law of reason" "it is permitted that things belong to the one who spent their labor on them, although before that everyone had the right to own them" [4]. As a result of this, through labor, a person "seems to fence off" his property, first of all, a land plot, "from the common property" [4]. However, over time, due to the tightness and lack of land, people began to establish borders, fenced off and "thus property was established through treaties and agreements" [4].

Locke's view, according to which the right of ownership is fully full and without the participation of the will of others, was decisively different from the view of another great thinker - I. Kant.

In contrast to the teachings of J. Locke, Kant considers property as a social phenomenon, the emergence of which is impossible without civil society. In his work, "Metaphysics of Morals," Kant remarks: "You can only have something external as yours in a legal state, if there is an authority to establish public laws, i.e. in a civil state. When I (in word or deed) declare: I want something external to be mine, then I declare each other to refrain from using the subject of my arbitrariness; no one would have had such an obligation without my legal act." According to Kant, "only a will that obliges each other, therefore, a collectively universal (joint) and possessing will, can give everyone a guarantee. The state, when a universal external (i.e. public) legislation is in place, accompanied by power, is a civil status. Therefore, only in a civil state can there be external mine and yours" [3].

Thus, Kant rejects the idea of the "natural" nature of property, being the first to identify the need for an institution of civil society and the state as a source of property rights.

Another German philosopher, who paid close attention to the essence of this category, rejects the understanding of property as natural law - V.F. Hegel.

According to Hegel, "the starting point of law is a will that is free; so that freedom constitutes its substance and definition, and the system of law is the realm of realized freedom" [2]. Free will as a "starting point of law" manifests itself in the outside world through property. "In order not to remain abstract, free will must first give itself a being, and the first sensory material of this being is the essence of things, in other words, external objects. This first kind of freedom is the one that we recognize as property" [2].

As we see, in Hegel, property arises first because it is connected with external objects, the external, inanimate world, and in this sense property is "putting the will into the thing" [2], i.e. the person gives himself the "external sphere of his freedom."

The basis of the institution of property, according to Hegel, is alienation: “I can alienate my property, since it is mine only insofar as I put my will into it, so I generally remove my thing from me as an ownerless or transfer it into possession the will of another, but I can do this only insofar as the thing is by its nature something external” [2].

According to Hegel, alienation is the true mastery of a thing. Meanwhile, the philosopher emphasizes the impossibility of alienating certain goods: “Therefore, those goods or, rather, those substantial definitions — and the right to them are not destroyed by prescription — that make up my own personality and the universal essence of my self-consciousness, as well as my personality in general, mine universal free will, morality, religion” [2].

In contrast to the concept of ownership presented in Hegel’s writings, German philosophers Friedrich Nietzsche and Max Stirner insist on understanding ownership from the perspective of appropriation.

F. Nietzsche, explaining the appearance of property as the “oldest and healthiest of all instincts,” says that, in essence, property has nothing to do with justice: “The whole past of the old culture is built on violence, slavery, deception, delusion; but we ourselves, the heirs of all these conditions, or even clots of this whole past, cannot cancel ourselves and should not try to separate out a single part from us” [5]. People strive for appropriation, this is inherent in a person from birth: “You need to strive to have more than you have if you want to become something big” [6]. This argument is given by the philosopher to explain the unviability of socialism - the rejection of private property is contrary to the human instinct of appropriation.

Max Stirner in his work “The Only and His Property” emphasizes the paramount role of appropriation in understanding property: “... property is a designation of unlimited dominance over anything (a thing, beast, person) that I can dispose of and order at my discretion ... What is in my power is my property. While I affirm myself as the owner, I am the owner of the thing, but if it leaves me ... then the property disappears” [7]. Paying close attention to the subject of ownership, Stirner concludes that “property depends on the owner” [7]. At the same time, Stirner, like Kant, insists on the need for the institution of law in the recognition of property rights. According to the philosopher, property becomes such only after the “consent and accordance of the law.”

Despite the fragmentation and the presence of obvious contradictions in the writings of the thinkers considered above, it should be noted that these approaches, which emphasize the different essential characteristics of property, made it possible to emphasize once again the versatility and inconsistency of this complex philosophical and economic category, reflecting the effect of one of the most important dialectical laws - “unity and struggle of opposites.” On the one hand, the

right of ownership is granted to a person from birth, is one of the basic instincts and depends on his will, on the other hand, its existence is impossible without civil society and the state. On the one hand, the essence of ownership is the appropriation of a certain object, and on the other, it is inextricably linked to its alienation. On the one hand, the distribution of property rights between entities is designed to solve social problems, but at the same time it has nothing to do with justice.

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关于在俄罗斯联邦支付赡养费的协定
**AGREEMENT ON THE PAYMENT OF ALIMONY
IN THE RUSSIAN FEDERATION**

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抽象。在俄罗斯法律中引入赡养费支付协议标志着过渡到减少传统上早先在俄罗斯家庭法中占主导地位的强制性监管方法的影响。社会需求决定了寻求简化方法来巩固赡养费义务。本文探讨了俄罗斯未成年人赡养费协议的基本条件的一些问题。

关键词：赡养费协议，赡养费，赡养费金额，未成年人抚养费。

Abstract. *The introduction of an alimony payment agreement in Russian law marked the transition to lessening the influence of mandatory regulatory methods that had traditionally dominated earlier in Russian family law. It was determined by the needs of society in the search for simplified ways to consolidate alimony obligations. The article examines some issues of the essential conditions of an agreement on alimony for minors in Russia.*

Keywords: *Alimony agreement, alimony, alimony amount, maintenance of minors.*

Ensuring the well-being of children during divorce is an urgent problem not only for Russia, but also for many foreign countries. The possibility of concluding an agreement on the maintenance of children during divorce is an effective tool to reduce psychological tension between parents in the event of a divorce and the ability to quickly and effectively ensure the interests of the child during the breakup of the family. Despite the popularity of this tool in many foreign countries, in Russia this agreement is not as popular. This is explained not only by the low legal literacy of Russians, but also by the insufficiently clear regulation of this institution in the family law of the Russian Federation.

The agreement on the payment of alimony for minor children, as a legal institution that defines the responsibilities for the maintenance of children, appeared in Russia in the post-Soviet era, in 1994, with amendments to the earlier existing

RSFSR Code of Laws on Marriage and the Family of 1969. [11] [3] In the nineties in Russia there was a catastrophic situation with multiple appeals to the court with claims for the recovery of alimony for children, which entailed a long time for consideration of cases. [1; 188] In a review of the judicial practice of the Moscow City Court, “The Practice of Inter-Municipal People’s Courts of the City of Moscow in Civil Cases on Disputes Arising from Family Legal Relations”, it was stated that the majority of family cases in court proceedings are cases of collecting alimony for children. [5] Therefore, the application in Russia of a new way to ensure the well-being of children through contractual regulation was undoubtedly primarily aimed at reducing the pressure on the courts. The content of the agreement on the payment of alimony for children was the voluntary establishment by parents of the conditions for the payment of alimony to children. (Articles 80, 99 of the Family Code of the Russian Federation). [10] Independence of the decision, in itself, was to stimulate the effective implementation of alimony obligations by payers. To increase the effectiveness of this legal institution, the recognition of the agreement on the payment of alimony by an executive document was legislatively enshrined, which allowed in case of violation by the payer of the obligation to transfer funds immediately, without a court decision, to appeal to the bailiffs for the forced collection of funds. (Clause 2, Article 100 of the FC of the Russian Federation) [10] Meanwhile, the approach to an alimony agreement as a civil law transaction that regulates only cash payments contradicts the basic principles and fundamentals of family law. The obligations of parents are much broader than the obligation to pay money in the manner prescribed by law. [2; 862] The Family Code indicates that parents should equally provide for the care, maintenance, development and upbringing of a child. (Article 61 of the Family Code of the Russian Federation) [10] The well-being of the child is not limited to only material support from the father (mother). Article 27 of the UN Convention on the Rights of the Child, article 54 of the Family Code of the Russian Federation emphasizes the right of the child not only to material well-being, but also his right to satisfy the spiritual and social development needs. [6] Thus, to reduce alimony obligations only to the payment of funds means to legally limit the ability of citizens to voluntarily agree on their participation in the life of their child after the family breaks up. In addition, the determination of the amount of cash payments without taking into account the degree of participation in the child’s life is not an equitable distribution of the contribution of parents to ensuring the well-being of minor children. A number of Russian legal scholars believe that expanding the content of the alimony agreement by including non-material obligations in it will impede its feasibility. [13; 34] These concerns appear unreasonable. The obligation to fulfill the terms of the contract should be provided to a large extent by the possibility of applying punishment for non-compliance with the established agreements. Thus, the inclusion in

the alimony agreement of not material obligations, supported by the establishment of monetary fines, as a measure of responsibility, will make it possible to enforce the agreement not as part of the obligation itself, but under the threat of monetary fines for their non-fulfillment. That will be a powerful argument in favor of fully fulfilling parental obligations. This approach will solve the problem of one parent preventing communication between the child and the other parent. There are frequent cases when the mother (father), with whom the child's place of residence is determined, receives alimony in full, but under far-fetched pretexts, does not allow the child to meet and communicate with the alimony payer. Current Russian legislation does not establish any effective mechanisms for resolving this situation. Numerous lawsuits demanding to ensure legal communication with the child only load the courts, destroy the psyche of children, create a negative atmosphere, but do not really solve the problem. A comprehensive approach, in which the obligation to pay alimony corresponds to the obligation to communicate with the child, will allow balancing the interests of parents in the field of upbringing and maintenance of the child, will provide a systematic approach to preserving the mental health of the child, ensuring his harmonious upbringing in a traumatic situation of family breakdown.

The issue of determining the amount of alimony established in the agreement causes in practice the most problems. Article 81 of the RF FC, as a general rule, establishes a percentage method for determining the amount of alimony. [10] For one child, one-fourth of the parent's income should be transferred every month, for two children - one third, for three or more children - half. The courts adhere to this rule, considering claims for the recovery of alimony in the absence of an agreement on the alimony of minors. But what criteria should notaries be guided by when approving an agreement on the payment of alimony? Can the amount of alimony paid in an agreement be more or less than the statutory amount? The absence of specific legislative criteria and, as a result, conflicting judicial practice entails legal instability and forces citizens, in order to avoid the risks of invalidating the agreement, to apply for a judicial act. At first glance, an analysis of the norms of the family code governing alimony obligations allows us to conclude that it is impossible to establish the amount of alimony in the agreement less than the amount established by law. So, for example, Art. 102 of the FC of the Russian Federation indicates the invalidity of the agreement if it significantly violates the interests of the child. [10] The current legislation does not disclose what is meant by a significant violation of the interests of the minor recipient of alimony. The Saratov Regional Court has indicated that, according to Art. 102 of the FC of the Russian Federation, an example of a substantial violation of the interests of the recipient of the alimony is the establishment of the amount of alimony for a minor child in the agreement on the payment of alimony lower than the amount of

alimony that he could have received in court, the value of the property transferred to the child for use, and the obligation to pay for school fees and the institute does not matter (paragraph 2 of article 103 of the FC of the Russian Federation). [7] The Murmansk Regional Court confirmed the lawfulness of the decision of the Kovdorsky District Court, which recognized the agreement on the payment of alimony as invalid, since the amount of alimony stipulated by the agreement was lower than the amount of alimony that the plaintiff could receive when collecting the alimony in court. This circumstance is sufficient to invalidate the entire agreement. [8] Of course, this circumstance, by virtue of a direct indication of the law (Article 102, Clause 2 of Article 103 of the FC of the RF), is the basis for invalidating the agreement. But does the establishment of a reduced alimony rate when the alimony payer incurs additional obligations to compensate for the costs of health care, education, accommodation, vacation, care, etc. violate the child's interests? Ultimately, funds paid for specific purposes may be significantly higher than those established by law. It seems that in this case the courts should not use a formal approach. The main goal of legal regulation of family relations is to ensure the well-being of the child, and therefore, a smaller amount of child support than the statutory amount specified in the agreement cannot be an unconditional basis for declaring the agreement on the payment of child support invalid.

Given the civil law nature of the agreement on the payment of alimony, the parties have the right to independently establish conditions for the maintenance of children. Therefore, the acceptance by the payer of increased maintenance obligations is permissible. The Russian courts proceed from the admissibility of fixing in the agreement the amount of alimony, even exceeding the earnings of the parent. So, the Supreme Court of the Russian Federation, considering a case on contesting an agreement on the payment of alimony, which sets the amount of alimony for three children 90% of the income of the father, refused to satisfy the claim. [9] The court indicated that the payment of alimony aims to maintain and ensure the child's previous (habitual) standard of living. Before the divorce, the income of the father was significant. At the time of the conclusion of the disputed agreement, the income of the defendant significantly decreased. This circumstance is a weighty argument for the recognition of the fair amount specified in the agreement. The amount of established alimony is comparable with the amount of funds necessary to maintain a decent standard of living for three children, to satisfy their reasonable needs for material support. The Russian Federation is a social state (part 1 of article 7 of the Constitution of the Russian Federation), motherhood and childhood are protected by the state (part 1 of article 38 of the Constitution of the Russian Federation), the interests of children are of priority importance. [9] However, when determining in the agreement an increased amount of alimony, it is necessary to take into account the legislation of the Russian Federation on

enforcement proceedings. According to Article 99 of the Federal Law "On Enforcement Proceedings", collecting more than 70% of income at a time is not allowed for debiting funds for the maintenance of children. [12] This norm cannot be changed by civil law agreement, as it is established taking into account the solution of social problems and is necessary to maintain the necessary decent standard of living of the child support payer.

Thus, it can be concluded that the absence of a legislative restriction for alimony agreements, the minimum and maximum amount of alimony corresponds to the special legal nature of this agreement. However, when determining the amounts payable for the maintenance of minor children, it is necessary to take into account certain needs for medical care, education, nutrition, development, and relaxation. To minimize the subjective discretion and ensure the real needs of children, it is necessary to establish federal standards that would allow parties of the agreement on the payment of alimony to initially accept alimony obligations that meet the goals and objectives of family law.

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专业导向项目在编制单身汉建设者方面的相关性
**RELEVANCE OF PROFESSIONALLY-ORIENTED PROJECT TASKS
IN THE PREPARATION OF BACHELORS-BUILDERS**

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注解。 本文致力于解决当前高等教育机构“建筑”专业学士学位工程能力形成问题。 这项工作本质上是跨学科的,这一想法得到证实,这套开发的专业设计任务包括在土木工程师的专业活动中出现的情境任务。 文章以“材料阻力”学科为例,揭示了工程教育系统中学士学位工程能力的形成过程。 此区域还辅以对结构组件的审查,这些组件定义了“建筑”专业学士学位工程能力水平的标准和指标。

关键词: 工程能力, 构件, 工程, 复杂, 设计, 集成, 原理, 任务。

Annotation. *The article is devoted to the current problem of the formation of engineering competence of bachelors in «Construction» specialty in the educational institution of higher education. The work is interdisciplinary in nature, the idea is substantiated that the developed set of professionally-oriented design tasks includes situational tasks that arise in the professional activities of a civil engineer. The article reveals the process of formation of engineering competence of bachelors in the system of engineering education on the example of the discipline "Material resistance". This area is also complemented by a review of structural components that define criteria and indicators for the levels of engineering competence of bachelors in "Construction" specialty.*

Keywords: *engineering competence, component, engineering, complex, design, integration, principle, task.*

Higher education in the twenty-first century is characterized by a new phase in the development of engineering competence. As a result, the prestige of the engineering profession is growing significantly, the career of an engineer becomes promising in terms of status and material wealth, and this gives the right to a specialist to adequately bear the title of engineer, to be a professional who is really involved in engineering, to creatively apply the knowledge gained in the educa-

tional institution of higher education , find non-standard, non-standard methods of solving problems in professional activities, realize your ideas, be a competent organizer of production odstva aimed at international competitiveness, and have developed a team spirit in engineering.

Today, the state has a clear vision of the priorities for the development of engineering education. In order for future graduates to take place as individuals, in professional activity, achieve success, realize themselves in the interests of the country, new qualitative steps must be taken in the development of modern technical education [3].

In our study, we examine the engineering competence of bachelors in «Construction» specialty and see that competition in the construction industry in the labor market dictates the following requirements for future civil engineers: to have the full scope of the generated competencies, a high degree of professional mobility, and be able to effectively respond to questions of dynamically changing practice, owning the ability to solve the whole range of production problems. Strategic challenges in the construction industry are related to digital technology. We include design and preparation of production with the help of modern computer programs, since specialists in the construction industry have systemic, engineering and creative thinking, become competent in programming and robot control.

Successful results in the future professional activities of a future civil engineer are achieved by a promising (high) level of engineering competence. In addition, today, in the world of dynamically changing production requirements and technologies, it is impossible to maintain the high quality of competitive engineering competence without obtaining a high-quality higher education, which in the future contributes to competitiveness in the labor market. Educational organizations of higher education predict the regional need for the required personnel and correspond to changes in the areas of training. Therefore, educational institutions of higher education are given the following tasks:

- effective inclusion of bachelor-builders in professional activities, i.e. construction engineering;
- the desire to increase the activity and initiative of future graduates [5, p. 2454].

The term "construction engineering" is understood to mean the engineering support of a complex of construction and installation works, which covers all stages of the project. This process fully covers all stages of construction, from investment planning and pre-design to dismantling.

Engineering in construction is a lot of work, the effectiveness of which depends on a lot of experience and knowledge in this area. Specialists working in this field have a huge responsibility for the quality of both the project and, accordingly, the finished object. Often, customers engage professional engineers from

specialized companies for the implementation of a project. Meanwhile, it is much more efficient and more profitable to establish cooperation with a construction company that provides, among other things, engineering services. This approach will improve the organization of future construction, save time on obtaining all the required documents.

Thus, to achieve professional goals it is necessary to constantly move forward, to develop professionally, i.e. adhere to the principle of "education through life". Of great importance here are professionally-oriented design tasks, provided that they are introduced into the educational process. Professionally-oriented design tasks will provide training for engineering personnel in the field of construction, comprehensively developed, with in-depth knowledge in the technical sciences and able to apply this knowledge in future professional activities.

Note the basic principles for the formation of a competent, competitive specialist in the labor market in the construction field:

- The principle of "learning through problem solving" - the process of regular participation of students and teachers in the joint implementation of real projects commissioned by employers (using the experience of research and development and the experience of bachelors in construction teams) on the orders of enterprises based on the acquisition and application of modern key competencies;

- The principle of "education through life" - the development of integrated and professional training of competent specialists in the field of construction based on advanced high technology;

- The principle of interdisciplinarity - the ability and willingness to conduct scientific, engineering, design and calculation activities (own a set of key competencies) that meets the high requirements of today [2].

A set of professionally oriented design tasks developed on the basis of classification and typology of types of tasks for bachelors in "Construction" specialty in educational and professional activities, which are classified as follows: by type of engineering activity, by objects of engineering activity (presented in Fig. 1), by subject matter or academic discipline, by degree of complexity, by degree of intersubject integration, by labor functions and actions of a professional standard.

The engineering orientation of professionally oriented design tasks will be implemented by:

- selection of engineering-oriented content of educational tasks;
- inclusion of situations arising in the professional activities of the construction industry;
- the focus of tasks on the process of systemic, engineering and creative thinking.

Objects of professional activity

- industrial, civil buildings, hydraulic and environmental structures;
- building materials, products and structures;
- heat and gas supply, ventilation, water supply and sanitation systems of industrial, civil buildings and environmental facilities;
- machines, equipment, technological complexes and automation systems used in the operation of industrial and civil buildings;
- real estate, land, urban areas.

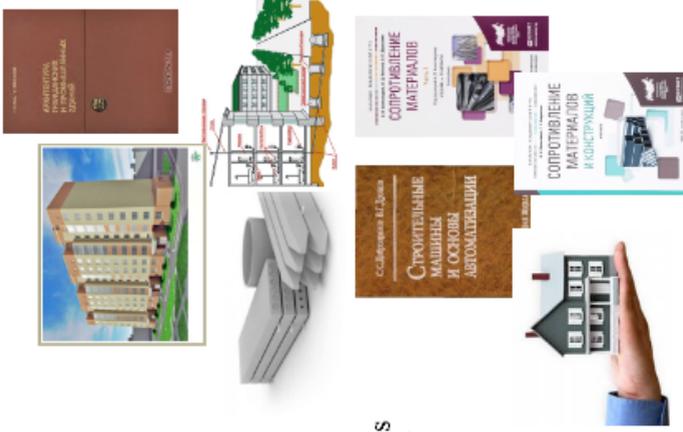


Figure 1. Objects of professional activity

Designing a complex of professionally oriented design tasks will be implemented from general professional issues to professionally oriented:

- selection of training material for professionally oriented design tasks (establishing the main problematic issues in the context of students' capabilities, distributing them according to the degree of generalization);

- Compilation of a set of professionally oriented design tasks for bachelors in "Construction" specialty (development of tasks for each academic topic, development of the content of the structural elements of design tasks: production experience, regional specifics, innovative construction industry);

- refinement of the complex of professionally-oriented design tasks for bachelors in "Construction" specialty in the context of the professional activities of future graduates (correlation of the complex of professionally-oriented design tasks with the implementation of types of professional activity and determination of the features of professionally-oriented design tasks for bachelors in "Construction" specialty).

The basis of the proposed materials is the idea of applying varied tasks to form the engineering competence of bachelors in «Construction» specialty. In selected tasks, the potential arises to acquire knowledge independently, and the right to choose is also provided.

During the experiment on the formation of engineering competence of bachelors in "Construction" specialty, there was a need for design work to create a set of professionally-oriented design tasks, as well as an experimental check for the success of students to study the topics raised.

When designing a complex of professionally-oriented design tasks bachelors in "Construction" specialty, we considered issues based on the interest of training (P. I. Pidkasisty, B. V. Goryachev), which state that “training is effective only in the process of interest students to knowledge” [4]. We also adhered to the interpretation of the concept of “interest” given by M. F. Belyaev: “... there is one of the psychological activities that is characterized as the general conscious aspiration of a person to an object, imbued with a relationship of proximity to the object, emotionally saturated and affecting the increase in productivity” [1].

“A set of tasks is a set of tasks that reflects educational tasks that have a single basis; built in such a sequence that the transition from one task to another was carried out.” The assimilation of the material and the development of skills for solving professionally oriented design tasks are controlled by the questions presented for self-examination and the tasks, which makes the complex especially accessible for independent study of the subject. The appendices provide reference data necessary for reviewing and solving professionally-oriented design tasks.

In the framework of our study, the important role of the educational process in the system of engineering education and in the formation of engineering com-

petence of bachelors belongs to the discipline “Material resistance”, which refers to the compulsory disciplines (modules) of the variable part. The resistance of materials as a science makes one of the main contributions to the formation and formation of an engineer, the goal of mastering which is the formation of research skills and engineering thinking in preparing bachelors for engineering activities that require fundamental, professional knowledge and skills in solving a wide range of issues related to the behavior of solid bodies under external loads, in the development of recommendations and quantitative ratios used in the calculations of strength and stiffness, design and operation of modern structures, machinery and equipment. The discipline "Material resistance" refers to the compulsory disciplines (modules) of the variable part and is the basis for the study of special disciplines. In the Kumertau branch of the OSU, as in most educational institutions of higher education, the study of the discipline “Material resistance” begins with the second year, therefore, the identification of the links between sections of this course with other subjects is of great importance.

It is very important for the teaching staff to highlight these features and topics in the sections of the “Material resistance” course and focus students on their study, to show how the planned learning outcomes characterizing the stages of formation of competencies can be useful in the subsequent study of compulsory (special) disciplines.

Formation of engineering competence of a bachelors in "Construction" specialty is impossible without the implementation of professionally directed training and without the use of interdisciplinary integration, i.e. the principles of continuity and continuity of training should be observed, which imply the joint work of specialists in the natural science block and the technical block [6, p. 201]. We consider interdisciplinary integration as the interconnection of educational subjects as follows: mathematics, physics, theoretical mechanics, technical mechanics, building materials begin to be studied by students earlier, i.e. are the prerequisites of the discipline "Material resistance", respectively, there is a possible integration option - one-way communication. The following disciplines that we are considering are being studied in parallel with the discipline “Material resistance” or after studying this discipline, respectively, here an option for interdisciplinary integration is possible - communication, interconnection (interaction): soil mechanics, building mechanics, metal structures, including welding, reinforced concrete and stone constructions, structures made of wood and plastic, foundations and foundations, inspection and testing of buildings and structures, modern software systems for design Danian and structures, computational models of buildings and structures, construction of single-storey industrial buildings, special course on metal constructions, special course on bases and foundations, design of foundations in regional soil conditions, a special course on wooden structures, wooden structures for low-rise construction.

In relation to our study, the structures of engineering competence and professionally oriented design tasks are studied. Structuring is accompanied by an analysis of the processes of educational implementation of a complex of professionally oriented design tasks and the formation of structural components of activities (Fig. 2). The value of modeling is determined by the ability to visually show which of the tasks have the greatest influence on the intensity of the formation of one or another component of engineering competence. The illustrative function also ensures the reproduction of simulated processes and phenomena in the educational process of higher education, since it indicates the conditions and results of the implementation of the model.

In our work, we adhere to the view that the structure of engineering competence of a bachelor of the construction industry is shown by the integrity of five components: cognitive, operational, production-empirical, motivational-value, reflective-prognostic. All components are interconnected, each performs its functions and tasks.

So, when solving professionally-oriented design tasks, the intersubject integration of professional knowledge is updated. Based on the formation of experience in solving these problems, an emotional-value attitude of students to a specific type of professional activity is formed, for which a bachelor is preparing, based on the needs of the labor market. In a practical sense, it is not individual professionally-oriented design tasks of a particular topic that acquire great value, but their systems that cover the main professionally significant situations.

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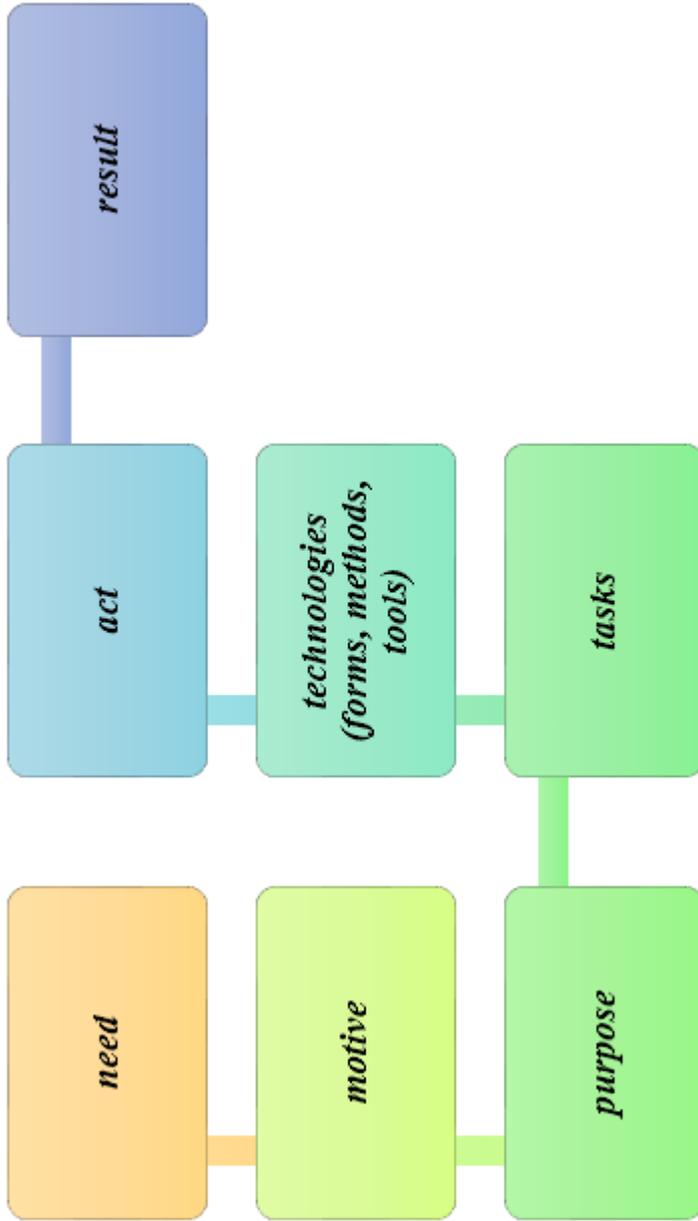


Figure 2. Structural components of the activity

在“微生物学”课程学习中组织学生教育研究活动的教育资源
**EDUCATIONAL RESOURCES OF THE ORGANIZATION OF
EDUCATIONAL RESEARCH ACTIVITIES OF STUDENTS IN THE
STUDY OF THE COURSE "MICROBIOLOGY"**

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注解。全球一体化进程，高等教育系统对就业领域不稳定局势的反应，竞争加剧和雇主要求水平的需求导致几乎所有部门的高等教育内容和结构都进行了改革。

研究人员将专业发展视为认知，主题 - 实践和个人经验的综合，并且不能通过给予学生学习任务或将其“融入活动”来形成。

学生必须经历一系列接近现实的情况，并需要越来越多的有效行动，评估和对所获得经验的反思。

因此，教育研究文化的本质是这样的，虽然它是培训的产物，但它并不直接依赖于它，而是学生自我发展的结果，在我们的例子中，学生，而不是个人成长，整体自我组织以及一个人的活动和个人经历的综合“技术”。

关键词：教育研究活动，微生物学，技能，科学研究。

Annotation. *The global integration processes, the need for the higher education system to respond to an unstable situation in the field of employment, increasing competition and the level of requirements of employers have led to a reform of the content and structure of higher education in almost all sectors. Researchers consider professional development as a synthesis of cognitive, subject-practical and personal experience and that it cannot be formed by giving students a learning task or incorporating it “into activity”.*

The student must go through a sequence of situations close to reality and requiring more and more competent actions, assessments, and reflection of the acquired experience.

