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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国际会议

参与者的英文报告

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“Scientific research of the SCO countries: synergy and integration”

Part 2: Participants’ reports in English

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这些会议文集结合了会议的材料 – 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.

Authors are responsible for the accuracy of cited publications, facts, figures, quotations, statistics, proper names and other information.

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Foreword

We thank all participants of our conference "Scientific research of the SCO countries: synergy and integration" for the interest shown, for your speeches and reports. Such a wide range of participants, representing all the countries that are members of the Shanghai Cooperation Organization, speaks about the necessity and importance of this event. The reports of the participants cover a wide range of topical scientific problems and our joint interaction will contribute to the further development of both theoretical and applied modern scientific research by scientists from different countries. The result of the conference was the participation of 56 authors from 7 countries (China, Russia, Uzbekistan, Kazakhstan, Azerbaijan, Tajikistan, Kyrgyzstan).

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

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

Fan Fukuan,
Chairman of the organizing committee of the conference
"Scientific research of the SCO countries: synergy and integration"
Full Professor, Doctor of Economic Sciences,
member of the Chinese Academy of Sciences

前言

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

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

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

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

在上海合作组织发展战略中创建单一保险空间的问题与前景
PROBLEMS AND PROSPECTS OF CREATING A SINGLE INSURANCE SPACE WITHIN THE DEVELOPMENT STRATEGY OF THE SHANGHAI COOPERATION ORGANIZATION

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抽象。 在文章中，考虑了俄罗斯与中国在SCO形式上的主要合作领域。 特别关注创建单一保险市场作为金融领域重要组成部分的可能性。 确定了上海合作组织全民保险和金融市场发展中出现的主要问题，并提出了克服这些问题所必需的一系列措施。

关键词：上海合作组织，俄罗斯，中国，单一保险市场，普遍化。

Abstract. *In the article the main areas of cooperation between Russia and China in the SCO format are considered. Particular attention is paid to the possibility of creating a single insurance market as an essential component of the financial space. The main problems arising in the development of the SCO universal insurance and financial market are identified, and a set of measures, necessary to overcome them, is presented.*

Keywords: *SCO, Russia, China, single insurance market, universalization.*

In modern society, particularly in the context of globalization, the role of international associations is significantly increasing; their influence on political events on the world arena isintensifying.The Shanghai Cooperation Organization (hereinafter referred to as the SCO) is an international organization, while its format provides the participating countries with a wide space for developing relations with strategic partners and at the same time creates conditions for safe and stable development throughout the region.It should be noted that since China and Russia are the main components of the SCO structure, relations between these countries and their strategic interests affect the development of the entire organization in many key areas.Due to the established economic and political relations with the

countries of the European Union and the United States, the emergence of the Russian-Chinese alliance is an important step for the further development of mutually beneficial cooperation between Russia, China and other SCO countries, a phased expansion of the organization's activities, including the creation of a common financial space.

In 2001, after Uzbekistan joined the Shanghai Five, the leaders of China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan signed the Declaration on the Establishment of the Shanghai Cooperation Organization, in which the SCO participants declared their intention to implement multilateral cooperation in order to maintain and strengthen peace, security and stabilization in the region, as well as to create a new democratic, fair and rational political and economic order of the international community. The final consolidation of the status of the SCO as an organization was completed in 2002, when the heads of 6 countries met in St. Petersburg, signing the "Charter of the Shanghai Cooperation Organization", where the principles and main directions of development of the SCO were defined [2].

At the initiative of China and Russia, the SCO was one of the first international organizations that are jointly counteracting terrorism. at the day of the founding of the SCO, the Shanghai Convention on the Suppression of Terrorism, Separatism and Extremism was signed (Russia ratified the document in 2003), and then the Regional Antiterrorist Structure was created in Tashkent [6]. Thanks to China and Russia, the SCO has achieved significant results in the proliferation of anti-terrorism forces and resources, as well as the development of cooperation to ensure security at the borders of countries.

As it developed, the SCO began to move from joint security activities to economic cooperation, which created new prospects for economic cooperation in the region. The role of one of the main driving forces of the SCO opens up new potential opportunities for the Russian Federation in the realization of its strategic goals and objectives [4].

In 2003, the heads of the SCO member states signed a long-term Program of multilateral trade and economic cooperation, followed by the creation of a free trade zone. The creation of a favorable environment in the sphere of trade and investment relations should be highlighted as the short-term goal of the SCO's activities.

For China and Russia, cooperation within the framework of the SCO is of obvious interest due to the following factors. China is at the stage of industrialization, which causes the need for the presence of significant reserves of oil and energy resources, exporter of which is the Russian Federation. In turn, the Russian agricultural industry depends on the size of foreign trade. Thus, the national interests of China and Russia create the prerequisites for mutually beneficial economic cooperation within the framework of the SCO.

At the meeting of the SCO Council of Heads of State in 2004, at the initiative of China, an agreement on the establishment of the SCO Development Fundwas reached, as well as an expert group to develop provisions on the principles of formation and operation of this fund. A year later, the Russian side initiated the establishment of the SCO Interbank Association (the SCO IBA), designed to provide financial support for projects implemented within the framework of the organization.The IBO included the State Corporation "Bank for Development and Foreign Economic Affairs (Vnesheconombank)" (Russia), JSC "Development Bank of Kazakhstan", JSC Corporation "State Development Bank of China", OJSC "RSK Bank" (Kyrgyzstan), State Savings Bank of the Republic of Tajikistan "Amonatbonk"and the National Bank for Foreign Economic Activity of the Republic of Uzbekistan [3].

At the meeting of the heads of the SCO member states in Astana in 2011, the Chinese side proposed the concept of creating the SCO Development Bank, in the authorized capital of which it was ready to contribute up to 10 billion US dollars. It should be noted that this initiative was of the greatest interest to partners from Central Asia because of the emerging prospects for financing their own economies at the expense of donors in the form of China, Kazakhstan and Russia [5].

If we analyze the activities of the SCO as a whole, the fact that most of the initiatives come from China attracts attention. It can be concluded that this situation is due to his interest in acquiring resources from Central Asia, as well as in promoting Chinese products both to the Russian market and to Central Asian. Obviously, to achieve these goals, China was ready and will be ready to invest huge amounts of money. The Russian Federation is characterized by similar motives for supporting the development of the SCO activity - the Central Asian market is also attractive for the sale of domestic products.

The geopolitical situation in the world by now has led to the need to change the global financial structure. Therefore, the task of forming an independent financial system is extremely important for the development of financial and economic potential, strengthening stability and security, and trade and economic cooperation of the SCO member countries. The SCO financial institutions are called upon to serve the foreign economic and investment activities of the members of the association. In this regard, the creation of universal financial institutions within the framework of the economic association of the SCO is a key element in the process of forming mutually beneficial relations of the states participating in the association.

Several years ago, experts were actively discussing the creation of a single insurance space for the SCO countries, special attention was paid to the possibility of developing reinsurance activities based on the established international insurance pool, but in practice the idea has not been implemented, although it has not lost relevance to the present. It is impossible to deny the importance of the

role played by the insurance market in the process of forming global economic relations.Cooperation of the SCO countries in various fields will inevitably be accompanied by certain risks common to project participants. The use of insurers' services exclusively in national markets makes it difficult for an effective system to minimize them at all stages of joint projects. Therefore, the initiative to create a unified insurance market of the SCO member countries seems logical, and the format of interaction between countries and common goals create the prerequisites for the successful development of such a market.

At present, the national insurance markets of the SCO member countries are quite separate, the insurance activity is carried out on the basis of national legislation. Therefore, the harmonization of insurance legislation with the goal of its unification should be one of the priorities in creating a single insurance space.

Among other factors hindering the process of creating and developing a single insurance market are:

- the present differences in the levels of economic development in the territories of the SCO member states;

- limited practice of using reinsurance by national insurance organizations;- не значительнаярольвзаимногострахованиянастраховыхрынках;

- insufficiently high degree of financial literacy and lack of insurance culture among citizens and legal entities on the territory of individual SCO member states.

The above problems are not insurmountable, but they cannot be ignored, which requires the implementation of a set of phased activities.

1. It is necessary to make a rational integration of the insurance space, create a developed infrastructure for it and develop a guarantee mechanism ensuring the reliability of the insurance market;

2. The national insurance legislation of the SCO member states should undergo changes towards universalization, which will create the possibility of unhindered insurance activities throughout the SCO territory;

3. Creating conditions for the formation and maintenance of fair competition in the insurance market;

4. Carrying out activities aimed at improving the financial literacy of the population.

The implementation of the proposed set of measures is designed to contribute to the development of mutually beneficial relations of the SCO members in the framework of creating a single insurance space. The results of the implementation of these recommendations should be:

1. Formation of a stable and reliable common insurance space on the territory of the SCO;

2. Creating incentives for the formation of demand and supply of insurance services in the international insurance market;

3. Creation of a developed infrastructure that ensures the effective functioning of a single insurance market;

4. Formation of personnel potential in the field of insurance and increasing the insurance culture of the company;

5. Stimulation of such areas of insurance as reinsurance and mutual insurance.

Currently, the SCO has become a multifunctional association with significant international influence in various fields of activity. It should be noted that a significant factor determining the further development of the organization and its prospects is the expansion of interaction of the participating countries in new areas, in particular in the field of finance and insurance.It is necessary to take into account the fact that within the framework of the common financial space of the SCO, countries with different cultural traditions and values, with a different outlook and attitude towards all spheres of activity, including economic and, in particular, insurance, are united.Therefore, the achievement of the goals requires the solution of a variety of tasks, first of all, a set of measures to universalize various aspects of the functioning of the financial market in general and the insurance market in particular.

In our opinion, mutually beneficial cooperation in many areas of the two leaders of the SCO: Russia and China is a key factor in the success of the entire SCO association. In addition, the bilateral relations of Russia and China within the framework of the Shanghai Organization will largely determine the trends in the entire Central Asian region.

Highlighting continued commitment to peace, common development and equal cooperation, expanding dialogue and interaction with the international community, the SCO member states will make every effort to establish security and stability in the region, strengthen ties in the trade, economic and financial spheres in the territory of the association.

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血液巨球蛋白酶联免疫法检测人体遗传
HUMAN REMAINS IDENTIFICATION BY THE METHOD OF ENZYME-LINKED IMMUNOASSAY OF BLOOD MACROGLOBULIN

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摘要：本文介绍了一种利用免疫分析方法鉴定人类遗骸的方法。 血液的巨球蛋白首次被提出作为鉴定标记物。 证明了它们对各种外部破坏因素的作用的高抵抗性和高识别价值。

关键词：法医学，鉴定，球状，人体血液，调查。

Abstract. *The article describes a methodology of the identification of human remains using immunoassay methods. Macroglobulins of blood are for the first time proposed as identification markers. Their high resistance to the action of various external damaging factors and high identification value is proved.*

Keywords: *forensic science, identification, globulines, blood of human, investigation.*

Forensic investigation of human remains is aimed at solving a number of problems, among which the most important should be recognized as follows:

1. Establishment of the time of death;
2. Establishment of identity by human remains.

Solving these problems is often complicated by a number of factors, among which the following should be indicated: a significant fragmentation of cadaveric material; manifestations of putrefaction; postmortem damage of the body and remains by thermal, chemical and other natural factors.

The successful solution of these problems is seen in the use of a wide arsenal of morphological, serological, cytological and immunochemical methods of research techniques.

In this regard, we have attempted to study the application of methodological approaches to human macroglobulin studies in health and disease for solving forensic issues associated with establishing the identity of unidentified corpses and human remains exposed to the simultaneous action of various damaging factors.

The objects of the study were blood samples of 123 men, 98 non-pregnant and 233 pregnant women and 33 lying-in women and 66 women in childbirth. We used 312 white rats.

Aseptic inflammation process of the rats was caused by intramuscular injection of turpentine. Gestational age of the female rodents was determined by formation of vaginal plugs. The estrogen stimulatory effect on the rats was assessed by 17-β-estradiol injection. For inoculation of Pliss sarcoma, tumor cells were injected into the lymph nodes of the neck of the animals.

Test material were the corpses of the crew and passengers of the aircraft AN–124 "Ruslan" that crashed in Irkutsk, including bone and muscle fragments, skin grafts, as well as musculoskeletal conglomerations with enclosures of clothing, jewelry, small wearable objects and elements of interior paneling, instruments and controls, as well as material debris (broken bricks, gravel, wood chips).

The remains were largely contaminated with soil and oily substance with the smell of oil-product. In 98% of cases, various degree of cadaveric material charring was observed.

Blood samples were drawn from large vessels, the inner cavity of the abdominal aorta and the heart in a volume of 10 ml. In the case where the object was a conglomeration of muscle tissue and (or) internal organs, maceration of tissue was used, followed by centrifugation at 1000 rev / min.

After centrifugation, supernatant was sampled with a clean Pasteur pipette and placed into 10 ml vials. The blood was a red-brown liquid with a peculiar odor. At the blood transfusion, clods of dense reddish-brown substance were found. The blood was poured into 10 ml vials, tightly capped and stored at –20°C.

Before the test, blood was defrozen, mixed with the buffer to add samples and loaded into the wells of a polyacrylamide or agarose gel.

As a test sample, we used pooled donated blood of healthy men and women at the age from 24 to 38.

To obtain native proteins, proteinase inhibitors – fenilmetilsulfanol fluoride (0.005 mol), Trasylol (0.0015 mol) and soybean trypsin inhibitor (5 mg / ml) – were added to the blood plasma. Then we used the integrated scheme of successive extraction of PAPP-A, PZP and MG, based on a combination of purification methods of PAPP-A and PZP. Initially, plasminogen was removed through affinity chromatography on a lysine-agarose column. Then, the eluate was mixed with an equal volume of 0.05 M of Tris buffer, pH 7.8, containing 0.1% of Triton X-IOO and 0.45 M of sodium chloride. The solution was passed through a column of heparin-agarose. Wherein PAPP-A was fixed on a column and eluted with the same buffer without detergent, but with increasing concentration of sodium chloride up to IM. Final decontamination of PAPP-A was achieved through negative affinity chromatography on a agarose column with immobilized rabbit antibodies against male blood serum proteins. The product not bound with heparin-agarose was precipitated with polyethylene glycol with a molecular weight of 6000 in a concentration range from 6 to 16%. The final residue was dialyzed against 0.02 M

of phosphate buffer, pH 8.0, containing IM of sodium chloride. To separate PZP from MG, zinc-chelate affinity chromatography on iminodiaceticacid agarose was used. At the descending gradient elution of pH (7.0 to 5.0), both proteins are well separated from each other. PZP final purification is achieved by using the above-described version of the negative affinity chromatography, when final purification of MG is accomplished through negative affinity chromatography on a column with agarose with immobilized antibodies against PZP. To obtain transformed conformational forms of the proteins we used ammonium sulfate precipitation, and addition of primary amines and proteases.