Thus, the nature of the educational research culture is such that, although it is a product of training, it does not directly follow from it, but rather is a consequence of the self-development of the student, in our case, the student, and not so much “technological” as personal growth, holistic self-organization and synthesis of one’s activity and personal experience.

Key words: *educational research activity, microbiology, skills, scientific research.*

Introduction

The implementation of the conceptual provisions of this document has led to a change in the strict unification of educational institutions, uniform plans, programs and textbooks, template forms and methods of pedagogical activity, the active transfer of schools in Kazakhstan in an innovative development mode that is adequate to the tasks, goals and rhythm of that time.

The main goal of education in the specialty 5B011300– “Biology” is the implementation of education aimed at training highly qualified personnel with practical skills and leadership skills through the introduction of innovative educational technologies and the training of competitive specialists in the field of education, ensuring the training of qualified, competitive personnel that meet modern requirements to the quality of specialists with higher education in the field of education for independent work oty in this specialty [1].

The training of competitive specialists is aimed at the formation of skills in conducting design and survey studies, the preparation of fundamental and applied scientific biological projects, the participation of biologists in the work of environmental authorities, environmental monitoring of the environment, and the provision of educational, tourist and other services. So, the analysis of the State educational standard of the Republic of Kazakhstan in the specialty 5B011300 - “Biology” from 2012 shows that graduates in this specialty should be prepared to perform the following types of professional activities:

- educational (pedagogical): working as a biology teacher in various educational institutions (schools, gymnasiums, lyceums, colleges, etc.), including the teaching of disciplines in English;
- research: carrying out scientific research in specialized disciplines in various organizations (botany, zoology, anatomy, physiology, biochemistry, genetics, biotechnology, etc.);
- design: the implementation of general and specialized developments in design and engineering organizations (gardening, watering, reconstruction, planning, for example, agrobiostations, youth stations);
- organizational and technological activities in biological production facilities (sanitary and epidemiological stations, plants for the processing of plant and animal products, etc.);
- the use in research and practice of the results of undergraduate practice and the defense of the thesis (project) [2].

Among the requirements for the level of research work are the following parameters: planning a student’s research work, compiling a file on the topic of research, selection and testing of diagnostic methods on the research problem (tests, questionnaires, conversation plans, observation programs, etc.).

A graduate of the specialty "Biology" should be prepared for the selection of didactic material, visual aids necessary for conducting experimental work on the topic of his research, taking notes of at least 15-20 works on his problem, writing a report on the problem and giving a message to students and teachers, to the implementation and construction of experimental work, to interpretation of the results of the study [3].

As a result of university education, the graduate should have the basic research skills: observe and analyze phenomena, study and generalize best practices, put forward and substantiate the actual research problem, formulate a hypothesis and verify the data on which it is based, conduct an experiment, interpret the results, summarize material in the form of a report, course and final qualification work in the form of a graduation project.

Educational and research activities of students - one of the activities aimed at improving knowledge. This work is carried out under the guidance of teachers, as a result of which students discover new, objectively significant knowledge about the object of study, method or means of activity, develop creative features and professional qualities of the person [4, 5].

The formation of "intellectual feelings" is of great importance for the formation of "the foundations of a scientific worldview, and later on the development of educational research work" [6, 7].

In a number of works (M.M. Zinovkina, I.Yu. Medakova, N.M. Peysakhov, A.F. Esaulov, etc.), attention is drawn to the fact that the success of the formation of creative systemic thinking in the process of vocational education is largely determined by the level the formation of the main components of creative thinking at the earlier stages of personality formation.

These components include: the ability to analyze, synthesize, compare and establish causal relationships; critical thinking and the ability to identify contradictions; forecasting the possible course of development; the ability to multiscreen see any system or object in the aspect of the past, present, future; build an action algorithm, generate new ideas and present solutions in a graphic-graphic form [8].

According to the curriculum of the specialty, training activities include the entire period of theoretical training, including student research, workshops, laboratory and term papers. Despite the large amount of work carried out in the framework of the organization of research and educational research work of students, research activities are still organized and carried out rather haphazardly - through the implementation of a set of term papers, final qualification work, the content is little or not related to each other. A future specialist will become a teacher-researcher if he continuously studies the achievements of science in his professional field, puts them into practice; focus on new scientific ideas; analyze your research experience and apply diagnostic techniques; to analyze the system of training and education; substantiate the effectiveness of heuristic techniques using reliable scientific data [9].

Research results

One of the initial stages of our study was a survey of students.

In the course of questioning students of the specialty “Biology”, we obtained data on the refinement of the goals of study at a university. The content of the objectives was distributed as follows:

Table 1 - the results of the survey

Listo fissues	Share,%
Become an educated person	58
Learn your makings, abilities	31
Learn to constantly improve your skills	26
Learn to adapt skillfully to the demands of life	25
Get a diploma	17
Master a professional culture	16
Learn something interesting for yourself	5
Become an excellent student	2

From the analysis of the answers it follows that while in the process of studying with students it is not possible to form an idea of the essence of professional and research culture, its role in human life. As a result, many students lack the need to constantly improve their research culture. As a result, many students lack the need to constantly improve their research culture. There is no informed choice of norms, rules of conduct for solving various problems in professional activity. Valuable was the fact that every third respondent indicated the need for knowledge of their individual inclinations and abilities. The study also revealed that most students do not understand the role of self-organization in overcoming various difficulties. It turned out that 2nd year students are taking any actions aimed at improving the quality of study, under the following conditions: problems arise when passing various types of control (midterm, final); if a very strict and demanding teacher; if the item is part of an intermediate state control component. In the course of the study, we also identified barriers in the students' mastery of the culture of educational and research activities. In accordance with the rating, these include:

- lack of a stable system of value orientations for creative self-realization and self-development in educational and research activities;
- lack of a holistic, personal system of knowledge about the cultural potential of the research method and the methods included in its multidimensional structure;
- lack of sensitivity to contradictions, a sense of their external "task" as a condition of an educational research task;
- lack of ability to think in contradictions;
- stereotyping of thinking, cognitive activity, communication;

- lack of intellectual activity and productivity, initiative at all logical stages of educational and research activities; stereotype of personally significant goals of educational research activities;

- low level of general student culture.

In the process of variable experiments, the levels of understanding and overcoming the identified barriers were revealed:

- passive level - barriers are comprehended only with the help of a teacher in relation to a specific educational and research situation or task;

- extensively productive level - students are capable of independently detecting barriers in relation to a specific educational and research situation, but they are not able to systematize them in their personal experience of creative, research activities;

- creative (intensively productive) level - students are able to see not only external, but also internal (personality) barriers of creative self-realization in educational and research activities.

It was experimentally established that overcoming barriers occurs in several stages:

- development of the ability to identify external and internal (personal) barriers of educational and research activities and individual ways to overcome them;

- correlation of possible (predicted) and current barriers to educational and research activities.

Therefore, the culture of educational research is implemented at three levels:

- personal value;

- process and activity;

- communicative.

In our view, the full-fledged management of the learning process always involves: developing a student of each component of the educational research; the relationship of the components of educational research; gradual transfer of the individual components of this activity to the trainee for independent implementation without the help of a teacher.

In general, the formation of educational research go through several stages, each of which corresponds to certain levels of education. Therefore, the maturity levels of the educational research as a whole and its individual components are important qualities of the characteristics of the effectiveness of the teacher and student. As a result of the study, the didactic conditions for the implementation of the process of organizing educational research students are as follows:

1. A special organization of a teaching and research professionally-oriented learning environment that implements a targeted component aimed at resolving issues related to the peculiarities of the formation of students' educational research-culture, which in our view assumes:

- systematic development of methodological principles that ensure the activation of the formation of educational and research skills of future teachers;

2. The selection of content, a combination of forms and methods of teaching innovative activities aimed at the implementation of target settings and the achievement of a given level of formation of the educational research culture of future teachers.

3. Involvement of students in educational and research activities in the process of studying the specialty course, including “Microbiology”.

The study shows that the organization of MIA requires, first of all, the creation of an educational and research professionally-oriented environment, under which we consider a specially organized research environment aimed at solving professionally-oriented educational and research problems by students, which has an active influence on the educational and cognitive process through the use of modern technology and tools.

When modeling a teaching and research professionally-oriented environment in our study, the main emphasis is on the content of students' activities, defined by:

- logical-semantic models, acting as the object of study, learning tools, means of solving educational research problems;

- conceptual apparatus, including both commonly used and special research terminology;

- research accompanying the study of the elective course and acting as the object of study, learning tools, means of solving educational research problems.

Conclusions

The results of the study allow us to conclude that the educational research professionally-oriented environment provides the formation of readiness of future teachers-biologists for innovative activity, if it is characterized by:

1. The relevance of the professional environment through the inclusion of professionally significant tools and resources in the educational process.

2. Innovation, implemented through the inclusion in the educational process of research, as well as modern technologies, methods, forms, tools.

3. Communicative, ensured through the organization of communication of subjects of study with scientists, managers of scientific research, specialists in this field of professional activity.

4. Transformability, that is, it implies the possibility of changing the content of the components of the educational and research environment, determined by a change in the content of teaching innovative activity.

5. Comfort, i.e. It provides for the creation of favorable learning conditions in the conditions of the educational and research environment, contributing to the formation of a positive motivational basis in research activities. The organization of a teaching and research professionally-oriented environment requires a compe-

tent, scientifically-based approach and solving a complex of tasks: organizational and managerial, educational, methodological, staffing, organizational and methodological, informational, didactic and psychological and pedagogical.

These tasks can be solved at any university if there is an initiative group of like-minded teachers led by a manager, organizer of the educational process and the scientific management of the development of this activity by a specialist or educational organization. These teachers will need a certain level of scientific and methodological training, knowledge of design technology and the research method. The development of a model of a teaching and research professionally-oriented environment aimed at organizing a student's educational and research activity at a university has made it possible to single out a number of theoretical and practical provisions.

- The functioning of the system from the outside is determined by the social (state) order reflecting the objective educational needs of society. Moreover, the educational needs of society are the causative system-forming factor, and the educational goal is the functional one.

Here it is necessary to note the role and importance of the teacher providing pedagogical support for the research activities of students of higher educational institutions. We consider pedagogical support as a professional activity of a teacher, aimed at creating the conditions for personal development and self-realization of students in the process of their educational and research activities. Such an activity requires the teacher to search for effective forms and methods of students' educational activities that would not only involve them in research, but also contribute to the learning of this activity itself. The teacher at all stages of research should actively cooperate with the student and support in him the desire for self-disclosure and self-development of creative inclinations, that is, to provide comprehensive pedagogical support. Given the above, all the work on the organization of educational and research activities of students was conditionally divided by us into five interrelated areas:

The inclusion of research elements in lectures; in laboratory and practical classes; inclusion of research elements in pedagogical practice; inclusion of research elements in extracurricular activities (essays, term papers, dissertations, classes in research circles). Academic discipline in a university should not be considered as a subject with a set of ready-made knowledge, but as a specific intellectual activity of a person. Training should, to a reasonable extent, take the form of a rediscovery, rather than a simple transfer of knowledge.

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教育环境中健康障碍的危险因素分析
**ANALYSIS OF RISK FACTORS FOR HEALTH DISORDERS
IN THE EDUCATIONAL ENVIRONMENT**

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注解。本文讨论了校内环境的条件和风险因素。对研究的分析表明，学生的健康在很大程度上取决于教育组织的卫生条件和综合的教学过程。教育机构的成功不仅应该通过学生表现的结果（以成绩和考试的形式）来评估，还应该与决定学生健康水平和职能状态水平的指标相结合。通过引入新开发的健康节约技术，可以维持和维持教育过程中所有参与者的健康。缺乏教育可以通过自我教育，额外的教育，辅导补偿，恢复失去的健康非常困难，身体发育往往是不可能的。

关键词：教育环境，学校，学生，教师，父母，条件，风险因素，健康，健康生活方式，健康节约技术。

Annotation. *The article discusses the conditions and risk factors of the intra-school environment. An analysis of research has shown that the health of students depends largely on the hygienic conditions of the educational organization and the integrated pedagogical process. The success of educational institutions should be evaluated not only by the results of student performance (in the form of grades and tests), but also in conjunction with indicators that determine the level of health of students and the level of their functional state. Maintaining and maintaining the health of all participants in the educational process is possible with the introduction of new developed health-saving technologies. The lack of education can be compensated for by self-education, additional education, tutoring, and it is very difficult to restore lost health, physical development is most often impossible.*

Keywords: *educational environment, school, students, teachers, parents, conditions, risk factors, health, healthy lifestyle, health-saving technologies.*

The health of citizens is an important priority for society and the nation as a whole. A healthy lifestyle depends on the style, level of hygienic culture of individual groups, including the conditions of the educational environment. According to the Ministry of Health of the Russian Federation, over the period of study at school, the state of health of students worsens by 4-5 times, and 85% of underperforming children are sick [4, p. 34]. By K. Marx, a school is the protection of

the workplace from life-threatening or harmful to the conditions of the production process [3, p. 132].

From scientific research (Bazarny V.F., 1999; Dubrovsky A.A., 2011; Kolbanov V.V., 2016; Kaznacheev V.P., 2013; Tatarnikova L.G., 2013 and others) it follows that the formation of the teenager's healthy lifestyle is the intraschool environment. This is not only the conditions for the stay of children, but also the mode of the educational process, the training load, the quality and regularity of nutrition, the psychological climate in the classroom.

Among the conditions that contribute to lowering the level of health of school-children, there are, firstly, non-compliance with sanitary and hygienic requirements for the conditions of instruction (Belostotskaya E.M., 1994; Betsky I.I., 2012; Grum-Grzhimai K.I., 2016; Erisman F.F., 1993). Failure to comply with sanitary and hygienic requirements for learning conditions causes an increase in the myopia of students. A long forced position of the body (in a sitting position), which persists throughout all 6-7 hours of training sessions, causes low motor activity and a large static load on the musculoskeletal system, especially of older students [8, p. 56]. The tough position of the sanitary-epidemiological service allowed to reduce from 40.7% to 11.7% the number of classrooms for educational computers that do not comply with sanitary-epidemiological rules and standards. In 65% of Russian schools, artificial lighting was reconstructed and old educational furniture was replaced with new modern, educational furniture that meets the requirements of sanitary rules and standards. [7, p. 18].

Secondly, a large amount of workload leads to poor health (Antropova M.V., 2006; Bezrukikh M.M., 2002; Belyaev A.V., 2013; Bystrov N.I., 2018; Sychev A.A., 2016; Grombach S.M., 2000; Zubkova V.M., 2010 and others). Older students spend 6 hours or more at school in isolation from their families: classes, community service, self-service and community service. To deepen knowledge of a particular subject, optional classes are intended. This is an additional training load, although it is believed that attending an elective is voluntary and this is the choice of the student and his family. Heads and teachers of schools strongly disagree with this statement.

According to Nevera E.: "Today, children are in such conditions that they don't have to choose if the child is going to go to university, then the burden falls on him at school, the load on electives, homework plus classes with a tutor [9, p. 23]. Thus, the working day of high school students wishing to continue their studies at the university is 10-12 hours. We created such conditions for our children, we shoved them into such a framework ... "3.5-6 hours are allocated for homework, which, undoubtedly, is overload. Adolescents become inattentive, the number of errors in spelling and calculations increases, interest in completing tasks falls, the state of a number of physiological functions of the body worsens; headaches and

drowsiness appear. According to research, in 13% of cases, students do not sleep for 2-3 hours. In this mode, adolescents do not have time to read fiction, music, foreign languages and sports [9, p. 62].

According to the observations of recent years, cited by other researchers, a survey of students in grade IX (about 9,000 people), conducted in the school year in grade IX, only 17 people out of 1000 studied music. The same thing is noted with regard to foreign language and sports, and in school days in 58-51% of cases, students of grades IX-XI do not at all devote time to outdoor recreation [7, p. 10].

Permanent disorder of the daily regimen: a heavy load at school and at home, systematic lack of sleep, lack of rest - does not pass without a trace for the adolescent's body.

One of the conditions for the formation of healthy lifestyle skills among schoolchildren is pedagogical activity. Methods of teaching, the attitude of the teacher to the student can and should be considered as one of the possible ways of self-improvement. Undoubtedly, almost everything depends on the creative potential of the teacher, his interest in education, and the problem of forming the skills of a healthy lifestyle for a student.

According to a study by Borisova, A.V. 23% of young teachers (work experience of 1-3 years, with a total sample of 78 people) "were disappointed in the teaching profession." The ways and methods of work of such teachers affect the learning of teaching material in the classroom process is not the best way, adolescents have to deal more with preparing for home lessons. It is vital that the teacher creates an enabling environment for the development and improvement of the student's skills in a healthy lifestyle [2, p. 45].

A personal example of teachers attitude to their health, maintaining a healthy healthy lifestyle they play plays an important role in shaping a healthy lifestyle for the younger generation. A survey among teachers of educational institutions revealed a disadvantage in the state of their health: only 8% of respondents classified themselves as healthy, 20% indicated the presence of chronic diseases, periodically 2-3% of teachers were ill 2-3 times a year. At the same time, teachers recognize the factor of the negative impact of their own health on the pedagogical process: up to 2% indicated aggression, 21.7% felt apathy, a desire to escape from reality, outbreaks of irritation are characteristic for 41.3% of teachers [10, p. 37].

In terms of their attitude to the value of health, only 27.5% of the teachers surveyed lead a healthy lifestyle; focused on a healthy lifestyle, but at the same time 43.3% do not lead it; 23.8% are indifferent to their lifestyle; 5.4% of specialists did not want to express their position [6, p. 18].

The above data indicate a lack of awareness and serious attitude of teachers to their own health, as values, and maintaining a healthy lifestyle, which is most often reflected in disinterest in maintaining a healthy lifestyle of a teenager.

Equally important is the set of pedagogical factors that take place in educational institutions and have negative consequences for the health of students. Bezrukikh M.M. (2002) identified the main pedagogical risk factors:

- pedagogical tactics related to stress;
- Inconsistency of school methodological technologies related to the age-related capabilities of the student;
- the intensity of the educational process;
- irrational distribution of the workload;
- functional illiteracy of the teacher;
- lack of health-saving measures to promote health and a healthy lifestyle. The listed factors, according to Bezrukikh M.M., are especially dangerous. They act on the child continuously and for a long time, leading to a decrease in working capacity and severe overwork. Bezrukikh M.M. writes, that the modern school is a risk zone for the health of students, indicating the following reasons:
 - the presence of a complex set of pedagogical factors (if one of the factors can be eliminated in any institution, the situation remains practically unchanged);
 - given the minimum strength of each factor presented, they act on the period of intensive growth and development of students;
 - a complex of educational factors, especially this refers to a complex of pedagogical factors that continuously, continuously and systematically affect the body, which the child is not able to change, minimize or exclude, which directly leads to an increase in the incidence of students [1, p. 98].

Thus, the analysis of risk factors in the educational environment shows that most of the health problems of students are associated with the daily practical work and professional activities of teachers. Nevertheless, the implementation of the used pedagogical system as a set of techniques and methods of health-saving technologies, the teacher, owning up-to-date information in collaboration with students, colleagues, parents, medical workers, plans his work taking into account the priorities of maintaining and strengthening the health of all participants in the educational process.

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利用互联网技术发展民间行动主义
**DEVELOPMENT OF CIVIL ACTIVISM
USING THE INTERNET TECHNOLOGIES¹**

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抽象。互联网已成为现代社会不可分割的一部分，该国的互联网受众数量持续增长。网络上的用户活动受其社会人口和地域特征的强烈影响。今天，在地区互联网社区，存在一个严重的信任问题：互相信任，相信各种社会事件的信息来源。

民间社会机构在一个开放的系统中运作，不断与其要素接触。在某种程度上，他们不能总是解决他们在工作中必须面对的问题，当然任何公共组织的活动都建立在参与社会的基础之上。

关键词：公民行动主义，互联网技术，公民社会，跨部门互动，社会公正

Abstract. *The Internet has become an integral part of modern society and the volume of Internet audience in the country continues to grow. The activity of users on the Web is strongly influenced by their socio-demographic and territorial characteristics. Today in the regional Internet community there is an acute question of trust: trust in each other, trust in various sources of information about events in society.*

Civil society institutions operate in an open system, constantly in contact with its elements. In part, they cannot always solve the problems that they have to face in their work, and of course the activity of any public organization is built on participation in society.

Keywords: *Civic activism, Internet technologies, civil society, intersectoral interaction, social justice*

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The development of Internet technologies helps to increase civic engagement in modern Russian society. One of the features of civic activity is the increasing use of the network principle for its organization. The main mechanisms of network mobilization of citizens in modern Russia can be divided into traditional and new. The first includes all the methods of interaction with the population, motivating to participate: the dissemination of information through printed materials, radio and television; formation of the image of the leader of the movement; goal setting; organization of events, etc. New mechanisms expand the boundaries of action of initiative citizens, their integration and interaction takes place via the Internet. The specifics is the use of more operational interconnection, online discussion platforms².

In January-February 2019, the Resource Center for Support of Nonprofit organizations and Civil Initiatives and the Department of Socio-Political Theories of Yaroslavl State University conducted a survey of Internet users in the Yaroslavl Region on the topic “The Role of the Internet in the Development of Society and Intersectoral Interaction”. In total, the survey involved 648 people - residents of the Yaroslavl region using the Internet in everyday life.

The selection was built taking into account the socio-demographic and territorial characteristics of Internet users in the Yaroslavl region:

Sex	Abs.	Percent
Male	288	44,4
Female	360	55,6
TOTAL	648	100,0

Age	Abs.	Percent
18– 29 years	204	31,5
30 – 35 years	156	24,1
36 – 49 years	120	18,5
50 – 59 years	108	16,7
60 years and older	60	9,3
TOTAL	648	100,0

EDUCATION:	Abs.	Percent
Incomplete secondary, secondary education	73	11,3
Secondary vocational education	212	32,7
Higher education	306	47,2
Second higher education, scientific degree	57	8,8
TOTAL	648	100,0

²Golovin Yu.A., Frolov A.A. The practice of network civic activity in modern Russia / State and municipal administration. Scholarly notes of SKAGS. 2016. №2 p. 195-196

PLACE OF RESIDENCE:	Abs.	Percent
Yaroslavl	270	41,7
Rybinsk	108	16,7
Small towns	100	15,4
Rural areas	170	26,2
TOTAL	648	100,0

The selection is representative of the region as a whole. The reliability level of the data is 95% in the region as a whole; the statistical error is within the range of 5.0%.

The Internet has become an integral part of modern society and there is nothing unexpected in the fact that today - this relatively free space of public communication has become one of the means of manifesting civic activity, a mechanism for intersectoral communication. A special media culture, media literacy is being formed through the Internet. New forms of thinking appear, for example, clip thinking (perception of social phenomena through short images and messages: news feed, video content, etc.). All this is an opportunity to influence the consciousness of citizens, an opportunity to bring to the solution of social, political problems "without leaving home"³.

One of the most important indicators of democracy is the level of development of civil society, improvement the activities of public organizations and increasing the socio-political activity of citizens⁴. The Internet is an important tool for the formation of civil structures, a channel for social self-organization and association of citizens, which is especially important in the absence of effective formal methods of participation (parties, unions, etc.) in political life for the majority of the population⁵

In the Yaroslavl region over the past two years, the proportion of Internet users has remained unchanged - in the range of 60% -65% or about 650 thousand people. As of the 1st quarter of 2019, 71.1% of them (or 450 thousand people) access the Internet daily, 22.8% - several times a week / month, 6.0% - rarely.

As the survey showed, in the Yaroslavl region, the activity of users on the Web is strongly influenced by their socio-demographic and territorial characteristics. For example, men go online more often than women (75.7% and 67.5%, respectively). The most active Internet users are people aged 18-29 and 36-49 who are

³Frolov A.A., Mironova S.V. The influence of modern Internet technologies on increasing the level of political literacy // In the collection: Opportunities and threats of the digital society Collection of scientific articles. Under the total. ed. A.V. Sokolova, A.A. Vlasova. Yaroslavl, 2018. p. 122-125.

⁴Dan-Chin-Yu E.Yu. The participation of public organizations in the development of civil society (on the example of the Yaroslavl region) / Yaroslavl Pedagogical Bulletin. 2010. V. 1. №4. p. 159

⁵Sokolov A.V. Electronic communications in the social activity of citizens // Power. 2015. №3 p. 67-71.

“free” from family and household affairs (78.4% and 76.7% are online daily, respectively), as well as residents of small towns and rural settlements of the region (72.0% and 80.6%, respectively).

Today, the Internet environment can satisfy almost all human needs, the range of its capabilities (services) is constantly expanding. Like a year ago, in the top of the popular actions of regional Internet users - scrolling social media feeds (69.4%), entertainment (59.6%), searching for information necessary for work / study (57.4%) and viewing news (50.5%). Political news are interesting to 15.9% of the region’s online audience. In 2018, residents of the Yaroslavl region began to use the Network more actively to search for various background information (48.1%, +14 percentage points to the value of 2017), view email (39.5%, +10 percentage points to the value 2017), the receipt of state and municipal services (18.4%, +14 percentage points to the value of 2017).

The behavior of representatives of various social and territorial groups on the Web is fairly uniform. An exception is the natural specific interests of individual social groups. For example, young people and people with higher education more often than others use the Internet for self-education, women and representatives of age groups 30-59 are more interested in finding and making online purchases, citizens and highly educated people are attracted to political information, etc.

Most users go online to find the information they need, but only 15.9% of them are interested in political news and 38.7% are interested in the work of government bodies. According to the subjective opinion of users, now in RuNet domestic policy issues dominate over foreign, that is, Internet users are closer to social policy, economic, etc. Interest is dictated by fears for their future and the future of their children.

The opinion of people about the most discussed political topics on the Internet is directly influenced by their personal preferences and interests - “what you seek, you find”, i.e. online inquiries. Therefore, it is logical that the work of the authorities and domestic policy of the country primarily concerns the representatives of the middle age group (30-49 years old).

Today in the regional Internet community there is an acute question of trust: trust in each other, trust in various sources of information about events in society. For example, only 33.6% of respondents trust publications of ordinary people on the Internet on socio-political topics. Just as many do not trust, and another 31.3% do not know how to relate to them. Internet users believe even less in the media and government, especially young people and urban residents.

The survey data indicate that the tendency of representatives of the Internet community to distrust each other slows down the development of civic Internet activity. Now it is inherent only to 20% of users of the Network of the Yaroslavl region. These are the ones that at least once in their life shared on the Internet their

observations and/or events, from the life of society, making them public. Civil Internet activity in the Yaroslavl region is typical for users aged 30-35 years and urban residents.

The remaining representatives of the regional Internet community can be attributed to passive, indifferent users: 51.7% have never shared information on the Web, 30% were unable to answer the corresponding question due to their inexperience, choosing the “hard to answer” alternative.

An important factor in increasing the civic engagement of citizens is social justice in the actions of government at various levels.

Every third resident of the Yaroslavl region perceives social justice as equality in living standards (32.6%). 17.1% of respondents see social justice in equal conditions for the realization of people's abilities, 13.9% equality of all citizens before the law. Less often, the meaning of this concept comes down to guarantees for socially unprotected citizens (9.6%), the correlation of the social situation of people with their personal achievements (8.3%), and the participation of ordinary citizens in the development of managerial decisions by the authorities (4.8%). For 4.5% of respondents, social justice consists in the fact that each member of the society follows the principles of universal morality (4.5%). The older and more educated the respondents, the more often for them social justice means the relative equality of the standard of living of people and the conditions for their self-realization. The fact that social justice is the absence of significant differences in the standard of living of people is especially often said by residents of rural settlements. When asked whether the modern Russian society is fair, 33.2% of respondents called it fair, 42.3% are sure of the opposite. Another 24.5% found it difficult to answer the question. Much more often, the opinion on the justice of modern Russian society was expressed by residents of small towns and rural settlements. The socio-demographic characteristics of the respondents practically do not affect the population's perceptions of the level of justice in our society.