The above general scheme was used to obtain macroglobulin from materials of animal origin. To separate paired MG of animals, zinc (nickel)-chelate chromatography on iminodiaceticacid agarose or anion exchange chromatography was used.

The amino acid composition of proteins was calibrated with the automatic amino acid analyzer Biotronic LC-5001. Within the structure of their carbohydrate components, concentrations of monosaccharides, fucose, amino sugars and sialic acids were calibrated.

Molecular mass of proteins and their subunits was assessed by gel chromatography. For these purposes, zone electrophoresis in polyacrylamide gel plates was used. In this case, we used the gradient of polyacrylamide gel pores (4 - 40%), and protein samples were treated with SDS and β-mercaptoethanol after Laemmli. The same method was used to detect the con-formational restructuring under the influence of primary amines and proteases. Isoelectric point of the proteins was adjusted by means of isoelectric focusing in the gels containing pH gradients created by ampholytes and borate-polyol.

Inhibiting properties of the proteins in relation with proteolytic enzymes were examined by blocking lysis of chromogenic proteins substrates and synthetic substrates of low molecular mass. Expression of internal thiol esters under the influence of proteinases and primary amines was studied by titration of the sulfhydryl groups of proteins 5,5-dithio-bis (2-nitro) benzoic acid.

To obtain monospecific antisera, animals (rabbits, sheep and guinea pigs) were intradermally immunized with a mixture of highly purified antigen and incomplete Freund's adjuvant. Affinity-purified antibodies were obtained through positive affinity chromatography on agarose columns with immobilized highly purified antigens.

To determine the concentrations of the studied proteins, we compared resolutions of the radial immunodiffusion, kinetic immunonephelometry, rocket immunoelectrophoresis, and enzyme immunoassay. In the latter case, the conjugates were obtained by periodate method of application of purified antibodies. To determine the concentrations of PAPP-A, we used a self-developed method based on adjoining the protein to a layer of heparin having a high affinity and selectivity thereto.

Affinity of studied proteins to lectins, proteases, sex steroids, immunoglobulins and other affinantam was determined by rocket (crossed) immunoelektroforeea with intermediate gel.

For these purposes, we also used different versions of tandem cross, rocket-linear and other varieties of quantitative immunoelectrophoresis assay.

The relative mobility of the studied proteins was studied by the method of zone electrophoresis in the agarose gel and by the method of mikroimmunoelektroforeza after Sheydigger. Immunoprecipitates were stained with amido black 10 B, Coomassie Brilliant Blue, black sudan, prironinom, Schiff's reagent, and mixtures for the detection of enzyme activity.

For proteins that cannot be purified, the molecular mass and half-value were found combining electrophoresis in polyacrylamide gel or isoelectric focusing with cross immunoelectrophoresis. Macroglobulin reactions with alleged receptors as part of bacterial cells, or blood cells were determined by western-immunoblotting and dott-blotting onto nitrocellulose.

Reactions of antigen identity were assessed by immunodiffusion (standard and "square" scheme), as well as various options of quantitative immunoelectrophoresis.

Influence of the studied proteins on cellular component immunity was studied by means of spontaneous and mitogen-induced proliferation of peripheral mononuclear cells. These cells obtained from standard Ficoll gradient-verografin, were adjusted to final content of 2x106 cells / ml and cultured in Eagle's minimal medium containing 0.002 M of glutamine, 0.02 M GEPES-buffer, 50 ug / ml of streptomycin, 100 U / ml of penicillin, and 20% of inactivated fetal calf serum. Cultivation was carried out in 96-well polystyrene plates with addition of mitogens (pokeweed mitogen or fitogemaglotinina) or without it. Besides that, we added studied proteins (native or transformed) to the wells to final concentrations of 0.016 - 3.00 mg / ml. 4 hours prior to the termination of the cultivation we added by I mCi (3NI methyl-thymidine). At the end of cultivation, cells were quantitatively transferred to nylon filters, washed and placed in vials with a toluene scintillator. Radioactivity was measured in a computer complex "Beta 2".

Influence of learning proteins on humoral immunity was investigated on the basis of immunoglobulin biosynthesis in cultures of said cells. Cells previously incubated with the indicated proteins were washed from them, and then cultured. In the supernatants of cultures we determined immunoglobulin concentration using an ELISA method. Macroglobulin biosynthesis in cultures of the aforesaid cells was evaluated in the same way.

Statistical processing of the obtained data was performed on a PC Hewlett - Packard (USA) using standard software packages statistical processing. As the basic criteria, we used parametric criteria of Student - Fisher and sigma correlation

coefficient, as well as nonparametric criteria – criterion U of Wilcoxon – Mann – Whitney, and Spearman's rank test correlation.

The study of unidentified human remains was held as follows:

1. Identification of the spectrum of blood macroglobulin;
2. Identification of conservation of antigenic properties of MG, PZP and PAPP-A;
3. Comparative typing of blood of victims and their next of kin.

The spectral composition of blood plasma macroglobulin is shown in Figure 1.

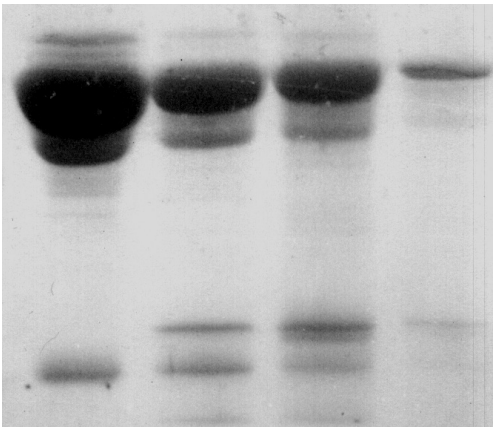

Figure 1.

Typical electrophoretogram of macroglobulin of human plasma identified in the focus of the plane crash.

This electrophoregram of the investigated in blood samples (tracks 2 - 4) distinctly demonstrates from 4 to 5 protein bands. However, it can be seen that the samples, which are on different tracks of the gel are slightly different according to their characteristics, especially in the low molecular area. These differences are related to different manifestations of low molecular proteins due to destruction of the latter. Such differences can be explained by the uneven temperature effect on biological material. Thus, the remains # 6/22, # 32/31 were found 150 meters from the fuselage of the aircraft at the crash site of the aircraft AN-124 "Ruslan", remains # 16/3, # 30/15 were found 100 meters away, remains # 15/9, # 38/34 were found under the debris of the building # 45, Grazhdanskaya Str. In the first case, the content of protein MG in cadaveric material corresponded to 2.3 mg / ml in the second the content was 2.0 mg / ml.

However, it should be noted that in all the tested blood samples with a molecular mass of 45-50 kDa we found piroconjugates formed under the high temperature stress on the analyzed biological material, which underlines the high degree of thermal denaturation of proteins.