Despite all the shortcomings in the structure of Russian society, 27.3% of the residents of the Yaroslavl region are confident that Russian society is more equitable than western and eastern. 28.5% of respondents are sure that there is more justice in the west, and 10.0% in the east. Every third found it difficult to answer the corresponding question.

Speaking about how the state should be, the opinions of the residents of the region were divided: 42.6% believe that it should be based on the principles of democracy, solidarity, personal freedom and value, 32.1% support the idea of the leadership of a strong state, order, national interests, social guarantees. Among the supporters of democracy, there are especially many young people, rural residents and those who consider modern Russian society to be fair.

Most residents of the Yaroslavl region are confident that strengthening the state's social policy in order to minimize the effects of material inequality will help bring Russian society closer to the ideal of social justice (59.3%).

In the course of democratic reforms, modern Russian society and its political structures made a risky attempt to transit a political model into Russian traditions, which is, in essence, an unstable balance of ethical principles, an eclectic mixture of legal norms and doctrinal political science prescriptions with a fairly diverse experience of their practical implementation. The lack of a strict systematic approach in the borrowed foreign ideological and organizational experience of civil society led before and now leads to the fact that when this experience is applied to the domestic traditions of relations between society and the government, selective elimination of those elements of this experience for which there are no free "cells" in the political culture of the Russian society takes place. Thus, the idea and practical implementation of civil society form a fundamentally new system of relations that has not yet been explained by political science because of its focus on popularizing foreign achievements in civil life and criticizing domestic (especially Soviet) traditions of citizenship.⁶

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英语动词对心理影响的区分
**DIFFERENTIATION OF ENGLISH VERBS
OF PSYCHOLOGICAL IMPACT**

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抽象。 本文介绍了英语同义词语义单元语义结构的生理学研究经验，具有产生心理影响的一般意义。 作者着重研究具有重叠表示的动词的区分问题，这是在识别词汇单位意义的差异和整体成分以及动词角色配置描述的背景下解决的。对研究假设的验证是基于对英国国家军团 (BYU-BNC) 的词典来源和数据的分析。

关键词和短语：意义的语义结构；代名词；重叠的表示，积分和微分量；语义角色。

Abstract. *The article presents the experience of onomasiological research of the semantic structure of English synonymic verbal units with a general meaning of making psychological impact. The author focuses on the problem of differentiation of verbs with overlapping denotation, which is solved in the context of identifying differential and integral components of the meaning of the lexical unit and description of the role configuration of the verb. Verification of the research hypotheses is based on the analysis of lexicographic sources and data from the British National Corpus (BYU-BNC).*

Key words and phrases: *semantic structure of meaning; synonym; overlapping denotation, integral and differential component; semantic role.*

Lexical units, acting as a means of verbalizing the same concept, are not equivalent in terms of their semantic structure; their meanings are distinguished by differential components, which determine a unique semantic code for the content of the lexical unit. The complexity of the development of dictionary entries for synonyms is explained, in our opinion, by insufficient development of the technology for distinguishing integral and differential components of the meaning of synonymic units [2]. The relevance of the study is dictated by the current state of lexicographic practice, which does not allow us to differentiate the area of denotation of lexical units close in meaning. Despite the long-standing practice of studying the role semantics of a verb, English verbs of psychological impact are the subject of research for the first time in this aspect, which is the scientific novelty of this study.

Turning to the analysis of the history of the issue of describing the role semantics of a verb, it should be noted that this topic is the subject of research by a wide range of linguists. So, T.D. Shabanova in her theoretical and experimental study dwells in detail on the description of the role semantics of English verbs of vision [6]. A.Kh. Bostonov's project is devoted to the study of the semantics of the right-sided actant of English sensory verbs [3]. O.G. Amirova describes a semantic model of English verbs of control [1]. Ya.V. Shvaiko's research is devoted to the analysis of the semantics of English verbs of learning [7]. E.G. Kuznetsova describes the content of the semantic role of the Experiencer as a factor determining the semantic type of predicate of English experimental verbs [5]. I.A. Sherstkova proposes a solution to the problem of semantic interpretation of the meaning of the English verbs of imagination through the interpretation of the semantic role of the left-sided actant [8].

The aim of this study is to differentiate English verbs of psychological impact based on the analysis of the role semantics of predicate actants, which leads to the formulation of the following tasks: to analyze the syntagmatic environment of the analyzed units, to determine the semantic components that make up the content of the left-sided and right-sided actant of the studied predicates, to identify differential components that contribute to the differentiation of the denotation area of the studied lexemes.

At the initial stage of the research we considered a wider synonymous series of verbs with a general meaning of making psychological impact. It included lexical units such as *to frighten*, *to scare*, *to startle*, *to terrify*, *to horrify*, *to dismay*, *to daunt*, selected on the basis of the component analysis. In this article, we will dwell on the description of the semantic structure of the most frequent items: *to frighten*, *to scare*, *to startle*. After analyzing the meaning of the studied verbs used with postpositions, we came to the conclusion that postpositions radically change the meaning of the lexeme. So, when using *away* / *off* postpositions, the verbs *to frighten*, *to scare* convey not only the psychological impact on the object, but also the causation of its further actions or changes in the physical localization of the object in space. For example: *Mr. Ridley was trying then to scare councils into lower spending. Or: ... the dog would bark loudly, and thereby frighten the donkey into the shed ...* [4] The verb *to startle* with the postpositions *out of* / *into* can also convey the semantics of the impulse to action, however, unlike the verbs *to frighten*, *to scare*, in this case the semantic component "scare, frighten" is neutralized. For example: *There was enough ill-temper left in him to startle Vulcan into a gallop* [4].

Further on we turned to lexicographic sources in order to identify differential components that contribute to delimiting the area of denotation of the analyzed units. Using the component analysis method (based on vocabulary definitions), we identified the following semantic features characteristic of these verbs: *fright*, *suddenness*, *anxiety*, *surprise*.

Analysis of the use of verbs suggests that for the verbs *to scare*, *to frighten*, *to startle*, an integral semantic component is *fright*. The semantic structures of the

verbs *to frighten* and *to startle* come closer together on the basis of the component of *suddenness*, and in the pair *to frighten* and *to scare* the integral component is *anxiety*. A pair of verbs *to frighten* and *to startle* can be contrasted with the verb *to scare* based on *suddenness*, and a pair of verbs *to frighten* and *to scare* can be contrasted with the verb *to startle* based on *anxiety*.

In the analysis of the use of the units under study based on the data of the British National Corpus (BYU-BNC), we found that the left-sided actant of the verb *to frighten* can be characterized by the following semantic roles: Mental Doer, Physical Doer, Agent, Agent Situation.

The subject with the verb *to frighten*, characterized by the semantic role of the Mental Doer, is distinguished by such semantic features as: Application of Mental Power, Controllability, Predictability. For example: *On other occasions he would think of frightening ladies of the court by planting plastic frogs and spiders on their laps* [4]. In this example, the phrase *he would think* explicitly indicates the application of certain mental powers to achieve the predicted result. Or: *And in England student revolutionaries were gathering in television studios to frighten nervous presenters like Frank Mackenzie* [4]. The presence of the sign of predictability of the situation is confirmed by the following example: *The aim was to frighten Place into acting hastily* [4]. The lexeme *aim* indicates the presence of the semantics of goal-setting and goal-attainment in the process of intentional intimidation, i.e. there is a prediction of the situation.

The subject with the verb *to frighten*, characterized by the semantic role of the Physical Doer, is distinguished by such semantic features as: Application of Mental Power, Controllability, Predictability, Application of Physical Strength. Application of Physical Strength can be illustrated by the following example: ... *he swung across the road to frighten a cyclist by passing within inches of him at forty miles an hour* [4]. In this case, the subject makes physical effort for a specific purpose - to frighten the cyclist by flying a few millimeters from him (S swung across the road to frighten O). Or: *But they had also struck matches to frighten him. He caught fire and suffered fatal 40 percent burns* [4].

The subject with the verb *to frighten*, characterized by the semantic role of the Agent, is distinguished by such a semantic feature as: Physical Localization. The cited component can be illustrated by the following examples: ... *the empty shells looked like shriveled skulls hung to frighten evil spirits* [4]. Or: *Those new twenty pound notes frighten me* [4]. The aforesaid sentences describe the situations with subjects having a certain location in space and producing some effect on the object without performing any actions, i.e. there is no application of mental and physical strength, as well as controllability and predictability of the situation.

The subject with the verb *to frighten*, characterized by the semantic role of the Agent situation, is distinguished by such a semantic feature as: Lack of Physical Localization. For example: *It (the painful process) was meant to frighten off the Liberal Democrats, but failed* [4]. Or: ... *time-consuming security problems can*

frighten people away [4]. Those sentences describe denotative situations in which the subject does not perform any actions, does not have a specific location in space, but is able to exert some influence on the object.

Thus, the following semantic features are characteristic of the subject with the verb *to frighten*:

- ± application of mental power;
- ± application of physical strength;
- ± controllability;
- ± prediction of the situation;
- ± physical localization.

A subject with the verb *to scare* is characterized by the same set of semantic roles as a subject with the verb *to frighten*, which indicates that the analyzed lexemes are identical in character to the left-sided actant.

The subject with the verb *to scare*, characterized by the semantic role of Mental Doer, is distinguished by such semantic features as: Application of Mental Power, Controllability, Prediction. Let us illustrate the semantic component Application of Mental Power: *In fact, when my Aunt Peg got the idea to scare her friends, she'd forgotten all about Mrs. Sugar* [4]. The cited example explicitly expresses a situation in which the subject plans to scare his friends, i.e. the subject applies mental powers in order to achieve the task (S got the idea to scare O). The following examples illustrate the presence of the component Controllability in the content of the semantic role Mental Doer: *I can understand the socialists being busy and trying to scare the electorate with a terror story every day.* Or: *Are you deliberately trying to scare me?* [4] Those examples contain explicit information that the subject carries out a certain set of actions aimed at creating the predicted situation (S (deliberately) trying to scare O), and its actions are planned, and therefore controlled. The component Prediction is reflected in the description of the following denotative situation: *... exploiting rumours of her Evil Eye to scare off creditors, and to get the best out of every bargain* [4]. In the above example we see that the subject performs a certain set of actions to scare off the object; the action is characterized by awareness and focus on a specific result, therefore, we can talk about predicting the situation. Or: *... director claimed his former lover regularly rang him in the middle of the night to scare him* [4].

A subject with the verb *to scare*, characterized by the semantic role of the Physical Doer, is distinguished by such semantic features as: Application of Mental Power, Application of Physical Strength, Controllability, Prediction. The presence of the component of Application of Physical Strength is confirmed by the following examples: *Why did you make the cut worse? To scare him?* Or: *Should I go ahead and stab them or just scare them?* [4] In the cited examples the subject performs a specific physical action in order to scare the object.

A subject with the verb *to scare*, characterized by the semantic role of the Agent, is distinguished by a semantic feature Physical Localization. The presence of this

component can be illustrated by the following examples: *Oh, that's really going to scare them. A stone ax. Or: Fishing boats in the South Atlantic must attach streamers to the nets to scare off sea birds* [4]. Those examples describe denotative situations in which the subject does not exert any force to scare the object, there is no controllability, but there is a specific position in space, i.e. physical localization.

The subject with the verb *to scare*, characterized by the semantic role of the Agent Situation, is distinguished by the absence of the Physical Localization component. For example: *Something began to scare her, as he repeated his invitation to dance* [4]. In the cited example the subject has a certain effect on the object (scares the object) without applying any force. The subject does not control the development of the situation; it does not have a specific position in space, therefore, physical localization is absent. Or: *The business community rallied to him for fear that Duke's election would scare off tourism and outside investors* [4].

Thus, the following semantic features are characteristic of the subject with the verb *to scare*:

- ± application of mental power;
- ± application of physical strength;
- ± controllability;
- ± predicting the situation;
- ± physical localization.

The analysis of the semantic structure of the left-sided actant with the verbs *to frighten*, *to scare* allows us to conclude that, from the point of view of the parameter under consideration, the structure of the left-sided actant is identical, and to suggest that the differentiation of these synonyms is based on differences in the semantic structure of the right-sided actant.

Unlike the verbs *to scare* and *to frighten*, the subject with the verb *to startle* is not characterized by the semantic roles of the Mental Doer and Agent. This verbal lexeme is characterized by the following semantic roles of the left-sided actant: Physical Doer, Instinctive Doer, and Agent.

A subject with the verb *to startle*, characterized by the semantic role of Physical Doer, is distinguished by such semantic features as: Application of Mental Power, Controllability, Prediction of Result, Application of Physical Strength.

Application of Physical Strength can be traced in the following example: There was enough ill-temper left in him to startle Vulcan into a gallop [4]. The components of Controllability and Prediction of the Result can be illustrated by the following example: *As he leapt to the attack again, he uttered a hoarse, nerve-shattering scream, the purpose of which was to startle his opponent momentarily and distract him for a fatal fraction of time* [4]. The subject performs a specific controlled and planned action with a given result (S uttered a hoarse nerve-shattering scream, the purpose of which was to startle).

A subject with the verb *to startle*, characterized by the semantic role of Instinctive Agent, is distinguished by such semantic features as: Application of Physi-

cal Strength, Instinct; there are no features of Application of Mental Power, Predictability of Result, Controllability. The components of Application of Physical Strength and Instinct can be illustrated by the following example: *Some caterpillars manage to startle their attackers by raising themselves up like small snakes* [4]. The subject performs an instinctive action with the application of physical effort to scare away the object (S manages to startle by raising themselves).

There are situations when the subject with the verb *to startle* is characterized by the lack of localization in space. In this case we can talk about Agent. For example: *... break-up startled the telecommunication world in general* [4].

Thus, the following semantic features are characteristic of the subject with the verb *to startle*:

- ± application of mental power;
- ± controllability;
- + physical localization;
- ± application of physical strength;
- ± instinct.

At the next stage of the research, we analyzed the verbs *to scare*, *to frighten*, *to startle* in terms of the structure of the right-handed actant. Analysis of the use of the verbs under study indicates the absence of differential features characterizing this actant with the verbs *to scare*, *to frighten*. However, the right-sided actant with the verb *to scare* can be characterized by the semantic attribute Psychological Instability, which explains the possibility of syntactic transformation of the sentence, where the object of the syntactic construction can function as a subject; consequently, the verb *to scare* goes from a transitive set to an intransitive one. For example: *... the area where he lives was full of crack dealers, so he doesn't scare easily* [4]. In this sentence, the pronoun *he* functions as a subject of a subject-oriented predicative construction, the core of which is the intransitive lexical-semantic version of the verb *to scare*. Therefore we can conclude that the presence of the component Psychological Instability allows us to distinguish two semantic variants of the verb to scare, transitive and intransitive.

In case of the verb *to frighten* as a predicate of a subject-oriented construction, a reflexive pronoun takes place, and the verb itself preserves the semantics of transitivity. For example: *I hate the past. I love Carla, but sometimes I frighten myself* [4].

Thus, on the basis of the database of the British National Corpus (BYU-BNC) we verified the hypotheses about the differential components in the semantic structure of a verb which contribute to delimiting the area of denotation of English verbs of psychological impact. An analysis of the role semantics of the right-sided and left-sided actant revealed additional criteria for differentiating the units under study. The mode of describing the semantic structure of synonymic verbs suggests that their differentiation can be based not only on the structure of the meaning of a verb itself, but also on the content of the semantic role of the actant, syntagmatically associated with the verb under study.

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俄罗斯的新罪犯：在1920年成立
**NEW CRIMINALS OF RUSSIA: FORMATION
IN THE 1920TH YEARS**

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注解。 文章揭示了一种特殊类型的犯罪社会世界，即苏联罪犯的形成特征。结果表明，这种犯罪行为的起源一方面与以前的犯罪分子有关，另一方面与新的社会经济和政治关系的形成有关。 提出了苏联俄罗斯犯罪世界的形成和发展的分期问题，作者将这个世界与权力结构联系起来的可能性。

关键词：犯罪；苏联的犯罪行为；近乎犯罪的社会世界；犯罪世界的发展分期。

Annotation. *The article reveals the features of the formation of a special type of criminal social world, namely, Soviet criminals. It is shown that the genesis of this criminality is associated, on the one hand, with previous criminal elements, and, on the other, with the specifics of the formation of new socio-economic and political relations. The question is raised about the periodization of the formation and development of the criminal world in Soviet Russia, which the author associates with the possibility of connecting this world with power structures.*

Key words: *crime; Soviet criminality; near-criminal social world; periodization of the development of the criminal world.*

Crime is inherent in every society and throughout its existence. Naturally, Russia is no exception in this regard. But, firstly, given the specifics of each society, which is due to its history, the degree of maturity of the totality of social relations, we can talk about the characteristics of crime in society. At one time, the Russian historian N.M. Karamzin, to the words of which P.A. Vyazemsky said, for example: “If I were to answer in a word the question: what is being done in Russia, I would have to say: steal” [Vyazemsky]. At the same time, something exceptional, peculiar only to Russian society, is generally not visible in these words, unless you take into account that we were talking about all layers of society, about the constancy, totality of this delinquent action. M.E. Saltykov-Shchedrin, a writer who knew Russian reality well, including what happened in the upper echelons of society, since he himself had been vice-governor for some time, he put the following words into the mouth of the “hero” of his work: “I sat at home and as usual, he didn’t know what to do with himself. He wanted something: either the constitu-

tions, the stellar sturgeon with horseradish, or the tear off of someone" [Saltykov-Shchedrin, 1965, p. 294]. It turns out that certain mental traits that were formed during the long-term socio-historical development also bring some exclusive characteristics to the deviant and delinquent behavior of significant masses of people. In this case, references to literary sources do not seem to look strictly scientific, are not arguments, unless you take into account that Russian realistic literature in the 19th century, showing different facets of public life, largely compensated for the impossibility of not only deeply scientific, but also social philosophical insight into everything that happens in society. And such observations and assessments really reflected the real situation in society.

Secondly, one should proceed from the fact that any change, and even more so radical as revolution, not only affects all elements of social life, including crime, but also significantly modifies them. Therefore, the emergence of a new, Soviet criminality occurs soon after the October Revolution of 1917. By many parameters, the criminal world, as the totality of all those who lived constantly breaking the law, remained the same. For example, all the "thieves' qualifications" have survived: thefts through the cut of clothes, bags and briefcases with special technical devices (among pickpockets, persons who steal in this way are called "scribes" or "techies"); thefts under cover of hands with various objects - cloaks, bags, bouquets of flowers, etc. ("shirmachi"); thefts from purses and pockets with the help of specially made hooks ("fishermen"); theft with tweezers, especially from hard-to-reach secret places ("surgeons"); thefts without technical means and a "screen" by a group of people with a mass gathering of people ("pinch"); theft by pushing objects with precise and quick movements ("shaking"). The "housekeepers" (thieves who seized property of citizens from apartments and houses), "bear cubs" (thieves who opened safes) and other "professionals" [Gurov] have not disappeared anywhere. Indeed, it didn't make much difference to rob the safe of any banker or state ("Soviet") institution.

But already at the very beginning of the Soviet period of history, the criminal world is being recruited from emerging new layers and social groups of society. In its own way, for example, the new, already Soviet bureaucracy appreciated the opportunities that large-scale nationalization of large enterprises opened up. This bureaucracy quickly realized how it was possible to personally enrich themselves at the expense of the so-called public property, which formally belonged to the whole people, but it was controlled by Soviet officials (workers of the "Soviet apparatus", the emerging nomenclature). Among them, official crime at that time became common, which was often veiled in party documents under the more neutral term "abuse of self-supply." In fact, this was nothing more than a frank "embezzlement of the land." Soviet officials widely used state funds for the repair of apartments, offices, summer cottages, and the acquisition of luxury goods. Distribution in the early 1920s received honors of senior officials and expensive gifts to them. The

"elite life" of the nomenclature required significant material costs. Funds for such a life were "obtained" by bribes or theft [Nikulin, 2013, p.14]. The scale of bribery is evidenced by the fact that only in 1922 the total number of those convicted for this in the 49 provinces of the RSFSR amounted to 3254 people, which is twice as many as those convicted of other state crimes [Kasyanov, 2014, p.20].

The originality of the formation of specific Soviet criminals is given by the new economic policy (NEP), the beginning of which dates back to 1921. Along with nomenclature crime, which characterizes, among other things, the peculiar envy of workers in the administrative apparatus, who often passed the tests of the civil war, for the emerging nouveau riche, the illegal activities of these new bourgeois themselves are clearly recorded.

In the NEP period, prosperous people quickly appeared: merchants, owners of workshops, restaurants, etc. The "new bourgeois" tried to establish specific contacts with Soviet officials, moreover, even introduced their people into the power structures. The initial accumulation of capital never, as is known, was not distinguished by a special moral purity; in Soviet Russia in the early 1920s, it was very predatory. They used deception of citizens and entire organizations, obtaining loans for enterprises that never existed, smuggling and currency fraud, speculation, theft of state property covered by bribes [Demchik, 2000, p. 39].

The spread is the creation of imaginary business entities, in particular, fictitious cooperatives, firms, etc. The number of such "wild" and "false" cooperatives grew every year. On January 1, 1925, for example, in the USSR there were about 14 thousand such associations, which accounted for 40% of their total number [Shanina, 2012, p.1108]. In parallel, further destruction of the consumer market took place, a landslide deficit of an increasing number of goods began, which intensified criminal activity in the sphere of exchange and distribution. It is not accidental that the fact that in cooperatives up to 60% of their leaders were previously convicted [Gurov, 1990, p. 176].

One cannot but agree with the assertion that the permission of entrepreneurial activity, carried out improvisationally, without promising targeted development programs in key areas, especially in conditions of actual dual power in Soviet Russia, turns out to be unproductive and opens the way to new totalitarianism [Kurginyan, p.22]. By dual power here we mean a special system of government in the USSR, when one power (party structures) was largely latent, but real, taking all the basic decisions on key problems of society. At the same time, party bodies did not bear legal responsibility for decisions made and their implementation. The second power was the Soviet and economic bodies. This power was clear, open, but responsible not only for its own, but also for party decisions. Here is how A.A. explains this situation. Zinoviev: "The Soviets were thought of as the main power, and the "party" apparatus as their weapon. But something unforeseen happened.

The Soviets remained the highest state power. But over it a state power arose, subjugating it and turning the entire system of power into a higher level phenomenon organizations - to the super state [Zinoviev, 2002, p.218].

During the NEP period, part of the capital acquired by criminal means in the previous period was withdrawn from the "shadow" back during the First World War. A perfectly legitimate opportunity was opened for investing these funds in the now legalized entrepreneurial activity [Bogdanov, 2011, p. 72].

It turns out that the new period of development of Russian society that began in the late 1920s, the phasing out of the NEP (1929, the "year of the great turning point", which meant the massive creation of collective farms - collective farms), was partly a kind of reaction to this policy, which means in a certain sense and its generation, dissatisfaction of a significant part of society with the growing and increasingly noticeable differentiation of incomes of various layers of society.

For us it is precisely this circumstance that seems to be the most important. Society in a peculiar socio-psychological shock experienced in connection with a sharp transition from declared equality to a strictly limited consumption level characteristic of the period of "war communism" to the assumption, even on a limited scale, of private property could not help but respond to this situation with a new wave bitterness and criminal aggression against the now Soviet "bourgeois" entrepreneurs. Which, incidentally, to note, intuitively realizing that the time of their activity can end very quickly, were in a hurry to extract the largest possible profit. Hence, another reason for the mass of illegal actions.

The concentration in the hands of offenders of a huge start-up capital was expressed in squandering the national wealth and in a real threat to the economic security of the Soviet state. According to Soviet economists in the 1920s, state losses during the "squandering period" amounted to approximately 350 million rubles. in gold. The events of the 1920s convincingly show that along with the traditional forms of bribery, such as giving and receiving money, mediation in bribery and extortion of a bribe, a new phenomenon has arisen - the so-called "hidden bribes", or "hidden bribery", which before the introduction of the NEP practically did not occur in law enforcement and judicial practice [Epikhin, p.6]. Latent bribery is sometimes understood to mean the provision of intangible services, removal of barriers for any action or its acceleration, the inclusion of "right" people, relatives in the number of highly paid employees, delivery of gifts, fictitious loan funds [Orlov, 2010].

The specific socio-economic system ("non-market" economy) gradually developing in the Soviet Union, which was based on state, somewhat impersonal, no-man ("nation-wide") property, received a peculiar reflection in the mass consciousness, in the attitude of people to material the benefits that were created by their efforts. After all, if the means of production, tools, land, everything that is grown on it, formally do not have a visible owner, all this can easily be appropriated.

It should be noted that in the first period after the revolution, a certain romanticism was noted, which was inherent in those who were in power. This was expressed, in particular, not only in the belief that a quick victory of the world revolution would occur, but also in the fact that crime would soon disappear, which was conceived only as the legacy of bourgeois society (the “birthmarks of capitalism” would be resolutely overcome). This led to the idea of the peculiar purpose of a “proletarian court”, which “cannot avenge people for living in bourgeois society. Therefore, the punishments of our people's courts now reflect a complete revolution in justice. Conditional conviction is increasingly being applied...” [Bukharin, 1919].

Reality, however, quickly showed that all this was no more than utopia. Already in the 1926 Criminal Code of the RSFSR, an article appeared that provided for liability for the theft of state property. It is noteworthy that the punishment under this article was more severe than for the theft of personal property [Hamidullaeva, 2007, p.161].

Romanticism, as we see, quickly vanished. The total capacity of criminals during this period can be estimated conditionally, referring to the statistics on the number of prisoners and camps. If in 1923 in the country there were about 71 thousand prisoners, then at the end of 1929 there were already more than 110 thousand [Luneev, 2006]. There came a different time, a period of tough actions by the authorities, a period of formation of a totalitarian regime. Thus, the stage of the formation of Soviet criminality was completed, which, from our point of view, is characterized, firstly, by the appearance of new types of crime, and secondly, by the adaptation of the previous criminality to other socio-economic conditions.

Summing up the above, it can be argued that at the very beginning of the Soviet period in the history of Russia a specific criminality was formed, which combined the features of the traditional, characteristic of any society, and possessing other characteristics. Among these new features can be identified, for example, selfish manipulations with state property. At a certain stage, organized criminal groups were not only purely bandit, but also, to some extent, were actively engaged in political opposition to the Soviet government. The criminality of many actions gave non-market character to the socio-economic system. By virtue of this, speculation and the acquisition of foreign currency were sanctioned.

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Q波心肌梗死患者血流动力学参数的动态变化
**DYNAMICS OF HEMODYNAMIC PARAMETERS
IN PATIENTS WITH Q-WAVE MYOCARDIAL INFARCTION**

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抽象。 梗死后重塑的稳定进展性并不总是通过MI早期病理性重塑的存在来解释。 随后以反复心肌梗塞的形式不稳定,持续性心绞痛也做出了重要贡献。 即使在没有血运重建和溶栓治疗的情况下,坚持放电治疗也可改善梗死后患者的预后并降低2年死亡率。

关键词: 梗死后重塑, 生存能力, 卸载治疗, 心力衰竭

对294例Q波心肌梗死(Q-MI)患者的数据进行了分析。 根据2年的观察数据,我们评估了可能影响患者生存能力的临床和记忆因素。 我们研究了不同组患者的心肌梗死后重塑。

Abstract. *The steadily progressive nature of post-infarction remodeling is not always explained by the presence of pathological remodeling in the early stages of MI. Subsequent destabilization in the form of repeated myocardial infarction, persistent angina pectoris also make an important contribution. Adherence to discharge therapy, even in the absence of revascularization and thrombolytic therapy, improves the prognosis of post-infarction patients and reduces 2-year mortality.*

Keywords: *postinfarction remodeling, survivability, off-loading therapy, heart failure*

There is analyses of data on 294 patients with Q-wave myocardial infarction (Q-MI). According 2 year observational data we evaluated clinic and anamnestic factors which may influence on survivability of patients. We studied the postinfarction remodeling in groups different group patients.

In 1980s Pfeffer M.A. and Braunwald E. introduced the term “heart remodeling”, which implies structural-geometric changes in the left ventricle (LV) after acute myocardial infarction (MI) and includes myocardial hypertrophy, dilatation of the cavities and impaired myocardial contractility [1]. Structural and geometric restructuring in MI is characterized by a symptom complex in the form of a change in the number and size of cardiomyocytes in both damaged and intact LV regions, as well as a restructuring of the interstitial component of the myocardium, development of heart attack expansion, LV dilatation and hypertrophy, time-consuming processes and leading to progression LV dysfunction [2,3]. In the next two decades, a large number of works were devoted to the assessment of functional (Pfeffer JM et al., 1991), structural (Anversa P., Sonnenblick EH, 1990; Cohn JN, 1995; Davies CH et al., 1996), biochemical (Houser SR, Lakatta EG, 1999) and molecular (Emanueli C. et al., 1999; Mann DL, 1999) mechanisms of postinfarction LV dysfunction and progression of chronic heart failure (CHF). Enzymatic thrombolysis and alternative methods of emergency myocardial reperfusion significantly changed the clinical profile of patients acute myocardial infarction and their tendency to develop cardiovascular x events (Yusuf S. et al., 1985).

Algorithms and recommendations for the management of patients with acute myocardial infarction have been developed, the principles of A, B, C, D-aspirin, beta-blockers, statins and ACE inhibitors are widely implemented (Mareev V.Yu., 2003), which made it possible to reduce hospital mortality in MI. However, myocardial infarction is one of the main causes of the development of chronic heart failure [4]. According to the Framingham study, heart failure develops over 5 years in 14% of patients who have had acute myocardial infarction [5]. The continuing problem of the absence of thrombolysis, the low availability of revascularization, and the low patient adherence to therapy prompted us to study the dynamics of postinfarction remodeling of the left ventricle in this category of patients.

Material and research methods

The study included 294 male patients (middle age) with primary Q-wave myocardial infarction. Exclusion criteria were: repeated MI, concomitant malignant neoplasms, systemic lung diseases, kidney diseases, patient refusal to participate in the study, or the inability to conduct an echo-examination due to constitutional features, atrial fibrillation, atrioventricular block II-III degree, repeated myocardial infarction. The inclusion of patients was carried out on 10-14 days of illness.

Anterior MI localization was observed in 155 patients, of which, in 76 patients, LV aneurysm was revealed according to the echocardiography data. DM was first detected in 30 patients. Coronary heart disease before the present MI suffered 45 patients, GB 209 patients. Potentially dangerous ventricular arrhythmia (more than 10 per hour and above class II according to Launa's classification) according to daily monitoring data was detected in 139 patients. All patients were prescribed standard therapy with the inclusion of ACE inhibitors, beta-blockers, dual antiplatelet therapy, statins, spironolactone, antiarrhythmic drugs and diuretics, if necessary.

Patients were referred for repeated clinical and instrumental examinations for 6 months, 1 year and 2 years of observation. For 2 years of observation, we examined 259 patients. The fate of 32 patients was established through interviews with relatives who provided a death certificate.

All patients underwent physical examinations, echocardiography, and HMECG. Echocardiography and dopplerographic studies were performed on a Sonoline Versa Pro device using a standard technique using the recommendations of the American Echocardiographic Society.

The following indicators were measured and calculated: thickness of the interventricular septum (TMJ); the thickness of the back wall of the LV (TZSLZH); final diastolic size of the left ventricle (CRD), final systolic size (LVC) of the left ventricle, ejection fraction (LV) of the left ventricle. To quantify the geometric shape of the LV, the sphericity index (IS) = $d1 / d2$ was determined, where $d1$ is the longitudinal finite diastolic size of the LV, $d2$ is the transverse finite diastolic size of the LV.

Long registration of the ECG was carried out in a free patient mode using the Cardio Sens + computer system. The analyzed parameters of HMECG included hourly average and daily average heart rate, circadian index (CI); structure of heart rhythm disturbances. Gradient classification B.Lown and M.Wolf (1971) and the prognostic classification J. Bigger (1982) were used to characterize the VE. Hourly qualitative and quantitative assessments were carried out in accordance with Lown-Wolf gradations. According to the classification of J. Bigger, after MI, potentially dangerous ventricular arrhythmias (PDVA) were referred to $VE > 10$ per hour, paired VE and group VE.

Mathematical data processing was performed using the STATISTICA-6.0 software package.

Results and its discussion

Over two years of follow-up, the overall mortality rate was 11.9% (35 patients). From non-cardiac causes, 3 patients died (1%), total cardiac mortality occurred in 32 (10.8%) patients, including Sudden cardiac death - in 24 (8.1%) patients. The causes of non-cardiac mortality were: tumors in 2 cases, strokes in 1 patient. The causes of non-sudden cardiac death (8 cases) in 8 cases were the progression of chronic heart failure (HF), including against the background of repeated current MI in 5 patients. It should be noted that in 20 (6.8%) cases, death was recorded in the first year of observation, which coincides with the data of Anthony J.J. McClelland et al. When the mortality rate of patients during the first year of observation was 7% [6]. As can be seen from table 1. Patients of both groups were comparable in age, growth and weight parameters, duration according to the history of IHD, burdened heredity, time of admission to the hospital and thrombolytic therapy. It must be said that in the group of deceased patients with

diabetes were significantly more likely to prevail (34.4% versus 8.5%; OS 5.64; 95% CI 2.41-13.2; $p = 0.0001$), almost every third patient Group II had a long smoker experience (28.1% versus 11.6%; OR 2.99; 95% CI 1.27-7.05; $p = 0.02$).

As can be seen from the table, the group of deceased patients significantly differed in the frequency of anterior localization of MI (71% versus 50.9%, OR 2.46; 95% CI 1.10-5.52; $p = 0.04$), which is possible and caused the development of acute heart failure in the overwhelming majority of patients of group II. So, in the group of patients with an unfavorable prognosis, severe heart failure was observed in every fourth patient. A similar trend continued throughout the observation period in the dynamics of heart failure.

So, if by the 6th month of observation, patients with FC I CHF amounted to 48%, then by the end of the first year of observation their number was less than 10%, while in groups with CHF II and III FC there was an increase in the number of patients, from 35% to 50% and from 15% to 40%, respectively ($p < 0.05$).

Table 1. Indicators of survivors and deceased patients on days 10-14 of AMI

Parameters	Survival (n=259)	Died (n=32)	OR	95%CI	P
Age					
Younger than 45	51 (19,7%)	4 (12,5%)	1,72	0,58-5,11	0,46
45 and older	208 (80,3%)	28 (87,5%)			
Anterior	132 (51,0%)	23 (71,9%)	2,46	1,10-5,52	0,04
AHF III-IV Killip	7 (2,7%)	8 (25%)	12,0	4,0-36,0	0,0001
LV aneurizm	65 (25,1%)	14 (43,8%)	2,32	1,09-4,93	0,04
PDVA	158 (61%)	25 (78,1%)	2,28	0,95-5,47	0,09
LBBB	35 (13,5%)	10 (31,3%)	2,91	1,27-6,66	0,02
DM	22 (8,5%)	11 (34,4%)	5,64	2,41-13,2	0,0001
Smoking	30 (11,6%)	9 (28,1%)	2,99	1,27-7,05	0,02
IHD in past	37 (14,3%)	8 (25%)	2,0	0,84-4,79	0,19
Dyslipidemia	119 (45,9%)	16 (50%)	1,18	0,56-2,45	0,81
Trombolysis	38 (14,7%)	4(12,5%)	0,83	0,28-2,50	0,95
Recurrent ischemia	90 (34,8%)	15 (46,9%)	1,66	0,79-3,47	0,25
AH	191 (73,8%)	24(75%)	1,07	0,46-2,49	0,95

At the pre-prescription stage, the compared groups practically did not differ in the therapy being conducted. Only patients of the 2nd group more often had indications for the appointment of AAP (amiodarone). Despite a thorough conversation with patients about the need to take medications, on repeated visits or questioning relatives in the group of the deceased, patients in both groups showed

low adherence to therapy. Moreover, in the 2nd group of patients, almost half of the patients stopped taking beta-blockers, ACE inhibitors, and statins. At the same time, in this group, the frequency of taking cardiac glycosides, diuretics significantly increased

The analysis of the frequency of post-infarction angina pectoris, instability episodes, and related hospitalizations increased significantly with the observation period in observation II, although at the hospital stage there were no significant differences between the groups. So, after 6 months, patients of the 2 groups were more likely to experience bouts of progressive angina pectoris, during visits they complained of angina pectoris, hospitalization cases were more frequent due to destabilization and recurrent MI. So, by the end of the observation period, cases of recurrent MI were registered in 40 patients (13.6%). Moreover, 15 (46.8%) of them were observed in patients of the 2nd group.

“Spherification” in the early stages of MI was observed in patients of both groups and is aimed at maintaining contractile ability, LV stroke volume, which echoes the data from other studies [7,8]. However, in patients of group 2, the adaptive nature of remodeling had a progressive course with a gradual transition to maladaptive, with a decrease in myocardial contractile function and an increase in the class of heart failure. So, at the pre-preschool stage, the IP indicator (normally tending to 2) in both compared groups was relatively the same.

Further, in the group with an unfavorable prognosis, a further increase in the transverse dimensions of the heart is noted, which was manifested by a decrease in the IS in this group from 1.64 to 1.45 cu ($p < 0.05$), while in the first group negative dynamics are not traced. Moreover, by the end of 2 years of observation, the IP index in the first group is close to 2, which indicates the adaptive nature of remodeling.

It should be noted that already at the pre-preschool stage, the group with an unfavorable outcome had higher end systolic and end diastolic parameters than the patients of group I ($p = 0.01$). In the future (for 6 months), the so-called "pseudo-normalization" is noted, that is, an increase in size, which is explained by the involvement of uninfected sections of the heart muscle. But it attracts attention that in the first group this dynamics is unreliable, while in the group with pronounced dilatation, the increase in size reaches significant levels. So, by the 6th month in the II group there is an increase in the end systolic and end diastolic parameters by 8.2% and by 14% ($p < 0.05$).

By the end of the 1st year of observation, the increase in the end systolic and end diastolic parameters in the 2nd group relative to the initial values was already 14% and 19% ($p < 0.05$). In the same period, in the 1st group, there was a significant decrease in the end diastolic parameters by 5.2% ($p = 0.004$). It should be noted that by the end of 2 years of observation in the first group there is a favorable

dynamics in relation to these indicators. So, the end diastolic was 5.3 sm ($\Delta\% = -7\%$), the end systolic 3.6 sm ($\Delta\% = -8\%$). Summarizing the above, it can be said that dilatation in the group of patients with an unfavorable outcome, starting at the pre-prescription stage, continued and worsened as the observation time increased, while in the group with a favorable outcome, a decrease in the end systolic and end diastolic parameters

One of the most commonly used parameters of LV systolic function in practical medicine is PV. An analysis of the dynamics of this indicator also showed that in the group with reduced PV further its further progressive decrease from 40% to 35.9% was noted. The data of numerous studies have proved the determining role of MI in the development of MI. It was patients with MI in the studies that had an EF below 45% and showed high mortality during the first year after MI. In recent years, considerable importance has been attached to the problem of patient adherence to recommended therapy, recognizing one of the determining roles in the prognosis of patients' lives [9, 10].

After all, as you know, late remodeling is characterized by the activation of the neuroendocrine mechanisms of structural and functional myocardial restructuring - activation of the sympathoadrenal and renin-angiotensin-aldosterone systems. As a result, the relevance of unloading therapy in the form of the use of ACE inhibitors and beta-blockers is beyond doubt. As can be seen from the data on the administration of drugs, patients of the 2nd group showed low adherence to therapy.

A similar slight thinning of the walls of the LV is possibly due to repeated myocardial infarction. The data obtained with respect to the echocardiography indicators in the 1st group also indicate the high efficiency of unloading therapy.

Conclusion:

The steadily progressive nature of post-infarction remodeling is not always explained by the presence of pathological remodeling in the early stages of MI. Subsequent destabilization in the form of repeated myocardial infarction, persistent angina pectoris also make an important contribution. Adherence to discharge therapy, even in the absence of revascularization and thrombolytic therapy, improves the prognosis of post-infarction patients and reduces 2-year mortality.

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眼科患者青光眼患者眼压的调节
**REGULATION OF INTRAOCULAR PRESSURE
IN PATIENTS WITH GLAUCOMA
DURING OPHTHALMIC SURGERY**

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抽象。青光眼是一组慢性和进行性视神经病变，是全世界超过6000万人不可逆转失明的主要原因。青光眼发病机制中的关键因素是视神经细胞凋亡，其背景是眼压升高或正常（IOP）。局部或全身治疗青光眼的准备工作具有严重的副作用，并且当与麻醉剂相互作用时，可引起各种严重的并发症。因此，麻醉师应该了解青光眼的处方治疗方法。在青光眼患者的围手术期处理中，有必要考虑确定手术期间IOP水平的机制，以及与麻醉技术和操作相关的因素。有必要预防术后恶心呕吐和足够的疼痛缓解，以防止术后期间眼压升高。

关键词：眼压，青光眼，围手术期处理，眼科手术。

Abstract. *Glaucoma is a group of chronic and progressive visual neuropathies that are the main cause of irreversible blindness in more than 60 million people worldwide. A key factor in the pathogenesis of glaucoma is apoptosis of the optic nerve against the background of increased or normal intraocular pressure (IOP). Preparations for local or systemic treatment of glaucoma have serious side effects and, when interacting with anesthetics, can provoke various serious complications. Therefore, the anesthetist should be aware of the prescribed treatment for glaucoma. In perioperative management of patients with glaucoma, it is necessary to take into account the mechanisms that determine the level of IOP during*

surgery, as well as factors associated with the anesthetic technique and manipulations. It is necessary to prevent postoperative nausea and vomiting and adequate pain relief to prevent an increase in IOP in the postoperative period.

Key words: *intraocular pressure, glaucoma, perioperative management, ophthalmic surgery.*

Introduction. Glaucoma is a group of chronic and progressive visual neuropathies that are the main cause of irreversible blindness in more than 60 million people worldwide. A key factor in the pathogenesis of glaucoma is apoptosis of the optic nerve against the background of increased or normal intraocular pressure (IOP) [1, 2]. IOP is normal 10-22 mm RT. Art., pressure above 25 mm RT. Art. considered pathological. IOP is determined mainly by the volume of aqueous humor of the eye, since the scleral membrane of the eye is rigid and its volume remains virtually unchanged. IOP is greater than pressure in any other organ or confined space in the body (even intracranial pressure is only 7-8 mm Hg). With penetrating damage to the membranes of the eyeball, the IOP is aligned with atmospheric, i.e. the pressure drop is large enough. The level of intraocular pressure is a consequence of the dynamic balance between the rate of formation of aqueous humor of the anterior chamber and its drainage.

Preparations for local or systemic treatment of glaucoma have serious side effects and, when interacting with anesthetics, can provoke various serious complications. Therefore, the anesthetist should be aware of the prescribed treatment for glaucoma.

For the treatment of glaucoma, local agents are used to reduce IOP, which reduce the production of aqueous humor in the anterior chamber, or improve drainage through the trabecular network, or enhance uveoscleral outflow. In refractory situations, tablet preparations are prescribed.

Usually, m-cholinomimetics (pilocarpine) with cholinesterase inhibitors (physostigmine) are prescribed initially to reduce intraocular pressure. After normalization of IOP, the patient can be prepared for corrective surgery.

Open-angle glaucoma and some cases of secondary glaucoma are chronic diseases and require long-term therapy with parasympathomimetics (pilocarpine, carbochol), adrenaline, β -blockers, carbonic anhydrase inhibitors.

It should be remembered that with angle-closure glaucoma, the appointment of anticholinergics, nitrates, antispasmodics can cause an acute attack of angle-closure glaucoma. This is an emergency, often requiring emergency surgery.

Topical use of ophthalmic preparations can cause various systemic reactions, as eye drops enter the bloodstream through the mucosa of the conjunctival sac and nasolacrimal duct. In addition, the concentration of the active substance in topical preparations is usually an order of magnitude higher than in intravenous prepara-

tions. The rate of entry of ophthalmic drugs into the general bloodstream is higher than with subcutaneous administration, but lower than with intravenous. It must be borne in mind that the risk of toxic effects of eye drops is most significant in children and elderly patients [3].

When prescribing treatment for glaucoma, it is important to remember contraindications for use and side effects of drugs.

Carbonic anhydrase inhibitors (azopt, trisopt) are not recommended to be prescribed simultaneously with systemic carbonic anhydrase inhibitors, since it is possible to enhance systemic reactions associated with inhibition of the enzyme. Also, they are not recommended to be combined with high doses of salicylates, which can lead to the development of hypokalemic metabolic acidosis [4].

Osmodiuretics (oral glycerol or intravenous mannitol): contraindicated in patients with renal failure, congestive heart failure and pulmonary diseases [5].

β -blockers used to reduce IOP (timolol, betoptic) are contraindicated in sinus bradycardia; AV blockade II and III degree; severe heart failure; bronchial asthma [3].

In the perioperative period, it is necessary to take into account the systemic side effects of myotic drugs used to reduce IOP.

Cholinomimetics (aceclidine, acetylcholine chloride) are contraindicated in bronchial asthma, angina pectoris, atherosclerosis, organic heart diseases, epilepsy. Acetylcholine chloride can cause resistance to depolarizing muscle relaxants.

Inhibitors of acetylcholinesterase and pseudocholinesterase. Neostigmine can cause bradycardia, a decrease in blood pressure, increased secretion of bronchial glands and increased bronchial tone. Phospholine (an irreversibly active cholinesterase inhibitor) increases the duration of action of succinylcholine (up to 20-30 minutes). Perhaps the development of bradycardia during the induction of anesthesia.

Carbachol (M-, H-cholinomimetic) causes systemic reactions: headache, fever, salivation, nausea, bradycardia. Oftan-pilocarpine (M-cholinomimetic) in high concentrations causes tachycardia, bronchospasm [3, 6].

Halogenated inhalation anesthetics increase the sensitivity of the myocardium to adrenaline, provoking the development of arrhythmias. Brimonidine, apraclonidine (selective α_2 -agonists) can lead to orthostatic arterial hypotension, bradycardia [6].

If local or tablet preparations are ineffective to reduce IOP, surgical interventions are used - laser (iridotomy, trabeculoplasty) and surgical anti-glaucoma surgery (microinvasive glaucoma surgery, trabeculectomy, cyclodestruction, cycloablation, implantation of anti-glaucomatous drainage devices) [7, 8].

In perioperative management of patients with glaucoma, it is necessary to take

into account the mechanisms that determine the level of IOP during surgery [6]. It is important to remember the dynamic balance between production and the outflow of aqueous humor of the anterior chamber. An increase in the moisture flow rate is caused by adrenaline, norepinephrine, pilocarpine, physostigmine, adrenergic agonists. Preparations for the treatment of arterial hypertension and cardiac arrhythmias lead to a decrease in the rate of moisture flow: β -blockers, α -agonists, carbonic anhydrase inhibitors. Corticosteroids cause a decrease in fluid drainage. Muscarinic cholinergic agonists of direct and indirect action (pilocarpine, atropine, oxotremorine), adrenergic agonists, and prostaglandin contribute to increased drainage [9].

Blood supply to the eye is carried out by the first branch of the internal carotid artery (ophthalmic artery). The central retinal vein provides venous drainage of the anterior segment of the optic nerve. Any obstruction between the eye cavity and the right atrium in the outflow pathway increases intraocular pressure. Obstruction of the central retinal vein and / or increased central venous pressure associated with anxiety, anxiety, hypervolemia, elements of heart failure, overflow of the bladder, coughing, vomiting, Valsalva maneuver or kinking of the endotracheal tube cause a sudden and sharp increase in the volume of choroidal blood and IOP [10].

Wang et al. (2015) showed that the blood supply to the optic nerve is most susceptible to a decrease in perfusion pressure of the eye caused by a drop in blood pressure relative to the induced increase in IOP. With low pressure in the ophthalmic artery (with atherosclerosis, angiopathy, controlled hypotension), with a decrease in blood pressure below 90 mm Hg. Art., autoregulation of blood supply to the vascular plexus ceases, and even a short-term increase in IOP can cause retinal ischemia. Thus, the anesthetist should monitor the maintenance of ocular perfusion pressure, avoiding hypotension [11].

Respiratory alkalosis (hyperventilation and hyperoxia), metabolic acidosis (diabetic acidosis, severe muscle strain, acetazolamide-induced acidosis) can lead to a decrease in IOP in both ordinary patients and patients with glaucoma. On the other hand, respiratory acidosis (an increase in $P_{et}CO_2$ in a closed system of regeneration, hypoventilation and hypercapnia) and metabolic alkalosis (intravenous administration of sodium bicarbonate) increase IOP.

A decrease in the vitreous volume when taking hyperosmotic agents (e.g. mannitol) reduces IOP. A temporary increase in IOP occurs after injection of drugs or gases into the vitreous.

General anesthetics reduce IOP directly through relaxation of extraocular muscles due to the central influence and indirectly, by facilitating drainage, through hormonal and hemodynamic effects [12].

Transient IOP fluctuations with an intact eyeball are well tolerated. However,

any sudden increase in IOP in violation of the integrity of the anterior chamber during surgery can lead to loss of the iris, lens, vitreous body and blindness. In addition, an initially elevated IOP complicates the work of the surgeon and can cause expulsive hemorrhage. [13].

Factors affecting IOP in the perioperative period. Ophthalmic pathology and surgical technique: glaucoma, high myopia, luxation and subluxation of the lens, complicated cataracts (uveal), traumatic cataracts, eye condition after repeated ophthalmologic operations, single eye, previous expulsive hemorrhage during surgery on the other eye, defects in the operating technique and techniques for performing local anesthesia (retrobulbar hematoma, injection into the vitreous body), paradoxical reactions to ciliary irritation, an allergic reaction with lump of eye tissue and near it.

Factors associated with the anesthetic technique. IOPs are reduced by inhalation, intravenous or intramuscular anesthetics, hyperventilation (hypocapnia and improvement of venous outflow), hypothermia, osmодиuretics (mannitol, glycerol, magnesium sulfate), carbonic anhydrase inhibitors, ganglioblockers, antispasmodics, β -tholimolate, in the absence of glaucoma, etc.), non-depolarizing muscle relaxants, pressure on the eyeball before surgery with an oculopressor, elevated head end (Fowler's position), neck extension.

IOP increase cough or vomiting, ketamine, succinylcholine, anticholinergics, antispasmodics, nitrates in angle-closure glaucoma; glucocorticoids (local), hypoventilation (arterial hypoxemia, hypercapnia), direct laryngoscopy, increased hilar pressure, large abdomen when lying on the back, Trendelenburg position, eyelid pressure, tight collar, fixation of the endotracheal tube on the neck.

Influence of concomitant pathology on IOP (may increase IOP): chronic lung diseases with increased intrathoracic pressure, pulmonary heart disease, cough, grade 3-4 obesity, chronic pain syndromes that do not allow the patient to be in a comfortable position on the operating table, insufficient overall preparation of the patient for surgery, acute and chronic visceral pain syndromes; encephalopathy, convulsive syndrome and generalized hyperkinesia, hypertension with high blood pressure, angioretinopathy in severe diabetes mellitus.

All these factors should be taken into account by the anesthesiologist when planning the appropriate method of anesthesia and when conducting an anesthesiological aid.

Of particular importance to the anesthesiologist is a sharp increase in IOP in response to the introduction of succinylcholine, associated with prolonged contraction (up to 20 min) of the oculomotor muscles. However, it is noted that induction anesthesia with propofol partially prevents an increase in IOP [13, 14].

Pronounced reflexogenic activity during laryngoscopy and tracheal intubation can cause a sharp increase in systolic blood pressure with an increase in the volume of vascular structures of the eye and an increase in the production of intraocular fluid. This provokes a sharp jump in IOP [15].

Opinions on the effects of ketamine on IOP are still mixed, but there are stud-

ies showing an increase in IOP within 30 minutes after intravenous administration of ketamine [16]. Perhaps this is due to the fact that the study was carried out in a group of children with ketamine monoanesthesia, which even with good analgesia does not inhibit deep reflexes and does not cause relaxation of the muscular apparatus of the eye.

Prevention of postoperative nausea and vomiting is necessary to prevent an increase in IOP in the postoperative period. Propofol has minimal emetic potential and is the drug of choice. Boey P.Y. et al (2012) reported that the introduction of metoclopramide before induction causes a slight increase in IOP, lasting about 30 minutes [5]. Therefore, onansetron and dexamethasone are preferred for the prevention of nausea and vomiting.

Tremors in the postoperative period can cause an increase in blood pressure and IOP, and therefore should be prevented with dexamethasone, dexmedetomidine, or opiates [6].

Extubation should be performed until complete awakening during the restoration of spontaneous breathing in order to avoid coughing.

Adequate pain relief in the postoperative period is an essential factor in the control of IOP and is usually ensured by the use of NSAIDs locally [17].

Key recommendations.

1. Preparations for local or systemic treatment of glaucoma have serious side effects and, when interacting with anesthetics, can provoke various serious complications. Therefore, the anesthetist should be aware of the prescribed treatment for glaucoma.

2. In the perioperative management of patients with glaucoma, it is necessary to take into account the mechanisms that determine the level of IOP during the operation, as well as factors associated with the anesthetic technique and manipulations.

3. It is necessary to prevent postoperative nausea and vomiting and adequate pain relief to prevent an increase in IOP in the postoperative period.

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糖尿病肾病患者上皮 - 间质细胞转化的新诊断标志物
**NEW DIAGNOSTIC MARKERS OF EPITELIUM-MESENCHIMAL
TRANSFORMATION IN PATIENTS
WITH DIABETIC KIDNEY DISEASE**

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抽象。本研究的目的是探索和分析DKD患者尿液中EMT新诊断标志物在其发展早期的作用。该研究纳入了79例诊断为2型糖尿病，新诊断，DN，CKD C 1，AH，1-2级的患者。对照组包括30名健康个体。在研究的第7天，在指标的基础上评估患者身体系统的功能状态：AER的测量，MAU的评估，根据CKD流行病学协作公式的GFR计算，定量分析通过ELISA，在测试系统的基础上进行尿样中EMT标记蛋白-E-钙粘蛋白，podocin，脂质运载蛋白-2的含量。研究组患者尿液中podocin，E-cadherin，脂质运载蛋白2浓度与AER指数的相关性通过podocin浓度，脂质运载蛋白2的平均结合强度与浓度的高结合强度的直接相关性来表示。尿液中的E-钙粘蛋白该研究证实了podocin，E-cadherin和脂质运载蛋白-2在DKD进展中的预后作用，作为2型糖尿病患者CKD的特殊情况。

关键词：上皮 - 间充质转化，糖尿病肾病，诊断标志物

Abstract. *The aim of this study was to search and analyze the role of new diagnostic markers of EMT in urine in patients with DKD in early stage of its development. The study included 79 patients with the diagnosis of type 2 DM, newly diagnosed, DN, CKD C 1, AH, grade 1-2. The control group included 30 healthy individuals. The state of the functioning of the body systems of patients was evaluated on the 7th day of the study on the basis of indicators: the measurement of AER, the assessment of MAU, GFR calculation according to the CKD Epidemiology Collaboration formula, quantitative analysis of the content of EMT marker proteins - E-cadherin, podocin, lipocalin-2 in urine samples was performed on the basis of test systems by ELISA. Correlation interactions between the concentrations of podocin, E-cadherin, lipocalin 2 in the urine of patients of the study group with AER index were represented by direct correlations of average binding*

strength for the concentration of podocin, lipocalin 2 and high binding strength for the concentration of E-cadherin in the urine. The study demonstrated prognostic role of podocin, E-cadherin and lipocalin-2 proteins in the progression of DKD as special scenario of CKD in individuals with type 2 DM.

Keywords: *epithelium-mesenchymal transformation, diabetic kidney disease, diagnostic markers*

Diabetic kidney disease (DKD) is the most dangerous among microvascular complications of diabetes mellitus (DM) with high mortality rate and the decrease of the quality of life of patients [1]. Although microalbuminuria (MAU) in patients with DM is considered to be the best predictor of the progression of chronic renal failure [2] and cardiovascular complications [3,4,5], earlier sensitive and specific markers of renal tissue damage can contribute to the early detection and initiation of therapy for DKD as special scenario of the development of CKD. The development of DKD in the tissue level is associated with the process of epithelial-mesenchymal transformation (EMT), in which there is the loss of intercellular connections, separation of cells from the basement membrane, the loss of markers of epithelial phenotype, the appearance of mesenchymal markers and cell transformation [6].

The aim of this study was to search and analyze the role of new diagnostic markers of EMT in urine in patients with DKD in early stage of its development.