However, it can be stated that all the studied samples retained full range of protein, although to a lesser extent, it was albumin that suffered degradation. Increasing the number of fragments in the low molecular area of the electrophoretogram indicates a destructive impact on the material under study, but cannot be considered as critical. The presence of the piroconjugates in the high molecular area o the electrophoretogram is also consistent with the literature data.

The results obtained clearly indicate the suitability of the material for identification research.

The presence of proteins in the full spectrum samples may not be indicative of integrity of the latter, antigenic determinants included. That is why, we attempted to study the ability of the described proteins to engage in immune responses such as "antigen – antibody." Method of "cross" immunoelectrophoresis was chosen as a research method.

Figure 2 shows the results of the "cross" immunoelectrophoresis with poliantiserum to serum samples of blood found at the site of the crash AN-124 "Ruslan" (samples # 6/22, # 32/31, # 16/3, # 30/15, # 15/9, # 38/34) at different distances from the fire seat.

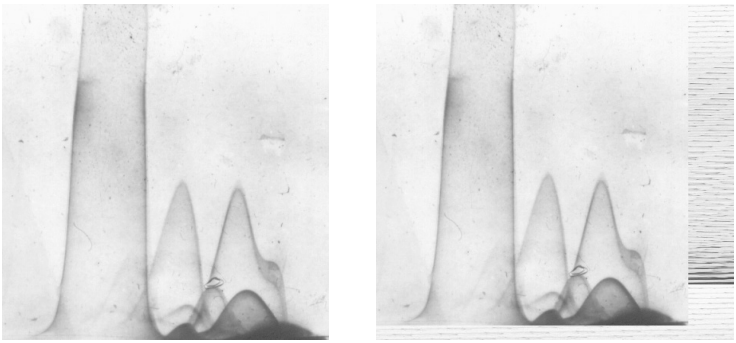

Figure 2.
Typical immune electrophoretogram of macroglobulin of cadaveric blood plasma

The experiment was planned basing on the following theoretical propositions:

1) The electrophoresis data in polyacrylamide gel showed the presence of proteins full spectrum in the plasma and blood serum.

2) As a result of exposure of damaging factors to the protein molecule, Fab- and Fc are primarily destroyed. They are end sites of the proteins responsible for the immunochemical reaction such as "antigen - antibody."

3) If the affecting factors have a significant effect on biological material, the immunochemical reaction system "antigen - antibody" will be absent.

4) The presence of a positive reaction would indicate the possibility of further study of the material.

The obtained results permit to come to the conclusion that, antigenic properties of proteins are retained in spite of the effects of combination of factors on the biological material. In all cases, there is presence (from 9 to 14) and the shape of the peaks.

Moreover, resistance to the damaging factors of Fab- and Fc (end sites of protein molecules) is retained in both men and women. This leads to the conclusion that there is no fundamental difference between the different parts of protein molecules in the blood plasma of men and women, and allows to use this method of study, regardless of gender of the remains found.

In order to detect polymorphic signs of macroglobulin, we determined the concentration of these proteins in blood plasma. The analysis has found out abnormal concentrations of MG in the interstitial fluid sample # 6/22. This indicated the possible presence of cancer pathology. A study of medical records confirmed this assumption – the patient suffered from low-grade peripheral lung cancer with manifestations of exudative pleurisy. This allowed to identify the remains at No. 6/22 as belonging to a citizen K. with a high degree of certainty.

In another case, we observed a high concentration of PAPP-A in the blood plasma of sample # 16/3 equal to 0,188 ± 0,042 0,032 ± 0,04 vs. normal. A study of medical records, revealed that the patient was observed in the perinatal center. Gestational age of 31 weeks. Analysis of the concentration of PAPP-A and the study of medical records gave grounds for identification of the remains as belonging to a citizen M.

According to thanatological research, remains # 30/15 belonged to a male child 6-7 years old. Macroglobulin concentration measurement in plasma (2,94 ± 0,24) helped confirm this hypothesis and identify the remains as belonging to a citizen C, born in 2006.

Meanwhile, it should be noted that human macroglobulin retains the native of conformation and ability to engage in immunochemical reaction "antigen-antibody" under the influence of destructive factors. Consequently, taking into consideration the presence of prominent polymorphism (three protein isoforms, inherited in an autosomal dominant pattern) human macroglobulin can be considered as a sustainable marker during identification of human remains for the following reasons:

- macroglobulin concentration in blood and body fluids is quite high (0.2 - 0.4 g / l), which allows to consistently identify it both in plasma and serum, while using the electrophoresis method in polyacrylamide gels;
- this protein is resistant to damaging factors and retains the native conformation;
- the protein polymorphism is represented by three stable genetic forms, inherited by an autosomal - dominant type (1, 2, 3);
- stability of the results shows sufficient reproducibility of the techniques employed.

健身作为心血管疾病的理疗因素
FITNESS AS A FACTOR OF PHYSIOTHERAPY IN CARDIOVASCULAR DISEASES

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注解。 该评价文章介绍了体育活动在预防和治疗心血管疾病中的作用的文献资料。 结果表明，规律的身体活动对健康和生产力有显着的积极影响。 这些影响很容易预测，取决于负载的大小，并且适用于广泛的个人。 数据关于细胞中自由基的NO，RO'和“灭火器”水平的变化，以及内皮和肌肉中的分子过程（如高水平的磷酸盐代谢和NAD（P）h氧化酶的表达减少） ），取决于运动强度，表明在适度的身体活动中氧化应激减少。 提出了针对患有心血管系统各种疾病的人的编程练习的建议。

关键词：健身，适应，体育锻炼，健康

Annotation. The review article presents the literature data on the role of physical activity in the prevention and treatment of cardiovascular diseases. It is shown that regular physical activity has a significant positive effect on health and productivity. These effects are easily predictable, depend on the magnitude of the loads, and are implemented for a wide range of individuals. data On changes in the levels of NO, RO' and "extinguishers" of free radicals in cells, as well as molecular processes in the endothelium and muscles (such as a high level of phosphate metabolism and reduced expression of NAD(P)h oxidase), depending on the intensity of exercise, demonstrating a decrease in oxidative stress in moderate physical activity. Recommendations for programming exercises for people suffering from various diseases of the cardiovascular system are presented.

Keywords: *fitness, adaptation, physical activity, exercise, health*

It is known that regular and moderate physical activity leads to a decrease in the risk of cardiovascular disease, diabetes, obesity and Oste-oporosis [27]. Conversely, lack of physical activity and inadequate nutrition act together and, often – additive, significantly increasing the negative effects of each other. The same ways and mechanisms of effects realization (for example, nitric oxide - NO, free radicals - RO', etc.) are used [28]. It is proved that physically active persons have a reduced risk of coronary heart disease (CHD). This is a reliable evidence that regular physical activity, even of moderate intensity, reduces the risk of cardiovascular pain. A more significant effect is observed in the application of the program of intensive exercises for General endurance, in which the maximum aerobic power is achieved

Molecular processes in the endothelium and muscles (high levels of phosphate metabolism and reduced expression of NAD(P)H oxidase) change when regular exercise ceases, as these processes are associated with physical exercise [13]. It is shown that even 30 minutes of intense exercise per week can reduce the risk of coronary heart disease. It is known that for patients with ischemic heart disease there are special structures for aerobic and strength exercises [10, 26, 28].

It is known that special recommendations and integrated exercise programs have been developed for women [9], adults [34], patients with chronic heart failure (CHF) and heart transplantation [20], who had a stroke [12], as well as patients with lameness caused by peripheral arterial diseases [23].

With the introduction of modern controlled exercise programs, the number of recorded cases of cardiovascular disease is estimated in the range of 1/50 000 to 1/120 000 patient hours of exercise, with modern risk stratification techniques for the management and control of coronary heart disease (CHD), allow to identify patients with increased risk of cardiovascular disorders during exercise. At the same time, it is possible to identify those patients who may need more thorough, intensive monitoring of the cardiovascular system in addition to medical supervision, which is relied upon for all participants of programs for the rehabilitation of the heart [16]. Thus, it is shown that controlled rehabilitation exercises for 3-6 months, increase mainly the maximum oxygen consumption (IPC) from 11% to 36%. At the same time, the best results are observed in the least stress-prone patients [7].

Improved fitness physical data improve the quality of life of patients and even allow people older than middle age to live in the regime of young people [24]. It is also associated with a decrease in sub-maxial heart rate, systolic blood pressure, and in-Dex pulse pressure (IPD). Thus, the oxygen demand of myocardium decreases during the transition from moderate rhythm to high activity in everyday life [21]. Moreover, an increase in the endurance of the car-dio-respiratory system when testing certain exercises is associated with a significant reduction in the risks of coronary heart disease regardless of other risk factors [14, 17]. However, for patients with long periods of sidlaczego lifestyle to apply exercise programs should be very carefully and gradually.

Fitness reflects the physiological state of well-being that enables a person to meet the requirements of daily life (related to health "Wellness fitness"), or the state that provides the basis for sports ("sports fitness"), or both. Fitness depends on the body's ability to transport and use oxygen during prolonged intense exercise or work. It is assumed that aerobic abilities (aerobic power) play a leading role in the implementation of many motor acts in everyday life [30, 31]. In this regard, we note the ongoing systematic studies [1-6] of our laboratory staff (Mr), which showed the possibility of correcting the condition of patients with arterial Hypertension by fitness methods.

As a standard measure of fitness is usually used IPC (VO2max), that is, the maximum amount of oxygen that can be transported and used by working muscles. There are a number of methods for indirect measurement of aerobic fitness. These are, in particular, submac-simal, and other auxiliary tests, including various types of exercises (Bicycle Ergometer, running, walking up the stairs, rowing, etc.). Often, heart rate (HR) is used to evaluate VO2max in submaximal and maximal tests using exercise. Low heart rate values for a given load are believed to indicate a higher level of aerobic fitness. At the same time, to determine the effectiveness of aerobic fitness at the final stage of dosing training loads, many experts prefer to use the duration of exercise, or to estimate the "cost" of oxygen (i.e. metabolic equivalent-MET).

The fitness of the musculoskeletal system is easy to control in La-borator conditions and outside them, without the involvement of expensive equipment. Typically, tests include hand dynamometry, push-UPS, muscle strength and flexibility exercises. It should be taken into account that there are differences in the results of fitness testing of different groups of patients. It should be noted that even a series of "field" tests have been developed to obtain reliable fit-ness characteristics.

However, note that children require a special series of fitness exercises. Thus, children, apparently, it is better to offer Jogging activity than exercise on a stationary bike, because of their less developed muscle strength. On the other hand, there are also clear guidelines that should be considered when determining the level of physical fitness in the elderly [8]. Older people are at high risk of heart arrhythmia during exercise and, in addition, they often take medications that can affect the physiological response during exercise. In such cases, it is desirable to use equipment that provides maximum safety during active exercises using traumatic devices (Bicycle Ergometers, treadmills, etc.).

For overweight people it is necessary to take into account the impact of full on their ability to perform certain tests and the originality of their physiological response to exercise. Overweight people may be prone to orthopedic injuries and changes in their heart rate in response to exercise may differ from the reaction of incomplete people.

Precautions should be taken when assessing the condition of people with chronic diseases. For example, during physiological testing it is necessary to strictly control the condition of patients with sero-dechno-vascular pathology. The chewing specialist should clearly pony-mother the impact of the patient's clinical status and medications on the physiological response when performing the exercise. In General, the low intensity of exercise is more indicated for people who are not familiar with regular training, those who are extremely detrenirovan, as well as the elderly. Low-intensity exercise can lead to a significant improvement in health; however, their physical condition may vary slightly or not at all. Moreover, regular absenteeism and moderate or intensive work in the garden or vegetable garden are sufficient to achieve positive changes in health [29]. Poorly trained people can achieve a significant improvement in their physical condition already at a low training load (i.e. 40-50% reserve of heart rate variability) than is required for people with a higher level of their basic fitness (this category of patients needs significantly greater intensity of exercise to achieve a noticeable improvement in health [22]. Getradiovalue people can improve their physical status with the intensity of the exercises 2 workouts per week [32]. To-shown that people with sedentary lifestyles improving aerobic fitness occurs when exercise intensity at 30% of the provision of varia-belesti heart rhythm (military revolutionary Council of Republic) [25]. However, motivation for this form of exercise may be weak, and the risk of musculoskeletal injury is high; this is especially true for people who are not accustomed to physical training. Thus, there is evidence that a beneficial effect on health is observed already at an energy cost of 700 kcal per week, with additional benefits at a cost above this value [19].

Many valeologists and physicians recommend a minimum level of energy consumption of 1,000 kcal per week, noting the cumulative benefits of higher levels of energy consumption. The cost of 1000 kcal per week is equivalent to 1 hour of moderate walking daily, 5 days a week. However, more moderate activity may also be useful [15].

The recommended level of daily energy consumption for health is currently 150-400 kcal per day [8]. For example, if a person who has previously led a sedentary lifestyle performs exercises at the level of the lower limit of the recommended energy consumption range (150 kcal) 4-5 days a week, he (she) is likely to approach the recommended value of the load of 1000 kcal, which allows to maintain optimal health. It is important that an increase in physical activity in excess of 1,000 kcal per week or an increase in physical status above the value of 1 MET provides a reduction in mortality by 20% [18]. This once again emphasizes the importance and relevance of the implementation of large-scale health, preventive and therapeutic training on scientifically based and confirmed programs. For example, participants in Pro-grams are often perceived as moderate exercises rec-

ommended by them. The most commonly used scale is called the ROE scale (the rating of perceived efforts). The basic principles of approaches to the development and conduct of training for healthy adults can also be recommended for patients with coronary artery disease. These patients should perform exercises for 20-60 minutes 4-5 days a week.

It was found that the energy consumption of 1600 kcal per week leads to effective inhibition of ischemic heart disease, and the consumption of 2200 kcal per week leads to the reduction of atherosclerotic plaque and the reverse development of the disease [11]. There are, however, differences in the approach to the appointment of a particular set of exercises for patients with coronary artery disease. Thus, the duration of each training session depends on the clinical status of the patient [33]. The minimum intensity limit of training is about 45% of the reserve of heart rate variability for patients with coronary heart disease [11], compared with 30% of the reserve of heart rate variability for a healthy non-trained person. This difference is the result of the difficulty of achieving the true maximum effort for patients with cardiovascular pathology when performing the stress test in [25]. Similar intensity of training is applied to patients with CHF, during the implementation of many traditional rehabilitation programs. However, the maximum benefit is achieved when performing exercises with greater intensity, if the patient load is transferred without harm to health [11].