Material and research methods. The study was multicenter prospective controlled randomized trial. The clinical study was performed on the basis of the department of endocrinology of the Republican Diagnostic Center (Makhachkala, Republic of Dagestan), the department of endocrinology of the Central City Hospital (Derbent, Republic of Dagestan), the Department of Nephrology of the Internal Medicine Clinic № 2 of the Rostov State Medical University (Rostov-on-Don), the medical center "Novomeditsina" (Rostov-on-Don). Criteria for the inclusion in the study: diagnosis - type 2 DM, DN, CKD C 1, arterial hypertension (AH), grade 1-2; outpatients and inpatients of both sexes from 40 to 70 years; the duration of confirmed disease of type 2 DM is not less than 3 years; persons of control group (CG) without type 2 DM; informed consent for the participation in clinical trial. Criteria for the exclusion from the study: primary pathology of the kidneys of non-diabetic origin; type 1 DM; frequent attacks of hypoglycemia; clinical and laboratory signs of ketoacidosis; other endocrine diseases; urinary tract infection; signs of acute cerebrovascular accident at the time of hospitalization, traumatic brain injury, neuroinfection, epilepsy, Parkinson's disease and syndrome; acute myocardial infarction, symptomatic hypertension, chronic heart failure II - III stage; acute inflammatory disease or its exacerbation; severe violations of the liver and kidneys; malignant neoplasms; gout; collagenoses; hypo-

thyroidism; vasculitis; pregnancy; current or previous smoking; alcoholism, drug addiction; patient refusal to participate in the study; the hypersensitivity to previously taken sugar-lowering drugs of sulfonylurea derivatives, an inhibitor of sodium-glucose cotransporter type 2 (iSGLT-2); the participation in clinical trials of other drugs within 60 days before the start of this study; administrative reasons. The duration of the study was 12 months.

The study included 79 patients with the diagnosis of type 2 DM, newly diagnosed, DN, CKD C 1, AH, grade 1-2, who took long-term antihypertensive therapy (angiotensin II receptor antagonist valsartan 80 mg/day, calcium channel blocker amlodipine 5 mg/day), antiplatelet agent acetylsalicylic acid 0.1 g/day, hypolipidemic drug phenofibrate 145 mg/day. The category of patients with type 2 DM corresponded the diagnostic criteria for DM and other glycemic disorders (WHO, 1999–2013) [7,8,9,10]. The CG included 30 healthy individuals. When included in the study, the cohort of patients was formed by random sampling. In patients with CKD C1, the glomerular filtration rate (GFR) is >90 ml/min/m², the albumin excretion rate (AER) is <30 mg/day. The search for diagnostic markers of EMT in urine was carried out 7 days after the inclusion of patients into the study in the observation stage on the basis of the “Individual Patient Registration Card”, which included main sections of the Study Protocol.

The main outcome of the clinical study was the dynamics of the concentration of EMT marker proteins in DKD and their correlation with standard indicators of DKD progression (AER, GFR). The initial state of the functioning of the body systems of patients with CKD C1 with type 2 DM was evaluated on the 7th day of the study on the basis of indicators: a) the measurement of AER (DCA 2000+, Bayer, Germany), b) the assessment of MAU (HemoCue Albumin 201, Sweden), c) GFR calculation according to the Chronic Kidney Disease Epidemiology Collaboration formula [11], d) quantitative analysis of the content of EMT marker proteins - E-cadherin, podocin, lipocalin-2 in urine samples was performed on the basis of test systems by ELISA (standard eBioscience kits, USA).

The clinical study was approved by the meeting of the Local Ethics Committee of the Federal State Budgetary Educational Institution of Higher Education "Dagestan State Medical University" of the Ministry of Health of the Russian Federation (Makhachkala, Republic of Dagestan, Russia) (Protocol № 18, November 6, 2017).

Statistical processing of research material was carried out in statistical program for biomedical research "STATISTICA 10.0" (StatSoft, Inc., USA). The randomization in the study was performed using the stratified random sampling method based on current patient data file using stratifying variables (age, weight, height, gender, pulse, blood pressure, smoking, low physical activity, dyslipoproteinemia, fasting blood glucose, family history of type 2 DM, gestational diabetes

and the birth of large fetus in history, polycystic ovary syndrome, overweight and abdominal obesity, indicators of renal function, type 2 DM, hypertension and their duration, associated clinical conditions - DN categories, stages of CKD). The final stage involved taking into account the criteria for inclusion/non-inclusion in the study. The sample size required for 90% power to detect a significant difference between CG and research group was calculated. The normality of the distribution of quantitative data was evaluated by the Kolmogorov-Smirnov test. Descriptive analysis of the study included the main statistical indicators (mean, standard deviation from mean). Intergroup differences were evaluated by the Mann-Whitney test. The relationship of the data was studied using Spearman rank correlation analysis. The criterion of statistically significant differences in the results was considered to be $p < 0.05$.

Results. The study included 79 patients (men - 34 people; women - 45 people; average age 59.5 ± 0.3 years) with diagnosis “DM, type 2, first detected, DN, CKD C1, AH grade 1-2” according to clinical and medical history (table 1) and the criteria for inclusion/non-inclusion in the study.

Table 1

Clinical and anamnestic characteristics of patients with type 2 DM and healthy individuals in the control group

Indicator	Study group	Control group
Sex (men/women),n ¹	34/45	16/14
Age, years	59,5±	56,5±
Weight, kg ²	86,3±	75,9±
Height, cm ³	174,4±	172,4±
Body mass index, kg/cm ² ⁴	29,7±	25,5±
Duration of DM ⁵ type 2, years	7,82±	-
Duration of AH ⁶ , years: 1 stage 2 stage	4,2±	-
The proportion of patients by the combined risk of cardiovascular events and terminal renal failure in patients with CKD ⁷ , depending on the category of GFR ⁸ and albuminuria (%):		
low risk	0	
medium risk	65,8	-
high risk	34,2	

Indicator	Study group	Control group
Patients with risk factors (n):		
hereditary burden -		
DM type 2	77	2
history of the patient -		
IGT ⁹	79	0
AH	79	0
CVD ¹⁰	79	0
DLP ¹¹	62	7
PCOS ¹²	5	0
gestational diabetes or the birth of large fetus	12	2
age ≥ 45 years	79	30
smoking	25	7
malnutrition	79	2
overweight and obesity	79	0
low physical activity	71	2
Diabetic Nephropathy (AER ¹³), n:		
A1, AER - 0-30 mg/day ¹⁴	79	-
CKD, stages, n:		
CKD, stage C1 (GFR >90 ml/min/1,73m ² ¹⁵)	79	-

Notes. The data are presented in the form of M±SEM (minimum-maximum mean value); ¹n-number of patients and healthy individuals; M – the mean value; SEM - standard error of the mean value; ²kg-kilogram; ³cm-centimeter; ⁴kg/cm²-kilogram per square centimeter; ⁵DM-diabetes mellitus; ⁶AH - arterial hypertension; ⁷CKD - chronic kidney disease; ⁸GFR - glomerular filtration rate; ⁹IGT - impaired glucose tolerance; ¹⁰CVD - cardiovascular disease; ¹¹DLP – dyslipoproteinemia; ¹²PCOS - polycystic ovary syndrome; ¹³AER - albumin excretion rate in urine / day; ¹⁴mg/day - milligrams per day; ¹⁵ml / min / m² - milliliter per minute per square meter.

Results of the analysis of indicators of functional activity of kidneys, the concentration of protein markers of DKD - E-cadherin, podocin, lipocalin-2 in the urine in patients with type 2 DM and CKD C1 and CG are presented in table 2. Significant increase of AER, the concentration of E-cadherin, podocin, lipocalin-2 was shown in the urine while maintaining the GFR index within the optimal values was in the study group of patients compared with the CG.

Table 2

Indicators of functional activity of kidneys and the level of protein markers of DKD in the urine of the study group of patients and in persons of control group

Indicator	Study group (n ¹ =79) M ² SD ³	Control group (n=30) M±
AER ⁴ , mg/day ⁵	24,6±1,2	0
GFR ⁶ , ml/min/1,73m ² ⁷	94,7±3,3 ^{0.05/0.96*}	95,2±3,5
E-cadherin, ng/ml ⁸	12±0,9 ^{0.00/<0.0001}	0,7±0,1
Lipocalin 2, ng/ml	99,5±7,9 ^{6.6/<0.0001}	8,0±0,2
Podocin, ng/ml	17,6±0,4 ^{9.2/<0.0001}	2,5±0,1

Notes. ¹n-the number of patients and healthy individuals; ²M-the mean value; ³SD- the standard deviation from the mean value; ⁴AER - albumin excretion rate; ⁵mg / day - milligrams per day; ⁶GFR - glomerular filtration rate; ⁷ml/min/1.73 m² - milliliters per minute per 1.73 square meters; ⁸ng/ml- nanograms per milliliter; ` - the value of the U-test Mann-Whitney; * - the probability of differences in the mean values of indicators by the Mann-Whitney U-test between 1) control group / study group

Correlation interactions between the concentrations of podocin, E-cadherin, lipocalin 2 in the urine of patients of the study group with AER index were represented by direct correlations of average binding strength for the concentration of podocin (r=0.57; p=0.0009), lipocalin 2 (r=0,58; p=0.0006) and high binding strength for the concentration of E-cadherin (r=0.70; p=0.001) in the urine.

Discussion. The results of clinical study showed that changes in indicators of functional activity of the kidneys (AER, GFR) correlated with the change in the concentration of marker proteins in the urine, which are participants of molecular pathways of EMT development in DKD. The increase in the concentration of E-cadherin in the urine ensures, within the limits of reference concentrations, the maintenance of epithelial integrity and cellular phenotype, the regulation of tubular EMT, and in high concentrations, - the progression of fibrosis in renal tissue. The increase of the level of E-cadherin in the urine of patients is accompanied by the lack of interaction with extracellular matrix receptors (ECMs) and various types of integrins aimed in maintaining of epithelial integrity of renal tissue in patients with DKD in type 2 DM [12]. The increase of the concentration of lipocalin-2 in urine is accompanied by the increase of the levels of inhibitor of matrix metalloproteinase 2 and, accordingly, TGF-β1 in the urine and renal tissue, which contributes to the development of fibrosis with the deposition of ECM in the renal tissue [13]. Podocin is a specific protein of podocytes that help to maintain the glomerular filtration barrier in the kidneys of patients with DKD and to protect the patient's body from protein loss. Podocin interacts with other molecules via

PI3K / AKT and MAPK signal pathological cascades, ensuring functional unity of nephrons. The increase of the concentration of podocin in the urine activates glomerulosclerosis due to the increase in synechia between the podocytes and glomerular basement membrane. Podocinuria promotes EMT in DKD: it increases the thickening of basement membranes and glomerular mesangial matrix [14].

Therefore, the study demonstrated prognostic role of podocin, E-cadherin and lipocalin-2 proteins in the progression of DKD as special scenario of CKD in individuals with type 2 DM. The role of multifunctional signaling molecules of podocin, E-cadherin and lipocalin-2 and associated active molecules in the development of EMT in DKD in conditions of type 2 DM was shown.

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通过低温管道控制液化气体混合物的运输参数
**CONTROL OF PARAMETERS OF TRANSPORTATION
OF A MIXTURE OF LIQUEFIED GASES
THROUGH LOW-TEMPERATURE PIPELINES**

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抽象。该文章描述了作者提出的技术，该技术用于通过远北地区天然气凝析油田的单相液态低温管道输送液化碳氢化合物，温度不低于 -50°C ，压力不高于 12MPa 。天然气和凝析油混合物的组成，关键参数使用REFPROP软件包确定，以确保具有上述运输参数的单相液态。通过通过关键参数改变混合物的组成来进行控制，因此，在制备混合物的阶段预测单相液态以进一步通过低温管道输送。所提出的方法允许根据其组成调节液化烃混合物的关键参数（临界温度和临界压力）以及运输参数（温度和压力）。

关键词：运输，天然气，凝析油，液化烃，温度，压力。

Abstract. *The article describes the technology proposed by the authors for transporting liquefied hydrocarbons through low-temperature pipelines in a single-phase liquid state from gas condensate fields of the Far North at a temperature not lower than minus 50°C and a pressure not higher than 12MPa . The composition of the mixture of natural gas and gas condensate, critical parameters are determined using the REFPROP software package to ensure a single-phase liquid state with the above transportation parameters. Control is carried out by varying the composition of the mixture by critical parameters, and accordingly, a single-phase liquid state is predicted at the stage of preparation of the mixture for further transportation through low-temperature pipelines. The proposed method allows to adjust the critical parameters (critical temperature and critical pressure), as well as transportation parameters (temperature and pressure) of a mixture of liquefied hydrocarbons, depending on its composition.*

Keywords: *transportation, natural gas, gas condensate, liquefied hydrocarbons, temperature, pressure.*

The authors [3, 4] considered the possibility of transporting a mixture of liquefied petroleum gases, consisting of natural gas, gas condensate, and oil fractions, through main pipelines at temperatures from -40 to -50 °C and pressures from 10 to 12 MPa. It is achieved by the fact that in order to ensure transportation of the mixture in a single-phase liquid state through main pipelines from gas condensate fields, natural gas is cooled to a temperature of from -30 to -50 °C and gas condensate and light oil to a temperature of from -20 to -50 °C, then chilled gas condensate and light oil is passed through chilled gas with additional cooling of the resulting mixture to a temperature of -40 to -50 °C at a pressure of 10 to 12 MPa, with a weight content of condensate and light oil in the mixture of 3 to 10%.

Consider a schematic diagram of the preparation of a mixture of liquefied hydrocarbons (natural gas, gas condensate and oil fractions) and transportation through low-temperature pipelines in a single-phase liquid state. The method is as follows. Natural gas directly from the gas condensate field enters the drying unit, where water particles are extracted from it, passes through a filter (purification from acidic components, fine purification from mercury and nitrogen removal) (Figure 1). After that, the gas goes through a multistage cooling and pressure increase with the addition of gas condensate and high molecular weight compounds at each stage. The resulting mixture of liquefied hydrocarbons at a temperature of -40 to -50 °C and a pressure of not more than 12 MPa is brought into a liquid state. After liquefaction, it enters directly into the pipeline [3].

Figure 2 shows a schematic diagram of the pipeline transport of liquefied gases. Natural gas from the gas condensate field of the North goes to the complex gas treatment unit (CGTU) 1, where it is cleaned, dried, and separated from impurities [2]. Then, purified and cooled natural gas and cooled gas condensate are fed to the hydrocarbon mixture production unit (HMPU) 2, where the following processes occur: pressure increase simultaneously with gas cooling and injection of gas condensate under high pressure into the lower part of the installation through a special nozzle until the required parameters of mixtures of liquefied hydrocarbons are achieved (pressure not more than 12 MPa and temperature from minus 40 to minus 50 °C). Part of the gas, which does not have time to go into a liquefied state, goes back to the lower part of the mixing plant. The process of preparing the mixture is repeated until the entire mixture passes into a single-phase liquid state at the above temperature and pressure. The resulting mixture under pressure is fed into a pre-cooled pipeline 3.

Further, the resulting mixture arrives at the head pumping station (HPS) 4, which supports the necessary pumping conditions. The composition of the HPS includes: receiving tanks, retaining and main pumping and metering unit. They serve to receive liquefied hydrocarbon gases and to store some of its reserves in order to ensure uninterrupted operation of the pipeline.

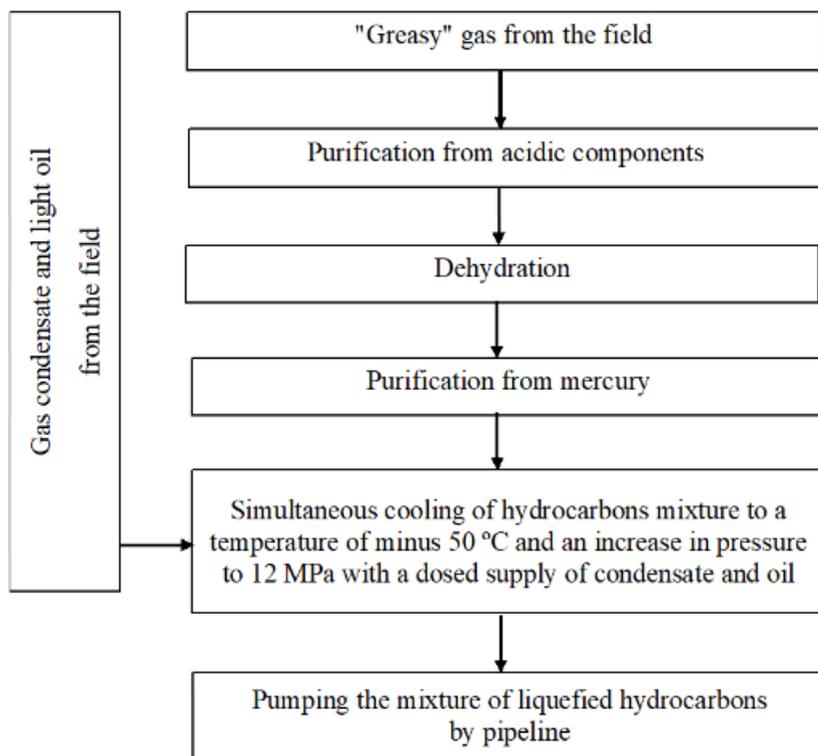


Figure 1 - Scheme of the technology for producing a mixture of liquefied hydrocarbons [3]

To prevent gas heating due to heat influx from the environment, pipelines are coated with thermal insulation (for example, from polyurethane foam with a thickness of 50 - 70 mm), and intermediate cooling stations (ICS) 5 are placed along the route.

Intermediate pumping stations (IPS) 6 are located at distances determined on the basis of hydraulic and thermal calculations. According to calculations, pumping and cooling stations should be installed at a distance of about 100 km.

At the end of the pipeline, a low-temperature storage (LTS) 7 and a regasification unit (RU) 8 of the liquefied hydrocarbon mixture are placed. At the regasification unit, the mixture is divided into components: gas, gas condensate, high molecular weight compounds. Gas is supplied to the main gas pipeline, and gas condensate is transported through pipelines or by rail or road.

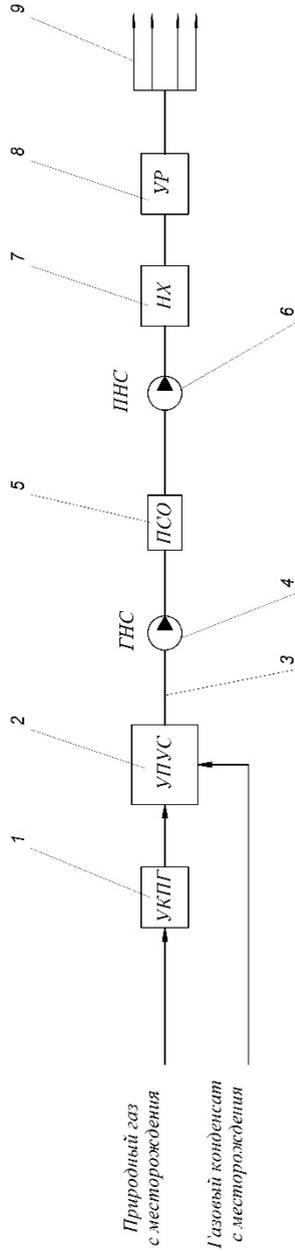


Figure 2 - Schematic diagram of the pipeline transport of liquefied gases [2]

- 1 - complex gas treatment unit, 2 - hydrocarbon mixture production unit , 3 - pipeline, 4 - head pumping station, 5 - intermediate cooling stations, 6 - intermediate pumping stations, 7 - low temperature storage, 8 - regasification unit, 9 - consumer gas supply output

The peculiarities of obtaining a mixture of liquefied methane, gas condensate and light oil are due to the need to obtain a relatively high liquefaction temperature at a relatively low pressure. Therefore, the standard scheme for the production of liquefied natural gas (LNG) can be significantly reduced by using only the first part of the LNG production scheme (refusal from the 160 °C temperature unit). And as a basis for preparing a mixture of liquefied hydrocarbons, it is proposed to use the DMR process (Double Mixed Refrigerant process) with two mixed refrigerants from Shell, used as part of the Sakhalin-2 project at the LNG plant.

Different amounts of natural gas, gas condensate and oil fractions are produced in oil and gas condensate fields at different time periods; it is necessary to promptly control the composition of the mixture based on the determination of its pumping parameters [6]. Here is a method for controlling the parameters of transporting a mixture of liquefied gases through low-temperature pipelines from gas condensate fields.

The transportation of a mixture of liquefied hydrocarbons from gas condensate fields is mainly affected by the following parameters: 1)the composition of the system (for example, natural gas - gas condensate); 2)pressure; 3)temperature.

The purpose of the method is to find the composition of the mixture of natural gas, gas condensate and oil fractions of the petroleum field, critical parameters (critical pressure and critical temperature), as well as control the change in temperature and pressure (as well as the thermophysical parameters of the mixture) depending on the composition of the multicomponent oil and gas condensate mixture.

Here is a method for controlling the parameters of transportation of a mixture of liquefied gases through low-temperature pipelines.

The initial data for the calculation are: component composition of natural gas, component composition of unstable condensate and oil fractions, density of natural gas and gas condensate, molecular weight and density of condensate.

Below is the calculation sequence:

1) Determining the composition of mixtures of hydrocarbons from the given compositions of gas, gas condensate and light oil, with the content of unstable gas condensate and oil fractions in the mixture from 0 to 10 mass. % of the gas.

2) Determination of critical parameters (critical pressure and critical temperature) using software systems (for example, REFPROP).

3) Construction of phase diagrams - P-T diagram (pressure - temperature) of mixtures of various ratios.

4) Mixtures of natural gas, gas condensate and light oil are selected in such a way that, in accordance with the task, the mixture of liquefied hydrocarbons at temperatures minus 50 - minus 40 ° C and pressures (10 - 12 MPa) will be in the liquid phase.

5) Determination of transportation parameters (initial temperature and initial pressure) of a mixture of liquefied hydrocarbons with the condition that $T < T_{cr}$ and $P > P_{cr}$.

Thus, the proposed method is intended for management of the transportation parameters of mixtures of natural gas and gas condensate through low-temperature pipelines - the composition of the pumped mixture, critical parameters, initial pressure and temperature, and their control.

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方法论对旅游和休闲区划的规律和因素的理解 (以奥伦堡地区为例)
**METHODOLOGICAL COMPREHENSION OF REGULARITIES
AND FACTORS OF TOURISTIC AND RECREATIONAL ZONING
(ON THE EXAMPLE OF ORENBURG REGION)**

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抽象。分析了旅游和休闲区划的方法,选择了区划原则和方法。旅游和休闲地区 and 地区的特点。

关键词: 分区方法和方法, 旅游和娱乐资源, 旅游和休闲区划。

***Abstract.** Approaches to touristic and recreational zoning are analyzed, zoning principles and methods are chosen. Touristic and recreational localities and districts are characterized.*

***Keywords:** zoning approaches and methods, touristic and recreational resources, touristic and recreational zoning.*

Scientific zoning, developed by leading geographic scientists, was used in our country not only for description and research purposes, but was a condition for effective territorial organization of the economy.

Recreational zoning always was and still remains an important methodological approach in geography to identify differences between territories in terms of provision of recreational resources, the state of infrastructure, the characteristics of the formation of recreational needs and the study of the diversity of tourist and recreational space.

The issues of recreational zoning and the development of the doctrine of tourist regions are the subject of the works of many leading scientific geographers: V.S. Preobrazhensky, B.N. Likhanov, E.A. Kotlyarova, Yu.P. Suprunenko, A. Yu. Alexandrova, D.V. Nikolaenko, A.V. Darinsky, Yu.D. Dmitrevsky, N. S. Mironenko, A. M. Sazykina, I.V. Zorin, T.A. Irisova, scientists of the Russian International Academy of Tourism, etc.

Tourist-recreational zoning, which is one of the private approaches of general recreational regionalization, serves as the basis for the design and planning for the development of tourist-recreational space. The basis of the district-forming features, developed by the scientists of the Institute of Geography, were: the degree of tourist-recreational development, the degree of accessibility of the region, the prospectivity of the territory and the functional structure [1].

Tourist-recreational zoning developed in 1996 by the Russian International Academy of Tourism has already considered the doctrine of the territorial recreational system (TRS) and all its elements that affect the development of tourism. It also took into account such an important factors affecting the conditions for the development of tourism, as the recreational needs of the population and the degree of their satisfaction in the regions (an important generating factor in the development of tourism) and recreational resources (implementing factor) [2].

Given these factors, the level of recreational needs of the population of the Orenburg region was studied. Typological territories were identified according to the level of recreational needs of the population, represented by three groups of areas of the region [3]:

- territories with a high level of recreational needs. In these areas of the region there is a fairly high degree of development of urbanization, income level and education. The areas are characterized by the formed constant volume of recreational needs, among the most numerous active population. High natural growth and the influx of youth from rural areas, provides for the need for the development of child and youth tourism in these territories;

- territories with an average level of recreational needs. It notes, respectively, the average degree of development of urbanization, income level and education. Recreational needs cover a small part of the economically active population. In these areas, it is necessary to develop cost-effective types of recreation through domestic tourism and maintaining the infrastructure of sanatorium-resort recreation;

- areas with low recreational needs. On the territory of these areas, it is necessary to develop socially-oriented forms of recreation and tourism [] (Figure 1).

When conducting tourist-recreational zoning in the Orenburg region, we analyzed the existing experience in recreational zoning, based on the following approaches: physical-geographical, economic-geographical, functional, territorial-planning [1,2].

The physical-geographical approach is mainly used in the early stages of tourist-recreational zoning, where environmental conditions are a determining factor. Orenburg region is one of the southernmost territories of the country with a climate favorable for the development of many types of tourism and recreation. The average duration of a comfortable period is more than 50 days. The period favorable for all types of tourism lasts more than 120 days. The swimming season in the Orenburg region is usually at least 80 days. But there are a number of natural restrictions in the development of tourism and recreation; on the one hand, weather instability in the spring-summer and winter periods (hot summers with characteristic dust “storms” and sharp temperature drops, winter with unstable snow cover with frequent thaws), on the other hand, a rather high and increasing economic development of the territory, especially in areas of the influence of large technical systems.

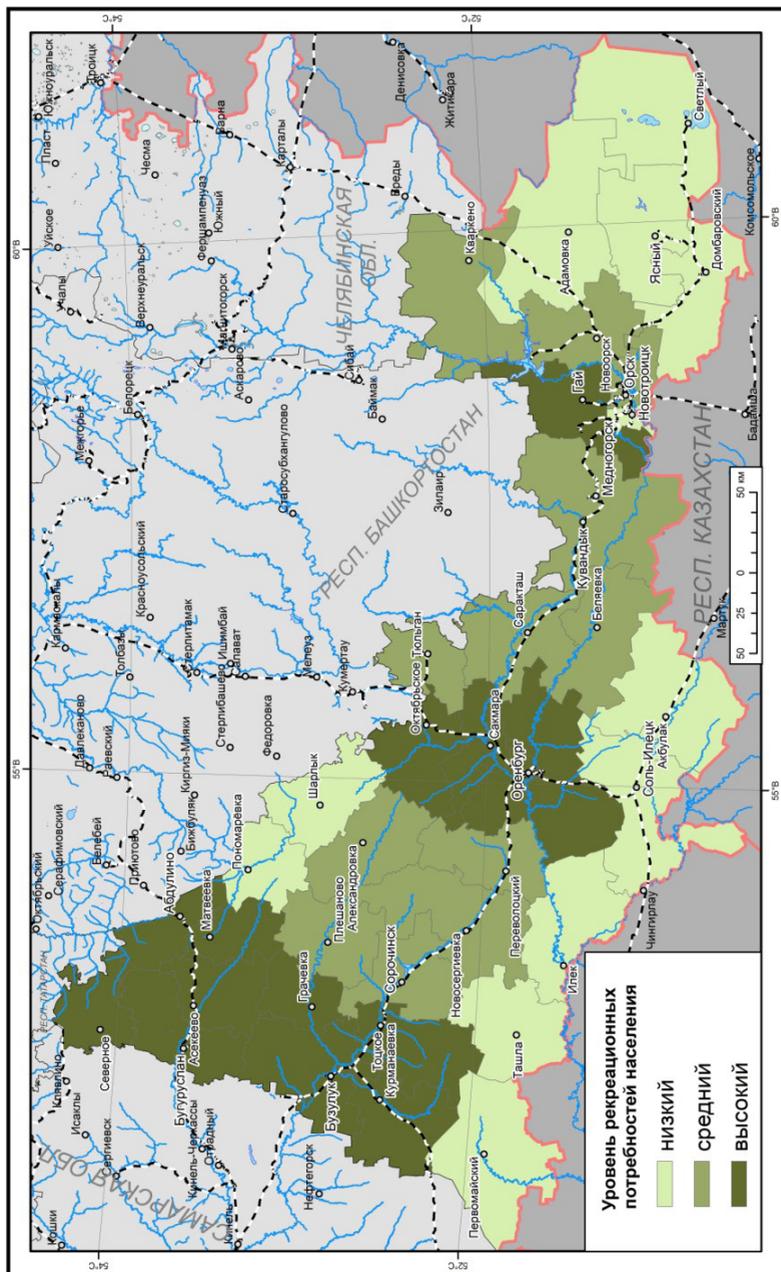


Figure 1 - The level of recreational needs of the population of the Orenburg region

The economic-geographical approach takes into account the socio-economic situation of the territory, recreational resources, the functioning conditions of recreational areas, the settlement system, especially the formation of industry, etc.