In conclusion, it should be noted that the wide spread of cardiovascular diseases is associated with the features of modern low-mobility and sedentary lifestyle, as well as diets enriched with fats and sugar and depleted ω-3 polyunsaturated fatty acids (PUFA), fruits, vegetables and fiber. In recent years, the combination of drug treatment with evidence-based recommendations for changes in the diet and the level of physical activity in patients with a high risk of developing cardiovascular diseases has become more popular. In this regard, any strategy to maintain health is of interest. In particular, important factors such as nutrition, exercise and/ or stress control attract attention. Complex counteraction to the main risk factors of cardiovascular diseases (Smoking, physical passivity, unhealthy diet), implemented in a social context, can lead to a tangible reduction in the main manifestations of cardiovascular diseases. An increasing number of studies and literature data prove that antioxidants, fiber, polyphenols contained in natural juices based on gra-Nata, ω-3 PUFA, certain wines, vitamins and minerals, together with physical exercises, reduce the number of risk factors for cardiovascular disease. We believe that due to the special, lifelong duration of the "history of development" of cardiovascular diseases, casual relationships of nutrition/ exercise of the main manifestations of cardiovascular reactions are very difficult to trace in the future. Nevertheless, there is no doubt that the overall well-being of large groups of people will be largely determined by an adequate and scientifically sound combination of physical activity with careful individual nutrition planning.

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初级信息基本不变量的形成是技术大学自然科学与特殊教育融合的一种方式
PRIMARY INFORMATION FUNDAMENTAL INVARIANTS FORMATION AS A WAY OF NATURAL SCIENTIFIC AND SPECIAL EDUCATION INTEGRATION IN A TECHNICAL UNIVERSITY

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注解。 本文提出了一种基于科学的结构和教学机制，形成了基本信息的基本不变性，揭示了其在工科人才专业化中的方法论作用以及科技与特殊教育在技术大学中的整合。

关键词：二分法，信息，初级信息不变性，基础科学核心，基础学科，元知识，知识方法论，进化，内卷化。

Annotation*. In the article a scientifically based structure and didactic mechanism for the formation of a fundamental invariant of primary information are proposed, revealed its methodological role in the professionalization of engineering personnel and the integration of science and special education in a technical university.*

Keywords: *dichotomy, information, invariant of primary information, core of fundamental science, fundamental discipline, metanotions, methodologization of knowledge, evolution, involution.*

The dichotomy of the natural science and general professional (special) education in higher vocational school has been so far one of the most burning educational issues, which impedes the achievement of the pedagogical result of the fundamentalization of engineering education, the formation of a methodological culture of engineering personnel, the development of abilities for professional reflection and the search for innovative solutions of scientific and technical problems.

This dichotomy, which arose in the objective processes of differentiation of scientific knowledge and the transition from the classical engineering school to the subject-disciplinary system of training engineering personnel, up to date has naturally stipulated the "mechanical principle" of the combination of disciplines included in professional training curricula. The negative consequence of the me-

chanical connection of the disciplines of vocational training is disunity in the pedagogical activities of the faculty of a technical university, the self-isolation of the teaching staff in the structural units of the higher school (department, research laboratory, department, etc.).

"Certain subjects do not form the developing system of an ***educated person***. Do not form! We teach Chemistry, we teach History, Algebra - and you never know what else! But we teach not always properly, not always to what is right. And mostly important - ***separately, not comprehensively, not systematically***... We inform the ready-made ideas, and not the way the researchers went to them. We cram a lot, ***but think a little***. We listen a lot, ***but talk a little***. We read a lot, *but analyze a little*," the teachers of the Kuban Universitycomment on the educational situation. N.G.TovamchevaandE.R. Krylov [1, p.82].

It should be noted that this comment was published in 1991, but now its content is extremely relevant. This means that the transition from the vague qualification characteristics of a technical profile specialist to a competence model of a specialist, including the vague, uncertain competencies of its professional activity, not only did not change the principles of interaction between the participants of the pedagogical process of the higher vocational school, but also heightened the priority "summative approach "in the building of a disciplinary system.

Under the conditions of a "summative approach", the disciplinary system of a technical college is formed as a domain structure of various densities. The components of the domain structure - sign systems of general and professional knowledge, due to the isolation of natural science and special education, only mechanically complement each other, and as the student "moves away" into the field of special education, fundamental knowledge gradually turns out to be on the periphery of the information array, which is a natural result of their fragmentary and unsystematic usage.

Thus, natural science education, structurally unrelated to special disciplines, in the process of preparing a specialist is transformed into its compulsory ***"mechanical" part***, and engineering education loses its traditional basis on broad fundamental training. Thereby, *the pedagogical practice of forming fundamental knowledge "in reserve" fastens according to the principle of "foundation for foundation"*, the dichotomy of natural science and vocational education in a technical university naturally deepens, which has a very negative impact on the quality of training engineering and technical personnel.

Nowadays, in the conditions of the rapid growth of world rates of scientific and technical progress, professional competence of a subject of professional and technical activity is manifested not only in his readiness *to reveal* the essence of the phenomena studied, but also in the ability *to foresee* their future changes. The

forecasts of the specialist are derived as consequences from the precisely formulated laws of motion and the development of the objects of study, as well as the conditions of action of these laws. In addition, a specialist should be aware of the causes and sources of the object's development, the ways of its formation or technical reproduction, which makes it necessary to create a reliable object model whose properties correspond to the properties of the original. The knowledge of the essence makes it possible to separate the true, objective content of the phenomenon from its appearance, to eliminate the element of distortion and subjectivity in the study.

Such an approach *to the study of the essence and prediction* of the properties of the object and subject of professional activity in modified conditions "requires knowledge of the more general and fundamental laws of being, from which the laws and processes found earlier follow in the form of their particular manifestations. There is a transition to a deeper essence, at the new structural levels of matter"[2, P.445].

The acquisition by thought of the ability to go from phenomenon to essence ***in the dialectic of unity and diversity*** becomes possible provided that it (thought) has a system of natural-science knowledge that ***goes back to the primary entities***, and therefore to the sources of understanding ***the nature of reality***. It is from these positions that natural-science knowledge acquires its ***fundamental nature*** (solidity), becomes the source, essence, and solid skeleton of any special knowledge. Thus, *the system components of scientific knowledge should be considered the fundamental* ***core of natural science knowledge*** *and special knowledge, variable to fundamental core.*

Fundamental natural science knowledge, reflecting the unity of the processes of the integration and differentiation in science, being ***the core of special knowledge*** in various branches of science, become the approximate basis for the knowledge of reality. In this connection, the problem of ***the quality*** (usefulness) of the formed ***orienting framework***, that is, the problem of the quality of the formed fundamental natural science knowledge is being actualized.

In the pedagogical literature (T.M.Davydenko, V.V. Kraevsky, I.Ya. Lerner, A.A. Kuznetsov, I.I. Kulibaba, T.I. Shamova, V.A. Zorin and others) as signs of full-fledged knowledge are revealed: completeness, depth, variability, flexibility, concreteness and generalization, contraction and expansion, systematic, mindfulness and strength. All selected qualities of knowledge perform integrative functions, are interrelated and mutually influence each other.