The current stage of socio-economic development of the Orenburg region is characterized by the imbalance of the economy, which has a pronounced raw material orientation with a low share of the final product. The production of means of production sharply prevails over the production of consumer goods. In industry and agriculture, dirty technologies dominate, which lead to degradation of the natural environment, worsening living and recreation conditions of the population [3].

The recreation and tourism institutions existing in the Orenburg Region for the most part do not meet international standards for the level of service, and insignificant rates of development of the material and technical base of the tourist and recreational complex are also observed.

Tourism and recreation have a natural orientation, therefore, the characterization and assessment of natural recreational resources is the basis for tourist and recreational zoning of the region. Natural recreational resources available in the region are presented in the form of a variety of complex territorial combinations [3,4]:

- river recreational, including floodplain-river and mountain-river landscapes. The landscape diversity and accessibility make it possible to organize various tourist and recreational classes on their territory for both adults and children;
- forest recreational, in the structure of these landscapes watershed island forests and mountain forests dominate, alternated by sections of meadows, arable land and mountain streams.
- pine forests with phytoncidal properties occupy the areal position, one of them, a large forest "Buzuluksky Bor";
- natural and historical-cultural resources, including complexes and groups of unique natural monuments with high aesthetic and scientific-cognitive properties;
- mud-balneotherapy, occupy small areas of the southern regions of the region and are characterized by a diverse structure - mineral springs, salt lakes and accumulations of therapeutic mud;
- lake and water, distributed everywhere in the region and occupy significant spaces of picturesque reservoirs, small and medium-sized lakes of various configurations and shapes.

The presented complex resource-recreational combinations are prerequisites for the allocation of tourist-recreational zones and areas.

The functional approach is well traced in the creation of distinguished relatively independent subsystems: 1- the subsystem includes a combination of resort and tourist-recreational institutions (facilities); 2 subsystem - is the creation of enterprises of recreational infrastructure (recreational activities, types of recreational activities); 3 subsystem - the formation of management bodies of recreational ac-

tivities, national and regional public-state institutions (management structure). For example, in the village of Aksakovo of the Buguruslan region, the manor of S. Aksakov is located - a memorial museum, a historical and cultural monument – vintage buildings and a natural park of the late XVIII century, this area also houses the manor of the famous natural scientist A. Karamzin. Forest plantations created in the manors of S. Aksakov, A. Karamzin, P. Rychkov are natural and historical monuments of forest park art of the late XVIII-XIX centuries. The balneological resources existing here are promising for the creation of a balneotherapy center based on hydrogen sulfide waters near Buguruslan. The tourists are attracted by the sport hunting of wild boar, moose, roe deer. Most of these animals are protected and partially live in hunting reserves: Rychkovsky and Borovsky [4].

Promising types of tourist and recreational activities - general health recreation, boating, sport hunting, recreational fishing.

Consequently, with the integrated conservation of the natural, historical and cultural heritage, it is possible to create institutions of two lines of activity: resort and tourist-recreational.

The territorial-planning approach is used in the practice of leading design institutes, where the regional organization is based on the infrastructural organization of tourist and recreational facilities based on existing recreational resources. The following taxonomic units can be distinguished: recreational area (for example, the Pre-Ural recreation zone) - resort area (Sol-Iletsky) - resort complex (Salt Lakes). For example, on the basis of the Sol-Iletsk lakes, which have significant tourist and recreational potential and are widely known for their healing properties, the tourist and recreational (resort) cluster “Salt Lakes” has been created. Lakes are considered sacred because of their healing properties among the Kazakhs and are a place of worship. The concentration of salts in lake Razval reaches 330 grams per liter. In composition, it is similar to the Dead Sea, the waters of which are used to treat various diseases [4]. In Sol-Iletsk, halo and speleotherapy based on salt mines and pits are organized for the treatment of respiratory diseases. The spent salt mine chambers located at a depth of 300 meters are effectively used to treat bronchial asthma.

Many geography scientists in their studies on tourist-recreational zoning rely on general geographical principles of zoning: constructiveness (the main purpose of zoning is determined - analysis of the state of the domestic tourist market and its development); objectivity (the study of the current socio-economic situation in the region, based on statistical indicators), multidimensionality (both the use of several district-forming features for conducting a comprehensive analysis of the territory, and the variety of types of recreation), hierarchy (dividing the territory into recreational zones, recreational area - macro district, meso district, micro district, recreational area, recreational facility).

On the basis of the map “Recreational Landscapes” developed by the author, recreational zoning was carried out, five tourist-recreational zones (TRZ) were identified on the basis of zonal-provincial affiliation and recreational areas, taking into account the provision of recreational facilities. The Tourist and Recreation Zone (TRZ) is a special type of economic zone where competitive recreational activities are being developed to create spa holidays, health-improving institutions, historical and cultural sites. The tourist and recreational zone includes several recreational areas that are geographically close to each other, connected by transport and functional links and having common natural and recreational resources.

Within the TRZ, we distinguished the types of territories according to the prospects of using natural complexes in types of tourism and recreation: the most promising, promising, and unpromising. The following territories are most promising for tourism: the border part of the Ural river floodplain, the Buzuluksky Bor, the Iriklienskoye Reservoir and its environs, the Prisakmarskoye low mountains (Kuvandyk region), the Ural Uplands (Saraktashsky, Tyulgansky districts) [3,4].

Thus, consideration of tourist-recreational zoning of the region’s territory, based on a detailed study of the conditions and factors of their differentiation, will facilitate a targeted phased tourist-recreational development of the region’s territory in close interconnection with environmental requirements, which will reduce the economic pressure on ecosystems.

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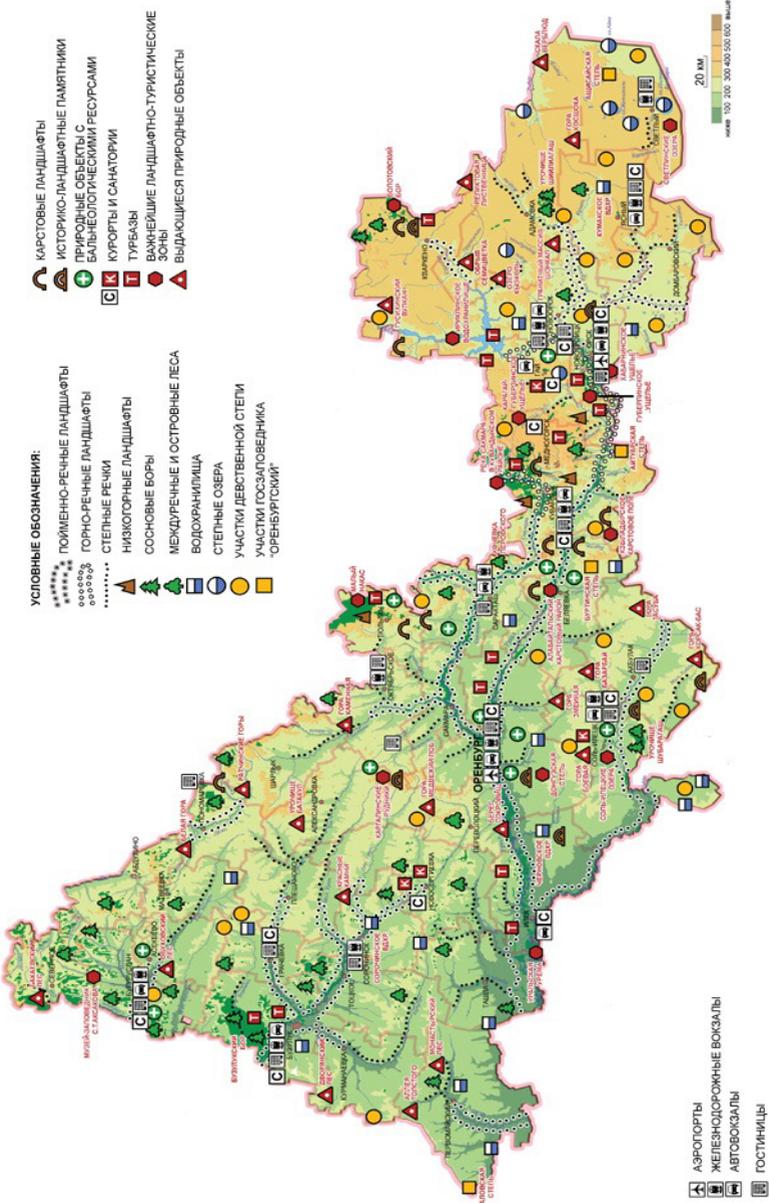


Figure 2 – Tourist-recreational resources of the Orenburg region

关于在萨哈（雅库特）共和国使用交通规则违规自动固定手段预防交通事故和保护道路使用者生命和健康的有效性

**ON THE EFFECTIVENESS OF USING MEANS
OF AUTOMATED FIXATION OF TRAFFIC RULES VIOLATIONS
IN THE PREVENTION OF TRAFFIC ACCIDENTS AND
THE PRESERVATION OF LIFE AND HEALTH OF ROAD USERS
IN THE REPUBLIC OF SAKHA (YAKUTIA)**

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抽象。萨哈共和国（雅库特）的车队密集增长，以及城市群周围商业活动的持续集中，提出了道路交通量急剧增加的问题，这是最严重的问题之一。具有监管要求的公路运输基础设施网络的不一致性，该系统的功能不足以及道路使用者的极低纪律要求采取有效和有针对性的措施来降低共和国道路上的事故率。

关键词：交通事故，道路安全，照片视频固定复合体，交通规则

Abstract. The intensive growth of the car fleet in the Republic of Sakha (Yakutia), along with the continued concentration of business activity around urban agglomerations, puts forward problems associated with a sharp increase in the level of traffic on roads, as one of the most acute. Inconsistency of road transport infrastructure networks with regulatory requirements, insufficient functioning of this system, as well as extremely low discipline of road users required the adoption of effective and targeted measures to reduce the accident rate on the roads of the republic.

Keywords: traffic accidents, road safety, photo-video fixation complexes, traffic rules

Reducing accident rate is one of the most important socio-economic and demographic tasks of the state. Road traffic injuries cause enormous material and moral damage both to society as a whole and to individual citizens.

Today in the Republic of Sakha (Yakutia) there is a focused, systematic work to reduce road deaths. It is extremely important that there is political support at the state level.

At an expanded board of the Ministry of the Interior, President of the Russian Federation Vladimir Putin noted: “It is important to achieve a consistent reduction in the number of road accidents and deaths on the roads, and in order to do this, to introduce new safety technologies.”

At a meeting of the Presidium of the State Council, held in March 2016 in Yaroslavl, this problem was rated among the priority areas of state policy. At the same time, the instructions formed following the results of the Presidium of the State Council determined the vector of tasks in the field of ensuring road safety for the near future.

It should be noted that in recent years, the Government of the Republic of Sakha (Yakutia) has done significant work that has allowed issues of safe participation in road traffic to take a priority place in the activities of executive bodies.

In the Republic of Sakha (Yakutia), there is an increase in the level of motorization, as evidenced by the annual increase in the number of vehicles, including those in personal use of the population. Today, every 4th resident of the republic has a vehicle.

On January 1, 2017, according to the UGIBDD of the Ministry of Internal Affairs of the Russian Federation for the Republic of Sakha (Yakutia), a fleet of vehicles

amounted to 319 585 cars, including cars - 242 583 units, trucks - 53 952 units [[Analytical Materials (2017)].

Road transport provides more than 77% of the total traffic. More than 25 million tons of cargo and more than 90 million passengers are transported annually [Statisticheskie dannyye (2016)].

The total length of roads in the Republic of Sakha (Yakutia) is 36.7 thousand km. Of the total length of 3.6 thousand km (9.8%) falls on public roads of federal significance, 12.6 km (34.3%) - of regional significance, 20.8 thousand km (56.6%) - on municipal roads. About 26% of the total length of roads is paved roads [Itogi razvitiya (2016)].

To achieve the objectives of reducing the number of accidents, the number of dead and injured, the following tasks are solved:

- The Government Commission on Road Safety is constantly carrying out its work in the republic. The Government of the Republic has developed and approved an Action Plan aimed at creating law-abiding behavior of road users, preventing traffic accidents associated with vehicles driving into the oncoming lane in the Republic of Sakha (Yakutia) dated January 9, 2017, № 11-2. The main priority of the Plan is the prevention and reduction of mortality in road traffic accidents. The Work Plan of the Government Commission for Road Safety in the Republic of Sakha (Yakutia) for 2017 was approved.

- In order to increase the reliability and safety of traffic on the republic's roads, by Decree of the Head of the Republic of Sakha (Yakutia) dated December 12, 2016 №1670 "On Amending the Decree of the President of the Republic of Sakha (Yakutia) dated October 12, 2011 №974" "On the State Program of the Republic of Sakha (Yakutia)" "Development of the transport complex of the Republic of Sakha (Yakutia) for 2012-2019", the Subprogram "Road Traffic Safety" was approved, within the framework of which the equipment and maintenance of systems of automatic control and identification of violations of the Traffic Rules on abundant public roads on the territory of the republic, the arrangement of roads (road signs, lighting, crossings, etc.) and the provision of conditions for safe traffic in accordance with the requirements of current industry standards are carried out.

- In accordance with paragraph 4 of Article 6 of the Federal Law of December 10, 1995 №196-Ф3 "On Road Safety", the List of accident-hazardous sections of public roads of regional importance of the Republic of Sakha (Yakutia) for 2016 with the implementation of priority measures was approved, aimed at eliminating the causes and conditions of the accident.

By order of the Government of the Republic of Sakha (Yakutia) dated August 18, 2017 № 1004-p from August 20 to September 20, 2017, a month plan was concluded to ensure road safety, aimed at reducing child traffic injuries in the Republic of Sakha (Yakutia).

In order to aid in solving problems of ensuring road safety, the following agreements were signed:

- The agreement on cooperation between the Ministry of Internal Affairs of the Republic of Sakha (Yakutia) and the Government of the Republic of Sakha (Yakutia) in the field of road safety of December 24, 2014

- Agreement dated August 24, 2015 №14/5571 with the Ministry of Internal Affairs of the Republic of Sakha (Yakutia) on cooperation in the field of road safety on highways of regional significance of the Republic of Sakha (Yakutia), subordinate to the State Public Institution "Management of Roads of the Republic of Sakha (Yakutia)";

- Agreement with the Ministry of Internal Affairs of the Republic of Sakha (Yakutia) dated January 29, 2016 №55 on the interaction of the parties during weight control on republican public roads.

- Agreement with the Ministry of the Interior of the Republic of Sakha (Yakutia) on cooperation on handling and maintaining systems for automatic recording of traffic violations of July 26, 2016.

- Tripartite Agreement between the Ministry of Internal Affairs of the Republic of Sakha (Yakutia), the Ministry of Transport and Road Facilities of the Republic of Sakha (Yakutia) and "Yakutsk City" on cooperation to ensure road safety on the road network of the city of Yakutsk using a photo and video recordings of June 23, 2017.

As a result of the measures taken, there has been a consistent decrease in the number of dead and injured in the places where the photo and video recording systems were installed.

On the territory of the republic in 2014, as a result of an accident, 140 died and 1339 people were injured, in 2015 119 were killed and 1258 people were injured, in 2016 100 were killed and 1281 people were injured, in 2017 109 were killed and 1307 were injured [Analiticheskie materialy (2014); Analiticheskie materialy (2015); Analiticheskie materialy (2016); Analiticheskie materialy (2017)].

Since 2017, large-scale work has begun to equip roads with traffic violations photo and video recording systems.

To date, 33 stationary and mobile complexes for automatic recording of traffic violations, 1 hardware and software complex for photo and video recording of traffic violations at the intersection of Petrovsky-Oyunsky streets have been installed in Yakutsk, which significantly reduced the accident rates on the roads of the republic.

Since November 2017, at the 5 intersections of Yakutsk, hardware and software complexes for photo and video recording of traffic violations and 5 lines of speed control on Autostrada Street 50 years of October have been installed; Vilyui tract; Chernyshevsky street; Pokrovsky tract and Avtodorozhnaya street. The coverage by mobile and stationary complexes of photo and video recording of traffic violations throughout the republic, provided with year-round transport communications, is also provided for in 2019. Similar photo and video recording complexes will be installed in the villages of Churapcha, Berdigesti, in the cities of Aldan and Neryungri taking into account the places of concentration of road accidents.

Photo and video recording systems for traffic violations began to be installed in the republic in 2013, based on the Concept of the Federal Target Program “Improving Road Safety in 2013 - 2020” approved by Order of the Government of the Russian Federation of October 27, 2012 №1995-r, as well as within the framework of the State Program of the Republic of Sakha (Yakutia) “Prevention of Offenses, Maintenance of Public Order and Combating Crime for 2012-2017”, approved by Decree of the Head of the Republic of Sakha (Yakutia) dated October 12, 2011 № 972.

Acquired and installed, mainly, complexes of photo and video recording of traffic violations of Russian production “KRIS-P”, “Arena” and “Parkon”. Since 2015, at the intersection of Petrovsky-Oyunsky Street in Yakutsk, the Vokord Traffic multifunctional intelligent traffic control system has been operating, which automatically performs the following functions in all weather conditions:

- identification and automatic fixation of violations of the Rules of the Road for 5 violations of the Code of Administrative Offenses of the Russian Federation (vehicle location, intersection of the STOP line, passage to a red traffic signal, exit into the oncoming lane, not providing pedestrian advantage, speed level).

- real-time inspection of vehicles on search bases and instant notification of the operator.
- monitoring of traffic conditions and notification of relevant services about incidents, collection of traffic statistics and reporting.
- recognition of all types of vehicle numbers and fixation of all passing vehicles regardless of time of day, time of year and weather conditions.

In accordance with the State Program of the Republic of Sakha (Yakutia) “Prevention of Offenses, Ensuring Public Order and Combating Crime for 2012-2017”, funds are annually allocated from the State Budget of the Republic of Sakha (Yakutia) to provide postal services for the reception, processing, transportation, delivery (serving) decisions on administrative offenses in the field of traffic is carried out.

The introduction of photo and video recording systems for traffic violations allowed to reduce by 2–3 times not only the severity of the consequences of traffic accidents, but also the general accident rate at the places of installation of automatic means for recording traffic violations and their immediate proximity, and in a number of places not a single road accident with the victims was occurred [Analytical Materials (2017)].

The complexes contribute, in addition to the prophylaxis and prevention of road accidents, and in the disclosure of crimes against the life and health of citizens, property. Thanks to the complex of photo and video recordings, crimes related to theft of vehicles, theft of other people's property, looting and robbery were uncovered, and vehicles, the so-called “cuts”, were detected and moved to specialized parking lots.

The use of technical means of photo and video recording, working in automatic mode, is relevant not only in places where traffic accidents are concentrated, but also for preventive purposes in those sections of roads where road users are massively violating traffic rules, which are one of the main causes of road accidents.

The positive result from the use of photo and video fixation is obvious, and therefore the issues of further development of systems in the Russian Federation are still relevant and are under the control of the Government Commission on the Prevention of Crimes.

All installed systems for photo and video recording of traffic violations are an integral segment of the "Safe City" computer complex. Along with the function of fixing violations of traffic rules, the complexes carry out the tasks of tracking the movement of vehicles of operational interest, checking vehicles passing through control zones for search records. The information received from the instruments is transferred to a single automated accounting of the traffic police data bank and is used by the interested services of the Ministry of Internal Affairs for the Republic of Sakha (Yakutia) and other departments.

Based on the results for 12 months of 2017, the Center's employees (CA-FAP) issued 146079 decisions (APPG-141342), imposed administrative fines in the amount of 84,080,450 rubles (APPG 82,670,225), of which 28,701,718 rubles were recovered. [Analytical Materials (2017)].

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调查驾驶员反应时间对环交叉口交通状况的影响
**INVESTIGATION OF THE INFLUENCE OF THE DRIVER'S
REACTION TIME ON THE TRAFFIC SITUATION
AT THE RING INTERSECTION**

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抽象。 通过仿真建模，给出了交通流参数对城市主要道路环形交叉口驾驶员反应时间的依赖关系。

关键词：驾驶员响应时间，环形交叉，仿真建模方法。

***Abstract.** The dependences of traffic flow parameters on the reaction time of drivers at the ring intersection of the main roads of city-wide significance are presented by simulation modeling.*

***Keywords:** driver response time, ring intersection, simulation modeling method.*

Safe traffic on roads is determined by many factors: compliance with traffic rules, mutual respect for drivers, pedestrian behavior when crossing highways. One of the main conditions for trouble-free transport movement is the response time of the driver.

What affects the response of the driver and his perception of a dangerous situation:

1. Gender - men who drive a vehicle respond more quickly to the appearance of a danger signal, the response time for them is 1.8 seconds, and for women it is 2.8 seconds, they perceive a simple situation almost the same way.

2. Age - for owners of cars whose age does not exceed 30 years, the perception of a dangerous situation occurs, faster than for drivers from 40 years and above. But older people make the right decisions faster, and their reaction time is stable. To solve a simple situation, a young motorist needs 0.17 s., For a complex one - 1.54 s. By the age of 60, the indicators change: for a simple situation - 0.26 s., For a complex - 2.05 s.

3. Experience - in the event of an emergency on the road you can always tell an experienced driver. He does not panic and does not fuss, his actions are quick and adjusted.

4. Physical training - sports aimed at developing reaction and endurance help lovers of driving to perceive a dangerous situation faster and choose the right strategic actions.

5. Workplace - a combination of little things that can distract a motorist (an uncomfortable seat, stuffiness in the cab, loose doors, improperly installed cargo in the trunk, noisy passengers) increase the reaction time.

6. Time of day - a person's biological clock is set so that at night there is a decrease in concentration, he often wants to sleep. At night, the period of perception increases by 20-25%. The predawn hours and time before sunset are also difficult for the driver. Therefore, he reacts longer even to a simple traffic situation, and this can lead to an accident.

7. Weather conditions - rain, snow, fog, icing of the road complicate driving, increase the reaction speed of the driver.

8. Medical preparations - there is a large list of medicines that can not be taken if you plan to drive. These may be the most common medications that relieve pain symptoms that help with colds.

9. Alcohol - it's no secret that alcohol and car driving are incompatible concepts. The responsible driver will not allow himself to drink alcohol on the eve of the trip, and even more so drink while driving. Most of the accidents occur while intoxicated, because alcohol reduces the concentration of attention, narrows vision, slows down motor reflexes. The time to prevent accidents increases several times.

10. Working conditions - oddly enough, it is easier for the driver to respond to a danger signal within the city than on suburban routes. The monotonous road relaxes and reduces the level of attentiveness, as a result, the motorist incorrectly assesses the situation [1].

The cases of the use of gadgets, which despite the prohibition of their use while driving, should also be noted.

Most often, it is the quickness when choosing the right solution that prevents accidents on the roads. Here, an important role is played by the time period during which the driver manages to take the necessary actions. In the work, traffic situations are considered in detail taking into account the reaction time of drivers that occurs in the zone of influence of the ring intersection.

Given the complexity of determining traffic conditions, due to the large number of influencing factors, the study used the method of simulation modeling of traffic flows, allowing:

- to take into account any combination of road conditions, the availability of means of organizing traffic, as well as the whole variety of situations that arise when traffic flows;
- to significantly reduce the duration of the study and the preparation of practical measures to improve traffic conditions;

- to establish the main characteristics of traffic flows and give them quantitative and qualitative assessment, as well as clarify the formulation of analytical problems and verify the reliability of analytical dependencies [2].

In order to simulate the conditions of vehicle traffic flows, taking into account the response time of the driver and the subsequent assessment of the road traffic situation, the specialized program AIMSUN – a microscopic model of simulating the movement of vehicles was used. Models of this class allow to describe in detail the behavior of each of the road users.

The object of research is the circular intersection of six-lane main streets of citywide significance with dedicated lanes for public transport and dividing lanes with a diameter of 100 m (Fig. 1).

The matrix of traffic flows in the directions of motion for the experiment is presented in table. 1.

Table 1. Traffic Intensity Matrix at the Ring Intersection

Name	V	Z	C	Y	Total
V		900	200	100	1200
Z	900		100	200	1200
C	100	200		900	1200
Y	200	100	900		1200
Total	1200	1200	1200	1200	4800

To conduct an experiment to determine traffic conditions, 6 values of the drivers reaction time (t_{dr}): were allocated: 0.5; 1.0; 1.5; 2.0; 2.5; 3.0 sec The values of motion parameters obtained during simulation are presented in table. 2.

Table 2. The results of simulation

Motion parameters/ t_{dr}	0,5	1,0	1,5	2,0	2,5	3,0
Travel time, s/km	238,7	237,5	258,1	266,4	268,9	274,1
Delay time, s/km	173,9	172,6	192,8	200,9	203,2	208,1
Stop time, s	141,5	139,9	161,1	172,0	174,4	179,6
Total travel time, h	79,4	78,0	78,5	75,4	72,7	71,0
Total distance traveled, km	1245	1227	1143	1064	1017	975
Number of stops, #/v/km	7,0	6,8	8,0	7,9	8,2	8,3
Density, v/km	25,4	24,9	25,1	24,2	23,2	22,7
Traffic capacity, v/h	4432	4393	4079	3825	3672	3516
Speed km/h	17,8	18,3	16,6	16,5	16,3	16,5

Indicators of delay time, density, speed and traffic capacity with increasing driver response time from 0.5 to 3.0 seconds are shown in Fig. 3.

Delay time increased by 20%, density increased by 11%, speed decreased by 7%, throughput decreased by 21%.

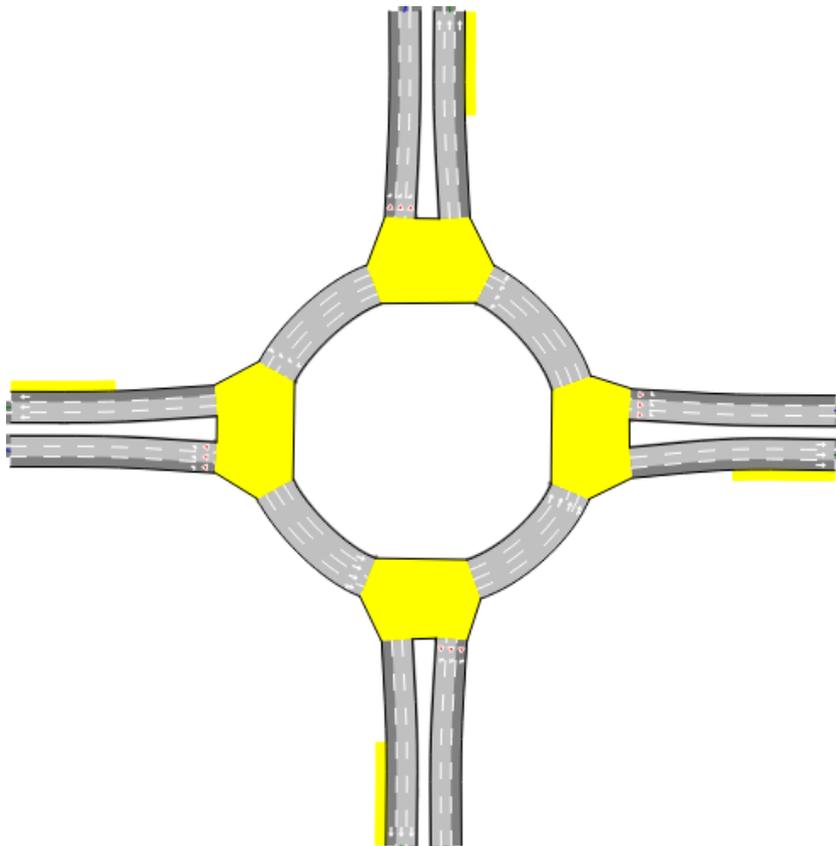


Figure 1. Ring intersection of the main streets of citywide significance with dedicated lanes for public transport

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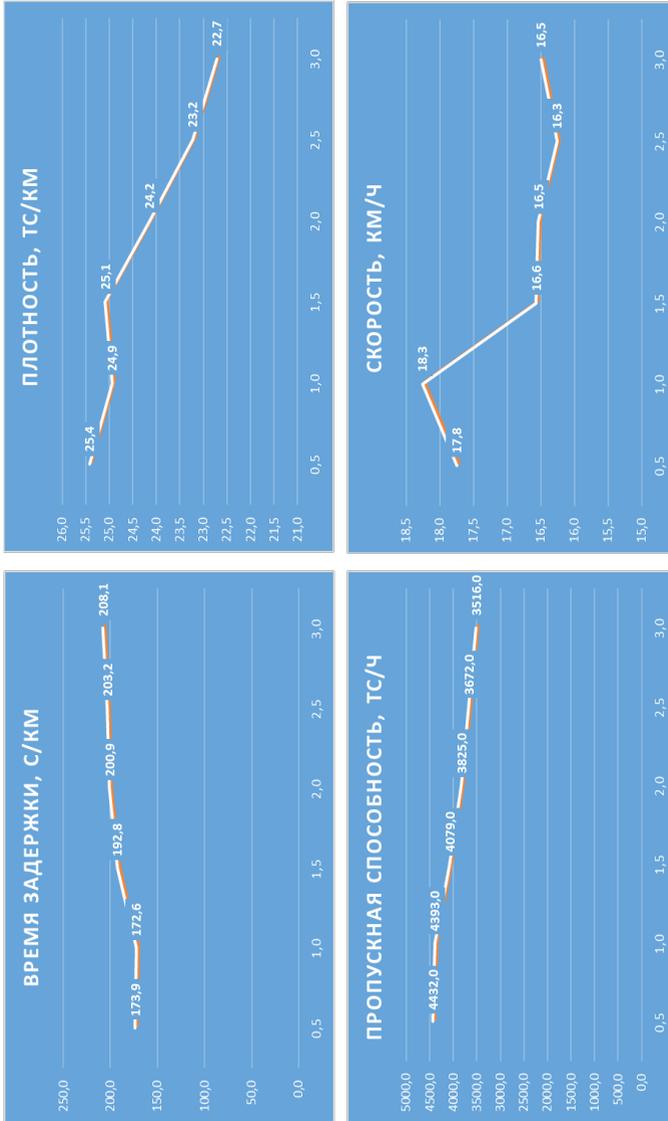


Figure 3. Charts of delay time, density, traffic capacity, speed

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用于自动灌溉的土壤水分传感器

SOIL MOISTURE SENSOR FOR AUTOMATIC DRIP IRRIGATION

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长度为20 m的电容式湿度传感器可以测量沿其长度的平均土壤湿度。传感器以捆扎电缆的形式制成，放置在植物的根层中。该传感器已用于滴灌自动灌溉系统，由于保持了最佳的土壤水分，产量增加了20-30%。

关键词：电土壤湿度传感器，土壤水分平均，自动滴灌。

Abstract. *Electric capacitance humidity sensor with a length of 20 m allows measuring the average soil moisture along its length. The sensor is made in the form of a bundled cable placed in the root layer of plants. The sensor has been used in an automatic irrigation system of drip irrigation due to the maintenance of optimal soil moisture, increase in yield is 20-30%.*

Keywords: *electric soil moisture sensor; soil moisture averaging, automatic drip irrigation.*

Due to length 20 meters electrical capacitance sensor allows to determine average data of the soil-moisture content along all its extension. It is made in the form of a bundle of insulated conductors that is in the root layer under the plants. The sensor was used in the automatic irrigation system under drip irrigation. We have seen the harvest growth of up to 20-30% owing to the maintenance of the optimal soil moisture.

The main result of the research activities of Anatoly Danilovich Voronin, professor, has been creation of a promising areas of research – structural and func-

tional soil hydrophysics. Within this area, the professor conducted a search for the relationship between soil moisture (W) and soil moisture suction (SMS), and developed an original method for measuring SMS.

In this paper, efforts have been made to create a method for measuring SMS and W not only at individual points in the soil, but also to average the assessment of soil moisture over large areas in natural conditions. The developed method is based on the relationship between W and the soil electric capacitance, since the relative electrical permeability of water (ϵ), equal to 81, is many times higher than ϵ of the dry solid phase of the soil, varying from 3 to 5. With an increase in W, ϵ increases to 30-40. The capacitance of the capacitor with such soil between the plates is 30-40 times larger than the capacitance of the capacitor with air between the plates.

In agronomy and pedology, electro-volumetric moisture meters are used, whose electrodes are located in moist soil. The electrodes are used to cover the oscillating circuit capacitor. When W is changed, the oscillation frequency of the generator changes.

The TDR method [18,19] (time domain refractometry) uses a traveling wave, when a short electrical impulse passes through the end of the electrode, then it is reflected and returns to the electrode. According to the velocity V of the passage of the pulse, the value of e soil moisture are determined. [2,3].

Due to the energy loss in the soil, the pulse decays quickly and therefore it is not possible to use electrodes longer than 0.2 m. Therefore, this method does not directly determine the average moisture of the soil being irrigated or drained. In order to determine the average moisture of large areas, it is necessary to increase the length of the electrodes to at least 20 m, i.e. the distance between drains or irrigation devices. To do so, it is necessary to reduce the current frequency to 1 mHz, according to expression (1). This paper is devoted to the development of such a method.

The dielcometric heads [1,4,5] lowered into a plastic pipe in the vertical position in the soil are also used.

Measurements of ϵ of the soils are usually carried out at high frequencies (0.1 to 11 GHz), since using low and medium frequencies may produce unreliable results. However, we should bear in mind that the use of high and ultra-high frequencies in dielectric dampers imposes certain limits on the size of the electrodes. Their critical value is a quarter of the wavelength in the dielectric. Wherein

$$L_{cr} = 3 \cdot 10^8 / 4f \sqrt{\epsilon_d}, \quad (1)$$

where f is current frequency, ϵ_d is dielectric permittivity of the conductive medium.

For example, if ϵ of the soil is 14, then at frequency of 0.01 GHz $L_{cr} = 0.2$ m, and at 1 GHz $L_{cr} = 0.02$ m. The length of the electrodes must be less than L_{cr} (1),

otherwise wave and resonance phenomena may occur in the electrodes, distorting the results. However, in order to determine the average soil moisture in large reclaimed areas, it is necessary to increase the length of the electrodes to at least 20 m, as the distance between drains or irrigation devices is often close to this value. It is also desirable to average soil moisture with drip irrigation. For this purpose, the current frequency should be reduced to 1 MHz in accordance with the dependence (1). The present paper is devoted to the development of such a sensor.

To measure the electrical capacitance (C) of the soil over a large area, it is necessary to use a large area capacitor plates. In this case, a twin wire placed in the soil at a certain depth with minimal disruption of its consistency can be used as a capacitor. Capacitance between the conductors of the conductor is measured. The length of the wire is determined by the expression (1). For example, at a frequency of 0.5 MHz and $\varepsilon = 15$, $L_{cr} = 20$ m. Exactly this length of the wires has been used in the present paper.

The largest capacitive electrical resistance is concentrated in the insulation of the electrodes, that is why the strength of the current in the circuit is determined mainly by its magnitude. When the soil is moistened, the capillaries are filled with moisture, their water meniscus area increases resulting in an increase in the wetted surface of the electrode insulation. This, in turn, leads to an increase in the electrical capacitance of the sensors. The low frequency of the current reduces the sensitivity of the sensors to changes in the conductivity of the soil solution and the temperature of the soil.

Influence of the Structure and Tillage on the Accuracy of Soil Moisture

Practice has shown that there are no significant changes in soil structure during the growing season, which would require correction of electro-capacitance sensors. Such changes may occur only when the soil is treated in the growing area or when the soil is completely dry. However, this does not occur in a normally functioning meliorative system that maintains optimal soil moisture. The electrical specifications of the sensors change significantly only in winter, when the soil freezes and thaws, which affects the contact of the sensors with the soil.

The service life of the sensors is at least 4 years. Minor damage to the insulation does not affect their operation.

The influence of the structure on the specifications of electro-capacitance sensors has been found in various types of soil. The steepness of $C = f(W)$ characteristics increases in structural soils and decreases in structureless soils. In addition, the initial electrical capacitance of electrical capacitance sensors in structureless soils is greater than in structural ones.

This confirms the hypothesis of the importance of contact between soil peds and the electrode insulation surface. In dry structureless soils, the area of such

contacts is small, but it increases significantly when wetted. In dry, non-structured soil, which is well-connected to the electrode, the contact area is much larger than in dry structured soil, so the electrical capacitance of the sensors is also much larger than in dry structured soil and cannot increase significantly with increasing soil moisture. Therefore, when using electric capacitance sensors, it is necessary to consider possible changes in the structure of the soil during its loosening or, conversely, compaction.

Effect of Soil Temperature

The experiment with heating and cooling of the soil was carried out in an isolated measuring cell, eliminating evaporation from the soil. According to the results of observations, the effect of temperature on the change in the readings of the capacitance electrical sensors has been determined. A change in temperature of 1 °C for strainometers led to a change in their readings, corresponding to a change in the moisture of the sod-podzol soil by 0.023% by soil weight, and by 0.023% on black soil.

For electric capacitance sensors, changes in their readings corresponded to 0.1% on sod-podzol soil and 0.2% on black soil.

In open ground, daily variations in temperature in the root layer did not exceed 4 °C, however weekly and monthly fluctuations reached 15 °C. As a result, the SMS measurement error with strainometer corresponded to a soil moisture of 0.35% on the both soils. The error of moisture measurement by electrical capacitance sensors reached 1.5% on sod-podzol soil and 3% on black soil. Therefore, it is necessary to conduct thermal compensation of electrical capacitance sensors.

Temporal Stability of Electrical Capacitance Sensors

A long-term (20 days) experiment has been also carried out to maintain the humidity of the greenhouse cocovite substrate at a constant level equal to the field capacity (FC) using small daily irrigation. For all the time of the experience, the electrical capacitance of the sensor increased from 365 pF to 370 pF, that is, only 5 pF, which corresponds to a change in humidity of 2.6% of the mass of the soil.

Field Experiments on Open Ground

The sensor was placed in the soil to a depth of 15 cm at the place of the future row of plants. A high-frequency transducer was placed nearby in a splash-proof casing. It converted the capacitive current of the sensor, proportional to humidity, into a DC signal. This signal was transmitted via cable to the command-measuring device, where there was a manual installation of moisture, a comparator and a hysteresis regulator, providing a dose of irrigation water necessary to maintain optimum soil moisture. The actuator is an electromagnetic valve on the irrigation piping.

The work has been carried out on a plantation of cauliflower on sod-podzol cultivated soil. Before planting, compost was introduced (30 t/ha) and liming (8 t/

ha). The area of the experimental plot was divided into two equal halves, experimental and control ones. At the test site, automatic drip irrigation has been used. At the control plot, watering has been performed by sprinkling at a decrease in soil moisture to 80% of FC. The estimated rate of irrigation at the control plot maintained the soil moisture in the 0–30 cm layer at the FC level. Electrical capacitance sensors were calibrated according to the readings of strainometers, specifically, watering has been performed at a maximum field capacity (MFC) of - 0.08 atm.

Table 1 shows the monthly and decade volumes of water inflow to the plots.

Table 1
Water Inflow (t/ha)

Month	July			August			September			Sum
Decade	1	2	3	1	2	3	1	2	3	
Precipitation		390	65	54	391	563	154	212		1840
Watering of the test plot	25	25	503	854	516					1923
Watering of the control plot	43	43	116	1545						1747

The amount of irrigation water in the experimental plot was 10% more than in the control plot. On day 95, the yield of inflorescences in the control plot reached 44.7 t/ha, and in the experimental plot was 58.6 t/ha, that is, it was 30% more than in the control plot. The increase in yield at the experimental plot was caused by a more uniform inflow of irrigation water and more accurate maintenance of the optimum level of moisture (FC). The decrease in yield in the control plot was caused by a lack of moisture from day 33 to day 37, when SMS was reduced to -0.48 atm.

Comparing the two methods of irrigation control (using strainometers or electrical capacitance sensors), it should be noted that electrical capacitance sensors are convenient in operation, reliable, cheap and durable. However, they are sensitive to changes in soil structure and density. The readings of strainometers do not depend on the structure and density of the soil, but they are fragile and take much longer to maintain. The most promising is the combination of the both methods. For this purpose, it is necessary to determine the optimum soil moisture using strainometers, and then use electrical capacitance sensors, according to the reading of which the established optimum moisture level is later maintained.

The practice of using electric capacitance sensors has proved that after rooting plants, the properties of these sensors stabilize, which makes it possible to use them effectively throughout the growing season.

Conclusion

Under the conditions of a field experiment, it has been established that the

Data on watering and precipitation on cauliflower plot from July to September 2012, corrected

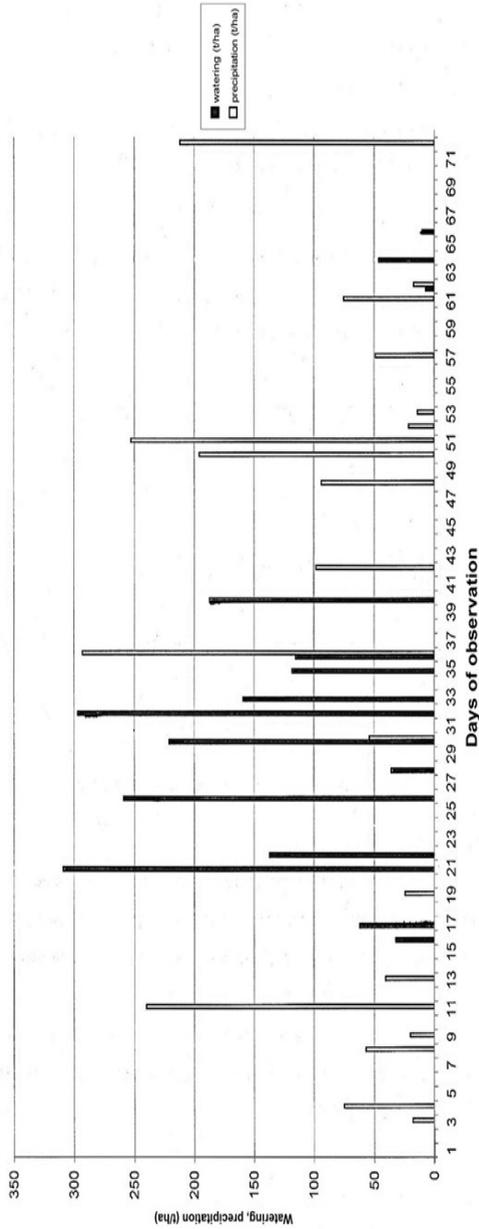


Fig.1. Data on irrigation and precipitation on the cauliflower plot. Horizontally: days of observation, vertically: inflow of water in tons per hectare. Empty indices – precipitation, black indices – waterings

use of an extended electrical capacitance sensor with a command device makes it possible, under the conditions of a drip irrigation system, to automatically control the irrigation regime and optimize soil moisture, thereby increasing crop yields.

The use of such an irrigation management system makes it possible, by increasing the yield, to recover the costs of creating this system as early as in a year after its commissioning.

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生殖力的外源调节和葡萄 (*Vitis Vinifera*) 植物对根瘤蚜的抗性
**EXOGENOUS REGULATION OF PRODUCTIVITY AND
RESISTANCE OF THE VITIS VINIFERA PLANT SPECIES
TO PHYLLOXERA**

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抽象。葡萄栽培技术的一个有希望的方向是使用诱导子来增加植物对疾病和害虫，特别是根瘤蚜的损害的抵抗力。这项工作的目的是研究诱导子对葡萄 (*Vitis Vinifera*) 植物对根瘤蚜 (*Phylloxera*) 的生产力和抗性的影响。研究对象是欧洲裔美国人 Bianca 种间杂交技术的根葡萄植物。植物生长调节剂 furolan 和氨基酸甲硫氨酸以及它们的组成用作激发子。在葡萄栽培技术中使用诱导子可以增加 Bianca 葡萄根系植物对根瘤蚜的根和叶形态的抗性，并且其生物学效果不逊于标准处理方案，其涉及使用大量的化学保护剂。诱导子的使用影响葡萄植物的代谢，增加酚类化合物的含量，并激活光合作用。这样可以激活葡萄植物的保护反应，提高生产力，获得环保产品，同时不影响葡萄的质量。

关键词：葡萄，根瘤蚜，诱导子，生产力

Abstract. A promising direction in the technology of cultivation of grapes is the use of elicitors to increase the resistance of plants to damage by diseases and pests, in particular by phylloxera. The purpose of the work is to study the effect of elicitors on the productivity and resistance of plants of the *Vitis Vinifera* species to phylloxera. The object of research is the root grape plants of the technical Bianca interspecific hybrid, of Euro-American origin. The plant growth regulator furolan and the amino acid methionine, as well as their composition, were used as elicitors.

The use of elicitors in grape cultivation technology makes it possible to increase the resistance of root plants of Bianca grapes to damage by both the root and leaf form of phylloxera and in its biological effectiveness is not inferior to the standard treatment option, which involves the use of a large number of chemical protective agents. The use of elicitors affects the metabolism of grape plants, increases the content of phenolic compounds, and activates photosynthetic activity. This allows to activate the protective reactions of grape plants, increase productivity, get environmentally friendly products without compromising the quality of grapes.

Keywords: grapes, phylloxera, elicitors, productivity

Introduction

Due to the global climate warming and local changes in weather and climate conditions, the identification of grape varieties that have complex resistance to abiotic and biotic environmental factors plays a crucial role in the construction of highly productive ampelocenoses [1, 2]. The climatic conditions of the Krasnodar Territory favor the production of high grape yields that can withstand competition in the international market. In the conditions of this region, only varieties combining high quality with adaptability can be successfully cultivated on a fairly wide scale [3, 4]. Adverse climatic conditions can have a negative impact on the resistance of grape plants to biotic stresses, including damage by phytopathogens and pests. Therefore, the study of the physiological and biochemical laws of the formation of both production and adaptive potential of grape varieties of various ecological and geographical origin and the identification of the most significant physiological, biochemical and anatomical and morphological parameters characterizing the expressiveness of the genetic systems of plant adaptation to abiotic and biotic stresses are especially relevant [5- 8].

One of the most expensive item in the technological process of cultivating grapes is pest protection. The effectiveness of the use of chemical plant protection products is quite high. However, they have a low degree of utilization in natural communities, accumulate in food products and are characterized by high carcinogenicity [8].

The use of various classes of chemical protective means affects pests, so that they are gradually becoming accustomed to pesticides. This not only reduces the effectiveness of the latter and requires the creation of more and more new chemicals, but also leads to the death of species of microorganisms that are “useful” in the agrocenosis. In addition, pesticides have a negative effect on the metabolism of a grape plant, and their residues fall into berries and grape products, including wines, juices, etc. [3,8]. One of the ways to solve this problem is to use low-toxic, environmentally friendly, protective reaction inducers used in microdoses — abiogenic elicitors, including synthetic low molecular weight immunomodulating compounds that are counterparts of natural substances [5].

In the southern region of the Russian Federation, the most common pests causing great damage to vineyards include the most dangerous pest - phylloxera (*Phylloxera vastatrix* Planch). On American varieties and hybrids of direct producers, there are all forms of phylloxera (root, leaf or gall, nymph, winged and genital). The roots of the European vine, turned out to be very convenient for feeding the root form of phylloxera. Recently, there has been a decrease in the resistance of such varieties to damage by the leaf form of phylloxera. The root form of phylloxera opens the door to pathogenic bacteria and fungi in the soil. Pathogens causing rotting of grape roots include some species of the fungi *Gliocladium*, *Fusarium*, *Cylindrocarpon*, as well as bacteria of the genera *Pseudomonas*, *Bacillus* [4].

To increase the resistance of grape plants to damage by both leaf and root forms of phylloxera, it is promising to use elicitors - substances secreted by the pathogen in the tissue of the host plant as a biotechnological method. A specific selection of synthetic analogues of such compounds and their use in doses that are harmless to the plant allows the immunization effect to be achieved due to the activation of metabolic processes aimed at detoxifying the exogenous compound and makes the plants more resistant to damage [5]. During pathogenesis, the plant receives a pathogen signal and launches a complex program of chemical protection, including the synthesis of ethylene, abscisic, salicylic acids, whose action is associated with the regulation of processes occurring in the cell wall, expression of apoptosis genes (lignification of tissues of affected areas), and synthesis of stress proteins [5, 8].

This allows to more fully realize the potential of the genotype by activating cascades of protective reactions to create an intracellular environment unfavorable for the development of phytopathogens and nutrition of phylloxera, which can also create prerequisites for increasing the resistance of grape plants to summertime abiotic stressors. To increase the resistance of root plants of grapes of Euro-American origin to damage by the root form of phylloxera, a composition of furolan and methionine preparations exhibiting the properties of elicitors is used, however, their effect on the resistance of grape plants to the leaf form of phylloxera has not been studied [5].

The purpose of the work-is to identify the effect of elicitors on the formation of productivity and resistance of plants of the *Vitis Vinifera* species to phylloxera

Objects and methods of research

The object of research is the root grape plants of the technical Bianca interspecific hybrid, of Euro-American origin. It is relatively resistant to mildew, to gray rot, leaf form of phylloxera and is unstable to damage by the root form of phylloxera [9, 10]. Planting of 2006. The test on Bianca grapes was carried out in "Primorskoye" CJSC of the Temryuk District of the Krasnodar Territory in 2014, 2015, 2016. Scheme of the experiment: 1 - Control, 2 - standard treat-

ment - reference, 3 - furolan 10 g/ha + methionine 10 g/ha (1:1). The repetition of the experiment is fourfold. 5 bush seats per repetition. Plants without treatment with elicitors were taken as a control. Treatment with elicitors (a composition of furolan and methionine at a dose of 10 g/ha of each of them) was performed three times (May 20, June 8 and June 22) in the form of aqueous solutions by spraying with a CHAMPION PS 257 backpack sprayer. Fluid volume - 870–950 dm³/ha [10]. Comparison standard (standard treatment option) - plants cultivated using chemical means of protection. In 2015, in May, grape plants were treated against a complex of diseases (anthracnose, alternariosis, black spotting) with Kuprosat KS and Polyram DF, VDG. Insecticides were not used, since after a sharp drop in air temperature in the third decade of April to 0.4°C, the release of the leaf form of phylloxera was not observed. In 2016, the treatment of grape plants at the end of April in all variants of the experiment was carried out to protect against mildew (Kuprosat KS), black spotting (Kuproksat KS, Rapid Gold SP, Cabrio Top VDG, Polyram VDG, Tanos VDG), to prevent the development of oidium (four times Mikrotiol special VDG, once Cabrio TOP VDG and Talendo KE), from the leaf form of phylloxera (Bi-58 new KE, Fastak KE) against european grapevine moth and cotton bollworm (Pirineks KE, Avant KE). The field experiment was carried out in accordance with the procedure [10]. We used modern high-precision physiological and biochemical methods for studying the content of chlorophyll (a+b), carotenoids by the spectral method of chlorogenic acid, sucrose, glucose, fructose by capillary electrophoresis using highly efficient analytical equipment Kapel105 M on the basis of the "Instrument-Analytical" CCP and the laboratory of physiology and plant biochemistry FGBSI NCRRIHV [11].

The experimental data obtained 2014-2016 were processed using generally accepted methods of variation statistics [12].

Results and discussion

To determine the effect of elicitors on the resistance of root plants of Bianca grape to damage by the root form of phylloxera, the number of root injuries per 1 cm of its length was determined [10]. The number of root injuries by the root form of phylloxera per 1 cm of the root with a diameter of more than 1 mm was the highest in the control — 0.95 pcs/cm (Fig. 1).

In the Fastak, Furolan + Methionine variants, the amount of damage was 3.5 times or more less in comparison with the control, and in the methionine, Furolan variants - 9.5 times.

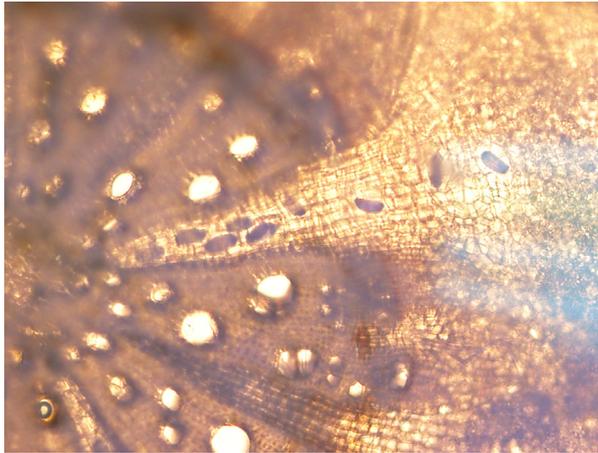
Anatomical and morphological studies revealed the penetration of phylloxera larvae into the root parenchyma (Fig. 2).

During anatomical and morphological studies on the transverse section of the root, nodule formation was found that impeded the absorption of nutrients, up to its complete cessation [13].

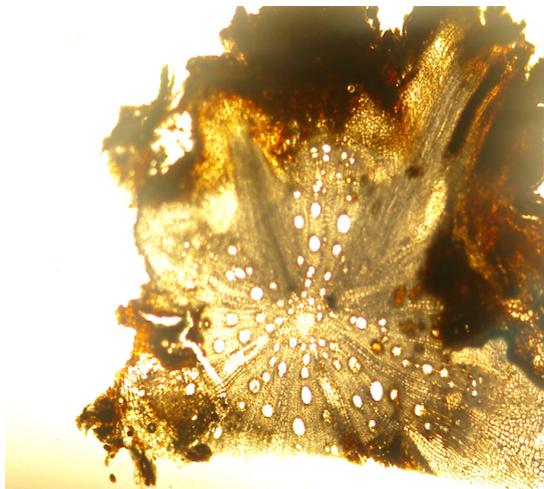


The number of root injuries, pcs/cm of root length

Figure 1 - Damage to grape roots by the root form of phylloxera



phylloxera larvae in root parenchyma



nodule formation on the root surface

Figure 2 - Micro photo of *phylloxera* larvae in the root parenchyma and nodule formation in the control experiment

Nodules are formed under the influence of the secretions of the saliva of the root phylloxera. In the variants of experiments with the treatment of grape plants with elicitors, the smallest number of nodules was found, and they were smaller in comparison with the control variant of the experiment. In these variants, the formation of a wound periderm due to the appearance of a wound phallogen, which isolates damaged tissues and prevents the spread of necrosis deep into the root, as well as the penetration of pathogens into nodules, has been found.

Subsequently, whole groups of roots isolate the nodules and cause them to die. A different degree of nodule formation was revealed, and, accordingly, a degree of root damage, depending on the type of experiment, which we expressed in points on a 4-point scale:

0 – no nodules

1 – 25% of the root surface is filled with nodules;

2 -50% of the root surface is filled with nodules;

3 -75% of the root surface is filled with nodules;

4 - 100 % of the root surface is filled with nodules

According to the results of 2013-2014, the control experiment was rated 4 points; The Fastak experiment was rated 1-2 points, Methionine 2-3 points, Furo-lan, Furo-lan + Methionine (1:1) 1-2 points.

Thus, the best results in increasing the resistance of grape plants to damage by the root form of phylloxera were achieved by treatment with Furolan, and the composition of Furolan and Methionine preparations with a ratio of Furolan + Methionine components (1:1).

The determination of microflora on the roots of Bianca grapes in June 2013 showed that grape plants in the variant with the treatment with the Furolan and Methionine preparations are more resistant to *Alternaria* (0% contamination), to *Mucor* fungi (0% contamination) compared with control (*Alternaria* and *Mucor* contamination - 20%) and the option with the Fastak chemical (*Alternaria* contamination - 40% and *Mucor* contamination - 20%).

In 2014, the best results were obtained in terms of the resistance of the *Vitis Vinifera* species to damage by the root form of phylloxera (root contamination - 0 points, in the control - 4 points) and resistance to phytopathogens (*Alternaria* contamination 0% and Yeast - 5%, *Penicillium* - 5%) were achieved by treating grape plants with the composition of Furolan and Methionine (1:1) [13, 14].

In November, the roots of grape plants in the variant with Furolan were more resistant to contamination by fungi of the genus *Aspergillus* (contamination 5%) and *Penicillium* (contamination 0%) compared with the control (contamination 20% and 10%, respectively) and Fastak (contamination 15% and 5%, respectively). The variant using the composition of chemicals was more resistant to contamination by fungi of the genus *Penicillium* (5% contamination). At the beginning of the growing season of 2014, a prolonged effect of the preparations on the wintering of Bianca grape plants was noted. The number of opened buds in the control was 93.2%, in the variant with Fastak - 94.9%, in the variants with elicitors - 96.2 - 99.2%.