The acquisition by the fundamental natural-science knowledge of the indicated signs of full-value knowledge leads to ***the transformation of the orienting basis into a means of cognition of the reality being studied***. Methodology of knowledge and mastering the system of methodological knowledge as a means

of knowledge allows the cognitive subject not only in educational and cognitive, but also in future professional activity to carry out a meaningful generalization of "knowledge about knowledge" with simultaneous reflection of the content of knowledge, the process of generalization and the bases on which the synthesis is conducted. It is ***reflexive knowledge*** that provides generalization and transfer of previously learned ways to new, non-standard situations of cognitive activity.

From these positions, the reflexive possession of a system of methodological, fundamental knowledge contributes to the deepening of thought from phenomena to essences of a higher order, a deeper knowledge of the essence of the objects under study and the observable phenomena. It is obvious that not only the study and reality of the predictions of the properties of the investigated reality, but also the adequacy of all transformations of the object (s) depends on ***the depth of penetration*** into the essence of the activity (professional and technical activity).

In this regard, it should be recognized that for the future specialist, possession of a system of methodological, fundamental knowledge as a means of knowing the essence of the subject and object is now becoming one of the leading regulators of qualified professional activity. "The level of knowledge (not the amount of memory, but the quality of knowledge and the ability to use it) becomes the most important criterion of a specialist today. In fact, the maximum value is gained by the ability of a specialist *to give his knowledge for the benefit of the cause*"[3, P.82].

From the standpoint of the above, it becomes necessary to ensure real structural links between all academic disciplines included in the training program of the future specialist. At the same time, the mutual connections between the natural sciences disciplines ensure the integrity of the fundamental base and the mutual connections of the natural sciences disciplines with special disciplines - the integrity of the education of the future specialist.

It was on this approach that the Russian classical engineering school was based, the advantage of which was that today can be called an "intuitive-activity approach to education" // Higher education in Russia. No. 1, 1997, p. 34. In accordance with this approach, a student who has extensive fundamental training and owns an arsenal of fundamental knowledge is gradually involved in genuine engineering or scientific activities. At the first level of efficiency, the student mastered a certain fragment of engineering or scientific activity, that is, acquired the ability to "function" in it. At the second stage of efficiency, he mastered this fragment, received reflexive-critical equipment, that is, and became capable of developing this fragment of activity and transition to other areas of knowledge.

Information has always acted as a mediator between a person (the subject of knowledge) and objective reality. A person as a subject of cognition perceives information contained in objective reality (the world of nature), understands it and fixes the results of understanding in one or another formalized sign systems. In this

case, two types of information are distinguished: primary, containing information about events of objective reality, and secondary, recorded by a person using sign systems on material carriers or in public consciousness. [5, 6]

Each fundamental science is characterized by a combination of experimental and theoretical methods that combine inductive and deductive knowledge of the world. The cores of the basic sciences differ in the choice of the dominant elements of the systems under study (bodies, substances, organs, people, etc.) and the type of relationship between them (interaction, transformation, physiological activity, activity, etc.), as well as the role of the environment, the possibility of isolating from it is a backbone element without losing the adequate understanding of the meaning of the events. The cores of the basic sciences are capable of multivariate transformations, which are caused by dependence on the parameters of the systems, the nature of the reacting substances, and the nature of the environment. As they are freed from the individual properties of substances, the general laws of one fundamental nucleus may become the property of another fundamental nucleus, etc. The examples of such a movement of the nuclei of the fundamental sciences are the periodic law of D.I. Mendeleev, the laws of M. Faraday, the diversity of biological organisms built on the basis of a relatively small number of chemical elements.

Thus, from the point of view of cognition of reality, it becomes fundamentally important to ***identify invariants of primary information***, which are used to distinguish between individual entities (identification), their quantification (measurement), and also to establish the most significant relationships between objects and environmental phenomena (laws, theories, models). Consequently, the system of basic sciences should provide the subject with a system of invariants of primary information, presented as specific sign systems, on the basis of which secondary information is produced.

From these positions, studying fundamental discipline (**FD**), it is necessary to construct a "projection" of the invariants system of primary educational information (**EI**) by consistently identifying invariants in each section of the fundamental discipline in the process of joint activities of teachers and students. At the same time, determining the content of allocated invariants becomes not an internal task of the teaching staff of the department of fundamental discipline, but should be the subject of a joint discussion of teachers of fundamental and special disciplines included in the subject training of a specialist in a technical college.

Dedicated invariants of primary educational information on sections of the fundamental discipline (**I1, I2, ..., IN**) are entered into the "working circulation" and, performing the function of an orienting basis for action, intensify the activity of students in the forms of educational process (lectures (**LC**), practical classes **PR**), laboratory classes (**LB**), independent classes (**IC**), research work (**NR**)), which in turn perform the function of recreating the content of digestible educa-

tional material.

At the "junction" of the natural science and special education of the higher school special content-oriented courses can be included in the content of the fundamental discipline for engineering training profiles, which in the conditions of interdisciplinary interaction of the fundamental and special disciplines makes it possible to form fundamental invariants of variable special courses (**ISC**) that are included in fundamental invariants as system components.

At the same time, it seems appropriate to analyze the possibilities that the fundamental invariant of primary educational information acquires at introducing ideas about metanotions. **Metanotions** (**MN**) **are specifically open concepts**, the content of which has slightly different meanings at different levels of cognition, while at the same time retaining some common intuitive component. In addition, the content of natural science meta-concepts corresponds to the context of models (theories) and is refined when moving to models and theories of a higher rank.

Consequently, the probability of a certain content of a metanotion is determined by the context of a model or theory, its belonging to one or another level of knowledge, one or another subject area. The "scope" of the content of metanotion ("science", "matter", "knowledge", "information", "space", "time", "energy", "movement", "entropy", "interaction", "nature" and etc.) depends on the level of knowledge.

However, it is the "capacity" of the content of metanotions that allows one to assess not only the depth of understanding by the subject of the nature of objective reality at a given level of knowledge, but also the possible prospects for development, expansion of the "capacity" of understanding in the process of knowledge. Differences in the understanding of metanotions in various sciences and academic disciplines limit the intensity of integration processes and "interpenetration" even among specialists in related fields of knowledge. Meanwhile, a consolidated interdisciplinary movement to ideas about metanotions, in which the fundamental discipline plays a dominant role, can contribute to the education of future specialists in a three-dimensional vision of the world based on the reflexive mastery of general scientific principles as properties of reality and human activity.

The very existence of meta-concepts with the property of universality is an illustration of ***the methodological principle of the fundamental unity of the world***, which presupposes the existence of a certain hierarchy and its unity. Chardin singled out the following property of the hierarchy: "Any phenomenon precisely established in at least one place, by virtue of the fundamental unity of the world, has ubiquitous roots and universal meaning." [4] Then, "due to the fundamental unity of the world", any transformations of the substance of nature, produced by man, lead to a change in external conditions, have "ubiquitous roots" and, therefore,

must be assessed from these positions.

Understanding the principle of the fundamental unity of the world leads to understanding the dynamics of world change in the coexistence of developing (the whole is more than its parts) and collapsing (the whole is less than its parts) systems, which is reflected by the methodological principle of evolution and involution. It is from the standpoint of this methodological principle that not only the integrity of the professional activity is comprehended, but also its possible consequences for the existence and culture of mankind in the conditions of complication of all activities caused by the needs of the information society with high production technologies.