By the time the experiment was laid (06/06/2014), the second generation of the pest was developing on the leaves of the main shoots. The highest number of leaf forms of phylloxera was observed in the control (17.29%). 50-78% less than in the control, the leaves on the main shoots in the variants with Furolan were populated by the pest. In variants with Fastak and Methionine, leaf populations with the leaf form of phylloxera were not found [15 - 17]. After the first treatment with elicitors and Fastak on day 27, the growing leaves turned out to be unattractive for the pest. The greatest biological effectiveness in containing pest colonization of stepson leaves was observed in the variant with the Furolan + Methionine composition (1:1) (62.2%) and in the variant with Fastak - 79.4%.

One of the precursors in the synthesis of lignin in plants is chlorogenic acid. In June, a higher content of chlorogenic acid in the leaves of grapes is consistent with a smaller number of leaves affected by the leaf form of phylloxera (Fig. 3).

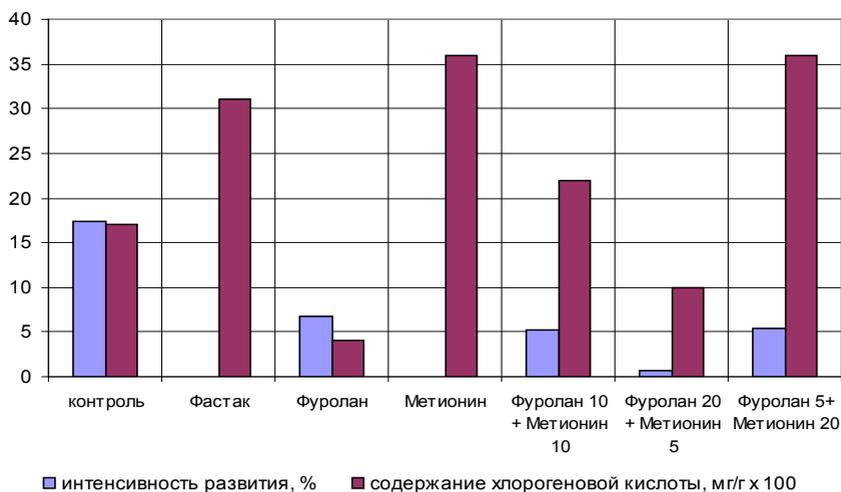


Figure 3 - content of chlorogenic acid in the leaves of grapes and their contamination by leaf form of phylloxera, 06/06/2014

In 2015, at the beginning of the growing season of grapes, a prolonged effect of 2014 treatments with abiogenic elicitors on wintering of plants was revealed [18]. As of April 10, 2015, the number of swollen buds according to the experimental variants ranged from 92% in the control variant to 99% in the variant with elicitors and 98% in the variant with standard treatment. However, after a sharp drop in air temperature on April 14 to -0.7°C and April 22 to 0.4°C , the number of shoots that developed from central buds did not exceed 30-40%, which affected the number of initially formed inflorescences (Fig. 4)

In 2015, in early July, in comparison with April, a greater number of inflorescences were noted in the variant with elicitors. In the variant with elicitors, it increased by 81.8%, in the control - by 94.4% and in the variant with standard treatment - by 37.1%.

It should be noted that the number of inflorescences increased due to the later (2 weeks) blooming and growth of shoots from replacing buds [18].

In 2015, adverse conditions (drought) formed for the development of the main pathogens. The leaf form of phylloxera was absent in all variants of the experiment for the entire growing season. The roots were excavated layer by layer to a depth of 30-35 cm, that is, to the calcaneal roots to predict the possibility of phylloxera nymphs reaching the soil surface. The results of determining the population of grape roots with the root form of phylloxera are shown in Figure 5 [17].

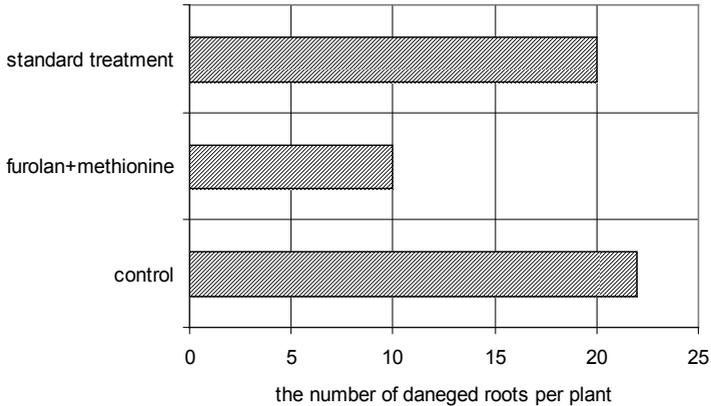


Figure 5 - Population of the roots of Bianca grape with the root form of phylloxera ("Primorskoye" CJSC, 2015)

Due to the large damage to the roots in 2015, in the control and standard treatment variants, the probability of nymphs leaving the soil was higher than in the variant with elicitors.

In 2016, the only pest actively propagating on Bianca grapes was the leaf form of phylloxera (Table 1)

Table 1 - The effect of elicitors on the contamination of plants of Bianca grape by leaf form of phylloxera

Variant	17.06.2016		27.07.2016		11.08.2016		29.08.2016	
	P*	R**	P	R	P	R	P	R
Control	14.6	7.1	66.1	31,9	65,5	37,9	29.1	12,6
Elicitors	5.1	1.6	18.6	6.4	36,9	12,5	30,9	20,2
Standard treatment	0	0	0	0	7.0	1.7	0	0

*P- propagation of leaf form of phylloxera, %

** R- the intensity of leaf population by phylloxera leaf form, %

In the control, from the second half of June until the second decade of August, an active population of young leaves by the leaf form of phylloxera was observed, while the number of pests increased by more than 4.5 times. Three-fold treatment with elicitors of grape plants contributed to a decrease in the number of leaf form of phylloxera from 65 to 80%.

In the case of standard treatment, the introduction of pesticides in June led to the formation of burns on the leaves (from the 14th to the 18th leaf), which negatively affected the population of the vine bushes with a quarantine pest. 50 days after the last use of elicitors, their biological effectiveness in controlling the spread of the leaf form of phylloxera decreased, which was associated with the growth of young leaves.

Abiogenic elicitors had a positive effect on the formation of grape productivity (Table 2)

Table 2 - The influence of abiogenic elicitors on the formation of grape productivity, Bianca variety, 2014-2015

Variant	The shoot leaves surface area, cm ²	The number of bunches, pcs/shoot	The leaves surface area, cm ² /bunch
Control	1740,1 - 2094,1	1,8 - 1,9	966,7-1102,1
Elicitors	2323,7 - 2848,2	1,8-2,2	1085,2-1582,2
Standard treatment	1406,4 -1970,8	1,7-1,9	1037,3-1097,9

Elicitors contributed to the formation of a larger leaf surface area by grape plants, which created the prerequisites for increasing productivity compared to control.

Microscopy of grape leaves revealed that elicitors increase the leaf palisade index, which leads to better photosynthetic activity and resistance of plants to abiotic summer stressors (Table 3).

Table 3 - Biometric parameters of the leaves of plants of Bianca grape varieties in various experimental variants (July-August 2014-2015)

Experiment variant	Leaf blade thickness	Palisade layer thickness	Sponge layer thickness	Upper epidermis thickness	Palisade index
Control	129,3-144,3	59,1-65,2	60,1-67,7	10,1-11,4	0,96-0,98
Elicitors	132,7-142,7	66,2-67,2	54,2-54,5	10,1-10,9	1,02-1,20
Standard treatment	133,9-137,0	60,2-61,7	68,3-64,4	9,9-10,9	0,94-0,95

A more active photosynthetic activity is indicated by an increase in the content of pigments in grape leaves. (table 4).

Table 4 - The pigment content and the effectiveness of the primary processes of photosynthesis in the leaves of Bianca grape varieties

Experiment variant	chlorophyll a, mg/g	chlorophyll b, mg/g	carotene, mg/g	carotene chlorophyll (a+b)	Pppc
Control	4,11-4,89	1,36-1,91	2,37-3,04	0,43-0,45	1,21-1,61
Elicitors	5,13-6,22	1,48-2,56	2,80-4,54	0,40-0,46	0,97-1,54
Standard treatment	4,43-4,94	1,39-1,83	2,56-2,71	0,41-0,44	1,28-1,79

In variants with the use of elicitors, the content of both chlorophyll and carotenoids is increased, while standard treatment reduces primary photosynthetic processes coefficient (Pppc), and elicitors increase it.

Photosynthesis is the main process in which the dry matter of plants is formed and the first free sugar formed during photosynthesis is sucrose, from which non-phosphorylated monosaccharides - glucose and fructose - are formed.

The main transport form of sugars in grape plants is glucose. Under adverse conditions, starch accumulates in the leaves.

Standard treatment and elicitors increase the content of starch in the leaves of grapes, while in all variants of the experiment, its hydrolysis is activated with the formation of sugars such as sucrose, glucose and fructose (table. 5).

Table 5 - Carbohydrate content in the leaves of Bianca grape varieties

Experimental variant	Sucrose, mg/g	Glucose, mg/g	Fructose, mg/g	Starch, mg/g
Control	0,07-0,10	0,33-1,70	0,59-1,67	1,01-5,55
Elicitors	0,76-18,95	1,93-5,21	1,8-19,42	2,08-5,02
Standard treatment	0,39-1,50	0,43-3,12	0,56-3,03	3,13-4,64

Table 6 - The effect of elicitors on the yield and quality of grapes of the Bianca variety, 2014-2015

Variant	The number of bunches per bush, pcs	The bunch mass g	Productivity kg	Yield c/ha	Grape quality	
					Sugar content, %	Juice acidity, g/l
Control	52,4-75,0	50,5-80,7	3,8-4,23	49,4-55,0	21,1-22,8	6,0-6,9
Elicitors	51,6-75,0	55,5-85,4	4,16-4,41	50,7-57,3	20,2-23,0	5,8-6,3
Standard treatment	56,6-80,0	51,6-84,8	4,13-4,80	53,7-62,4	17,3-22,0	6,8-7,3
HCP _{0,5}	3,6	3,5	0,4	3,2	0,7	0,7

An increase in the sucrose content in all variants in comparison with the control characterizes a more active course of photosynthesis in plants, and an increase in the content of monosaccharides indicates a their greater attraction to the generative organs. The development on leaves, inflorescences and bunches of diseases such as mildew, oidium, black spotting in all variants of the experiment in 2014-2015 was single and did not affect the crop and its quality (Table 6).

Threefold application of elicitors allowed to increase grape yield by 1.3 - 2.3 c/ha, and standard treatment - by 4.3 - 7.4 c/ha, which is due to an increase in the mass of the bunch by 4.7 - 5.0 g and 1 , 1 - 4.1 g, respectively, and the number of bunches per bush in the standard treatment version for 4.2 - 5.0 pcs., in comparison with the control version. The use of elicitors does not significantly affect the quality of grapes, and in the case of standard treatment, the acidity of the juice increases by 0.4-0.8 g/l.

Conclusions. Elicitors activate immune processes and photosynthetic activity in grape plants, which, combined with a better state of the root system and activation of root growth, creates conditions for increasing productivity, grape yield and its quality. The increased resistance of grape plants to damage by both leaf and root forms of phylloxera is due to the activation of metabolic processes, an increase in the content of chlorogenic acid, the precursor of lignin in the leaves, which creates unfavorable conditions for the nutrition of the pest. The use of elicitors in the technology of cultivating grapes is not inferior in its biological effectiveness to the option of standard treatment, which involves the use of a large number of chemical protective agents, which makes it possible to increase the productivity of plants without compromising the quality of berries and to obtain environmentally friendly products.

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有机盐的行为特征
乳液凝固中的铵

**BEHAVIORAL FEATURES OF ORGANIC SALTS
AMMONIUM IN LATEX COAGULATION**

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抽象。胶乳凝固生产的阶段是提取乳液橡胶的一般技术方案中最成问题的阶段之一。

迄今为止，氯化钠用于乳液胶乳凝固合成橡胶的过程中。在用废水从胶乳中提取橡胶碎块后，将钠盐供应到处理设施。在处理设施中，氯化钠不从水相中除去并倾倒在天然储存器中，从而污染环境。目前，乳液橡胶生产技术中的季铵盐应用于工业中。

它们允许在合成橡胶工业中排除使用氯化钠并且还解决一些环境问题。然而，季铵盐不能用于乳液橡胶生产的一些工艺过程中。

在已发表的早期研究中，文章展示了在乳液胶乳中凝聚过程中使用低分子量铵

盐的前景。它们的消耗量是钠盐消耗量的3-4倍。在该文章中，与无机铵盐和氯化钠相比，在研究乳胶凝结的过程中进行了乙酸铵、草酸铵和柠檬酸铵的凝结能力的评估。建立了天然盐组分的影响，以及它们对乳液胶乳中凝结过程的技术特征的消耗。显示了有机铵盐和酸化组分在完全凝结中的消耗之间的关系。这些橡胶，橡胶化合物和硫化橡胶符合标准参数。

关键词：乳胶，凝固，橡胶，有机铵盐，硫化胶，性能

Abstract. *The stage in the production of latex coagulation is one of the most problematic in the general technological scheme of extraction emulsion rubbers.*

Until now sodium chloride is used in the process of coagulation synthetic rubbers from emulsion latex. The sodium salt is supplied to the treatment facilities after extraction of rubber crumb from latex with waste water. At the treatment facilities sodium chloride is not removed from the aqueous phase and is dumped in natural reservoirs thereby pollutes the environment. Currently quaternary ammonium salt in the production technology of emulsion rubbers is applied in the industry.

They allow to exclude the use of sodium chloride in the industry of synthetic rubber and also to solve some environment problems. However quaternary ammonium salts cannot be used in some technological processes of production of emulsion rubbers.

In the published earlier research articles were shown the prospects the use of low-molecular ammonium salts in the coagulation process in the emulsion latex. Their consumption is 3-4 times less than the consumption of sodium salt. In the article was carried out the estimation of the coagulating ability of ammonium acetate, ammonium oxalate and ammonium citrate in the study of latex coagulation in the comparison with an inorganic ammonium salt and sodium chloride. The influences of the nature salt component were established, as well as their consumptions on the technological features of the coagulation process in the emulsion latex. The relationship between the consumption of organic ammonium salt and acidifying component on the complete coagulation was shown. These rubbers, rubber compounds and vulcanizates correspond to standard parameters.

Keywords: *Latex, coagulation, rubber, organic ammonium salts, vulcanizates, properties*

Introduction

In recent years, an active development of the industry producing synthetic emulsion rubbers is observed. This is fixed to continuously increasing demand for tire, rubber products, active development of the composite materials containing polymeric components and etc. [1]. High interest in products based on polymeric materials requires constant development, the introduction of new technologies, apparatus design, new catalytic systems, initiating systems, emulsifying systems and etc. Also, the high requirements are imposed to quality of the output, its range and strict observance of ecological standards. In addition, special attention de-

votes to the rubbers obtained by emulsion polymerization because they have a set of positive properties and they are widely used [2-4]. The process improvement is an important and central task standing this branch of the petrochemical industry.

One of the problem stages in the production of emulsion rubbers is the stage of their extraction from latex. This stage has high materials intensity and energy intensity and sometimes it contradicts with the environmental requirements. Generally, this is bound up with high consumption (150-200 kg/t of rubber) of the coagulating agent - sodium chloride which is widely used nowadays because it is economically profitable. However sodium chloride enters the environment together waste water and pollutes it. For this reason exploratory studies are currently being conducted in order to replace existing salt coagulating agents on organic substances. The organic substances must have high coagulation ability, biodegradability, low cost and accessibility.

In the published earlier research articles were shown the prospects of use of quaternary ammonium salts such as ammonium chloride, ammonium fluoride, ammonium bromide [8] in technology extraction of rubbers from latex. It's worth noting that these ammonium salts are presented in a significant amount in the waste of other chemical industry. In addition, until the present they are not used and they are dumped in natural reservoirs as water solutions so exploratory studies on the use ammonium salts which are formed as waste have high practical and environment importance. Earlier researches [5-10] were conducted only with ammonium salts on the basis of inorganic acids. In the meantime ammonium salts on the basis of organic acids are formed in the capacity of waste and by-products in the chemical industry.

In the published literature sources this problem had not been given special attention. Therefore, the study of possibility to use organic ammonium salts in the technological extraction emulsion rubbers from latex has scientific and practical importance. Besides it expands and complements the existing literature data on the coagulating agents used in the technology of the production of emulsion rubber.

The aim of this article is to contemplate the possibility of use organic ammonium salts such as ammonium acetate, ammonium oxalate and ammonium citrate ($C_6H_{17}N_3O_7$ and $C_6H_{14}N_2O_7$) with the assessment impact of their consumption, the acidity of the medium on the complete latex coagulation and the properties of the resulting rubbers, rubber compounds and vulcanizates.

Experimental part

The latex coagulation was made according to the standard procedure described in work [11]. Aqueous solutions of ammonium salts with concentrations: ammonium acetate – 9,4 %, ammonium oxalate – 4,3 % and ammonium citrate ($C_6H_{14}N_3O_7$ and $C_6H_{14}N_2O_7$) – 10 % were used in the technology extraction rubbers from latex.

As an acidifying agent were used 1,0 – 2,0 % aqueous solutions of sulfuric

acid. The latex coagulation process was carried out at a temperature of 20 – 22 °C at the coagulative installation. It's a container with a mixing device placed in the thermostat to maintain the temperature. The acidic medium of coagulation was created by introducing an aqueous solution of sulfuric acid. The completeness of coagulation was estimated visually on the transparency of the serum and gravimetrically - the mass of the obtained rubber crumb. The formed crumb was separated from the aqueous phase (serum), it was washed in warm water and after pressing it was dried in a drying oven at a temperature 80 – 85 °C.

The coagulation ability of organic ammonium salts was estimated in comparison with ammonium sulfate and sodium chloride because the first salt is an example of inorganic ammonium salt, and the second is the known coagulant used in the production of emulsion rubbers today.

Results and discussion

Results of an experiment showed (table 1) that the mass produced rubber crumb increases with increasing consumption of coagulant. Nearly complete extraction of rubber is achieved by consumption: the ammonium acetate – 200 kg/t; ammonium oxalate – 150 kg/t; ammonium sulfate – 90 kg/t and sodium chloride – 150 kg/t of rubber. Completeness of latex coagulation is not achieved when using ammonium citrate ($C_6H_{17}N_3O_7$ or $C_6H_{14}N_2O_7$). The consumption of sulfuric acid was supported constant – 15 kg/t of rubber.

Some features were noted during latex coagulation with organic ammonium salts. So to maintain the acid condition at a given level (pH=2, 5 – 3, 0), the consumption of sulfuric acid had to be increased. When using ammonium acetate the consumption of sulfuric acid is increased from 15 kg/t to 40 kg/t of rubber.

Table 1 - Extraction of emulsion rubber from latex by various organic ammonium salts. Temperature 20 °C

Coagulant	Sodium chloride						
Consumption of sodium chloride, kg·t ⁻¹ rubber	10	30	50	70	100	120	150
Consumption of sulfuric acid, kg·t ⁻¹ rubber	15	15	15	15	15	15	15
The pH of the aqueous phase	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Rubber outlet, mass %	34.5	56.3	74.7	80.5	85.6	90.5	97.1
Evaluation of complete coagulation	icc	icc	icc	icc	icc	icc	cc
Coagulant	Ammonium sulphate						
Consumption of sodium chloride, kg·t ⁻¹ rubber	10	30	50	70	90	-	-
Consumption of sulfuric acid, kg·t ⁻¹ rubber	15	15	15	15	15	-	-
The pH of the aqueous phase	3.0	3.0	3.0	3.0	3.0	-	-

Continuation of table 1

Coagulant	Sodium chloride						
Rubber outlet, mass %	36.8	71.9	85.4	91.9	93.0	-	-
Evaluation of complete coagulation	icc	icc	icc	cc	cc	-	-
Coagulant	Ammonium acetate						
Consumption of sodium chloride, kg·t ⁻¹ rubber	10	30	50	70	100	150	200
Consumption of sulfuric acid, kg·t ⁻¹ rubber	15	15	15	15	15	15	15
The pH of the aqueous phase	3.0	3.0	3.5	3.5	3.8	4.1	4.5
Rubber outlet, mass %	19.9	31.4	41.0	50.2	59.3	73.7	92.5
Evaluation of complete coagulation	icc	icc	icc	icc	icc	icc	cc
Coagulant	Ammonium oxalate						
Consumption of sodium chloride, kg·t ⁻¹ rubber	10	30	50	70	90	120	150
Consumption of sulfuric acid, kg·t ⁻¹ rubber	15.0	15.0	15.0	15.0	15.0	15.0	15.0
The pH of the aqueous phase	3.5	3.5	3.7	3.8	4.0	4.0	4.1
Rubber outlet, mass %	31.1	38.5	46.1	54.2	65.2	83.4	94.2
Evaluation of complete coagulation	icc	icc	icc	icc	icc	icc	cc
Coagulant	Ammonium citrate (C ₆ H ₁₄ N ₂ O ₇)						
Consumption of sodium chloride, kg·t ⁻¹ rubber	10	30	70	110	130	170	210
Consumption of sulfuric acid, kg·t ⁻¹ rubber	15	15	15	15	15	15	15
The pH of the aqueous phase	3.5	4.5	5.0	5.0	5.2	5.4	5.5
Rubber outlet, mass %	27.6	29.4	33.9	40.3	43.6	49.1	58.0
Evaluation of complete coagulation	icc	icc	icc	icc	icc	icc	icc
Consumption of sodium chloride, kg·t ⁻¹ rubber	10	30	70	110	130	170	210
Consumption of sulfuric acid, kg·t ⁻¹ rubber	15	15	15	15	15	15	15
The pH of the aqueous phase	3,7	4,4	5,1	5,3	5,4	5,5	5,7
Rubber outlet, mass %	22,4	27,3	35,4	37,8	42,7	50,5	56,9
Evaluation of complete coagulation	icc	icc	icc	icc	icc	icc	icc

Abbreviations: icc-incomplete coagulation; cc – complete coagulation

And when using ammonium oxalate the consumption of acidifying agent is

increased to 35 kg/t of rubber. This was not observed in the coagulation with ammonium sulfate and sodium chloride. At the same time, ammonium citric cannot be used as a latex coagulant because it has not been achieved complete latex coagulation even with high consumption of ammonium citrate (up to 210 kg/t of rubber) and sulfuric acid also has an increased consumption (up to 50 kg/t of rubber). This was not observed when using inorganic ammonium salts in the technology of emulsion rubbers. This unusual behavior of organic ammonium salts in coagulation can be explained by the fact that these salts are easily hydrolyzed because they are formed by weak organic acids and a weak base. The forming weak acids and weak base in aqueous solutions are presented mainly in molecular form since they weakly dissociate on ions (dissociation constant (K) of acetic acid and ammonium hydroxide - $\approx 2,0 \cdot 10^{-5}$). Efficiency of latex coagulation should deteriorate due to a sharp decrease in the concentration of ions in the solution. It's also necessary to consider that an aqueous solution of strong sulfuric acid is introduced into the coagulated system at the extraction of emulsion rubber. As a result several sequential and series – parallel reaction occur in the reaction mixture. During the hydrolysis weak organic acids are formed which are not able to provide the necessary acid medium of coagulation (pH=2,5 – 3,5). For this reason, a large amount of sulfuric acid is consumed with an increase in the consumption of the coagulating agent (organic ammonium salt) because its part reacts with organic ammonium salts and with surfactants in the emulsion system. It should be noted that the consumption of sulfuric acid depends on the strength of the organic acid released. So, oxalic acid (dissociation constant $K_1=5,6 \cdot 10^{-2}$, $K_2=5,4 \cdot 10^{-5}$) is a stronger acid than acetic acid, therefore, the consumption of sulfuric acid for maintaining the pH value at a given level is required less. This is confirmed by experimental data. The resulting citric acid (tricarboxylic acid), during the hydrolysis of ammonium citrate is also weak (dissociation constant $K_1=8,4 \cdot 10^{-4}$; $K_2=1,7 \cdot 10^{-5}$; $K_3=4,0 \cdot 10^{-7}$) than oxalic acid. Therefore, its effect on latex coagulation will be extremely weak and the completeness of the exaction rubber from latex will depend on the consumption H_2SO_4 (acidifying agent). Besides, high consumptions of dilute sulfuric acid cannot be used because it leads to a sharp decrease in the concentration of the dispersed phase. This fact badly influences on the mass of the forming rubber in the coagulation process.

It bears mentioning that acetic acid and oxalic acid are able to displace higher carboxylic acids from their salts (surfactants) because they are stronger. Weak citric acid has less ability to displace higher organic acids from their salts than acetic acid and oxalic acid. It can also be assumed that the sodium citrate formed in this case will perform the function of a weak surfactant.

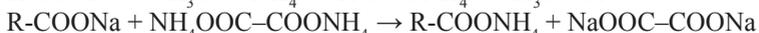
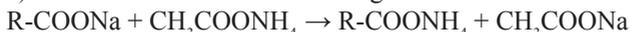
From literary sources it is known [12, 13] that some industrial non-ionic sur-

factants are obtained on the base of sugars. Carbohydrates, which include hydroxy aldehydes and hydroxy ketones, are approaching to oxyacids.

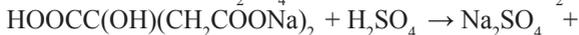
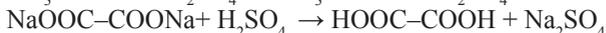
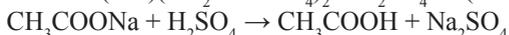
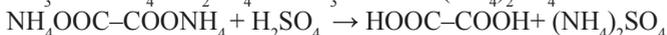
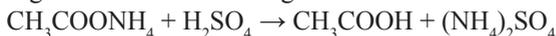
Besides, citric acid also belongs to the oxyacids. Carbohydrates are able to perform the functions of surfactants. They are widely used in pharmacological and other industries. Supposedly this provides a higher stability of the system to latex coagulation. Perhaps, for this reason, the completeness of latex coagulation was not achieved when using ammonium citrate.

The processes occurring in the system since the introduction of organic ammonium salt into it can be shown as follows:

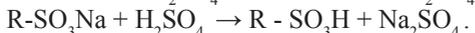
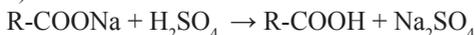
a) at the time of introduction of organic ammonium salt into latex:



b) when the acidifying agent is introduced into the coagulation system, the following chemical reactions begin to occur in it:



c) the interaction of sulfuric acid with surfactant can be shown as follows:



As a result of these reactions sodium sulfate and ammonium sulfate are formed, which will perform the function of coagulating agents. Organic acids are also formed. They will appear as acidifying agents. Though, the strength of organic acids is low to complete the coagulation process and fully transfer the surfactant into carboxylic acids. Therefore, high consumption of sulfuric acid is required. This is observed in the experimental data. In accordance with the standard procedure [14], rubber compounds were prepared on the basis of rubber which was obtained by ammonium salts.

The test results of rubber compounds and vulcanizates are presented in table 2.

Table 2 - Properties of rubber compounds and vulcanizates based on emulsion rubbers (SBR) obtained by ammonium sulfate, ammonium acetate, ammonium oxalate and sodium salt

Parameter	The coagulating agent			
	$(\text{NH}_4)_2\text{SO}_4$	$\text{CH}_3\text{COONH}_4$	$\text{NH}_4\text{OOC-COONH}_4$	NaCl
Mooney viscosity of rubber	42,0	45,0	43,0	44,0
Organic acids content, %	5,6	5,2	5,4	5,7
Organic acids soap content, %	0,10	0,11	0,14	0,09
Mass loss during drying, %	0,19	0,21	0,18	0,15
Ash content, %	0,20	0,17	0,16	0,24
Tensile strength at 300 % stretching, MPa	12,9	12,2	13,1	13,3
Tensile strength at stretching, MPa	24,5	24,2	25,1	25,8
Relative elongation at break, %	510	530	520	540
Relative residual deformation after rupture, %	16	13	15	12

The analysis of the results showed that the vulcanizates based on rubber obtained by ammonium salts have the required complex of properties. They approach the vulcanizates based on rubber obtained by the sodium chloride (standard sample).

Conclusion

The following conclusions can be drawn based on the conducted work:

- 1) some organic ammonium salts (ammonium acetate and especially ammonium oxalate due to lower consumption) can be used in the technological process of extraction emulsion rubbers from latex;
- 2) the consumption of the coagulating agent is interrelated with the consumption of the acidifying agent to maintain $\text{pH}=2,5-3,5$ in the coagulation system;
- 3) the stronger the organic acid, which is a part of ammonium salts, the less the consumption of sulfuric acid to the acidification system is;

The vulcanizates based on the obtained rubbers correspond to standard parameters.

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