Thus, the concepts of metanotions allow the learner to be brought to a qualitatively new, higher level of generalization and come closer to an understanding of the objective laws of the real world.

Reliance on full-fledged natural-science knowledge at the system level of cognition of reality is of fundamental importance in the disclosure and reproduction of the semantic content of the subject, that is, for understanding reality. From a philosophical point of view, the development of understanding "comes from, preliminary understanding", which sets the meaning of the object as a whole, to the analysis of its parts and the achievement of a deeper and more complete understanding, in which the meaning of the whole is confirmed by the meaning of the parts, and the meaning of the parts is the meaning of the whole"[2 , P. 350].

From the standpoint of the above, the fundamental invariant of primary educational information includes as system components: ***invariants of sections of the fundamental discipline, the fundamental invariant of a special course, and ideas about metanotions.***

The inclusion of ideas about metanotions in the structure of the fundamental invariant of primary educational information determines its methodologization and the "penetration" of general scientific methods into the educational space of a fundamental discipline.

It is this circumstance that makes it possible in principle for the natural science disciplines to perform a methodological function in the process of preparing a specialist by a higher vocational school, and the loss of the deep foundations of professional training causes defects in the process of professionalization itself: alienation of the future specialist from reality; education of the reproductive type of activity as the leading type of professional activity; self-identity based on the "mark-up" approach, and, as a result, inadequate self-esteem by the personality of their professional qualities and capabilities.

According to academician B.T. Likhachev: "... in today's rapidly changing world of knowledge, skills and abilities are unstable phenomena, they quickly lose the necessary and stable correspondences to real phenomena and processes.

A graduate of an educational institution must *be not only a "holder" of shares - knowledge,* ***but also an active creative user***. He needs to master not only the methods and methods of constantly updating them, but also the ability to overcome his outdated patterns and stereotypes of thinking and action "// Pedagogy №1, 1999, P. 16.

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教授学院 – 19世纪的俄罗斯科学学院
THE PROFESSORIAL INSTITUTE - RUSSIAN SCIENTIFIC SCHOOL OF THE 19TH CENTURY

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抽象。在教育全球化的条件下解决维护俄罗斯高等教育民族认同问题的必要性规定了研究的相关性。如果没有前几代国内经验的反思，这个过程的实施是不可能的。在这方面，本文考察了新组织Dorpat教授学院培训的有效经验，该组织在19世纪上半叶可以为俄罗斯大学增添民族特色。通过建立第一所俄罗斯科学学校，研究这一问题的主要方法是历史建模和人口学方法，对档案资源的研究和分析。他们的使用使得将Dorpat教授学院视为一种历史和教育现象成为可能。

本文介绍了在教授学院创建的欧洲类型和级别的大学教师培训体系。该系统是历史重建的结果。利用人口学方法，可以创建本研究所所教授的教授的集体传记，以确定其职业活动风格的共同特征。

本文介绍了与19世纪上半叶文化和历史背景相对应的“科学和教育学派”概念。基于Dorpat教授学院代表未来教授培训学校的事实，“科学和教育学”的本质学校“这一类别在文章中是合理的，作为教授培训的战略优先事项，胜过优秀科学家对国家培训的任务。

本文所包含的信息对于进一步研究俄罗斯科学和教育人才培养体系发展的实际问题和预测前景，为现阶段俄罗斯高校教师培训优化的理论规定提供了实用价值。

关键词：Dorpat教授学院，继任，俄罗斯大学教授，历史重建，人口学方法。

Abstract. *The relevance of the research is stipulated by the necessity of solving the problem of preserving the national identity of Russian higher education in the conditions of education globalization. Theimplementation of this process is impossible without previous generations domestic experience reflection.In this regard, this article examines the effective experience of training at the Dorpat Professorial Institute of the new formation, which in the first half of 19th century could add national character to Russian universities through the creation of the first Russian scientific schools.The leading methods of studying this problem are historical modeling and prosopographic methods, study and analysis of archival sources.Their use makes it possible to consider Dorpat Professorial Institute as a historical and pedagogical phenomenon.*

The article presents the system of training of university teachers of European type and level, created at Professorial Institute. The system was created as a result of the historical reconstruction.The use of the prosopographic method made it possible to create a collective biography of professors studied in this Institute, to identify common features in the style of their professional activity.

This article presents a definition of "scientific and pedagogical school" concept corresponding tothe cultural and historical context of the first half of 19th century.Based on the fact that Dorpat Professorial Institute represented a training school for future professors, the essence of "Scientific and pedagogical school" category is justified in the article as a strategic priority for professors' training, prevailing over the very task of good scientists' training for the country.

The information contained in the article are of practical value for the further researches of actual problems and forecasting prospects for scientific and pedagogical personnel training system development in Russia, the development of theoretical provisions for the Russian universities teaching staff training optimization at the present stage.

Keywords: *Dorpat Professorial Institute, succession, Professor of Russian universities, historical reconstruction, prosopographic method.*

1. **Introduction**

The complex modernization processes taking place in Russian higher education system put the solution of the most acute problems of the modern Russian higher school and domestic science in the forefront: Russian higher school national identity preservation in the context of education globalization;competitive professors training;scientific and pedagogical schools continuity.

Modern researchers interpret "scientific school"phenomenon as a kind of social education, with a certain structure developing in specific social and historical conditions. They identify its main characteristics: researchers united by the commonness of methodological approaches to solving scientific problems;leader is a well-known scientist, ideas generator;research program is developed and implemented by all members of this scientific community."Spiritual commonness" and "unique atmosphere of scientific creativity" are theimportant features of scientific schools [1].

An effective solution to this problemis impossible without previous generations domestic experience reflection.

This article considers scientific school concept in the cultural and historical context of the first half of 19th century.In the investigated chronological period, the understanding of this term was associated with the history of university education in Europe.At German universities, the "scientific school" meant the unification of the professor and his students.Considering the fact that at the University of Berlin to be a student of a well-known professor meant to learn from him "how to work properly

on the further development of science and how to teach the same others" [2, 208], it is possible to realistically call such a community of Teacher and his Pupils a "scientific and educational school".The essence of the "scientific and pedagogical school" category is substantiated in the article as a strategic priority for professors' training, prevailing over the very task of good scientists' training for the country.

For Russia, the problem of training professors of this level became relevant in the first decades of 19th century resulting from new universities opening, the main task of which was not just knowledge transfer, but the preparation of graduates for independent scientific work.In this connection, the requirements for professors changed: science can be taught "only by one who is at productive work on it" [2, 149].A significant contribution to the solution of this problem was made by Professorial Institute, which opened in 1828at the University of Dorpat (Tartu), at that time a cultural and scientific center, not inferior in many ways to Western European universities.

In the history of the national higher school the problem of training professors for Russian universities was one of the most urgent since the period of their establishment.At the end of 19th-early 20th century, it drew the attention, first of all, of historians, and was reflected in the historical essays of S. Shevyreva [3] (1855), D. I. Bagaleya N. F. Sumtsov and V. P. Buzeskula [4] (1906), N. P.Zagoskina [5] (1903), dedicated to the history of the first Russian universities.These essays contain brief information about Professorial Institute, as a specially created structural subdivision of the University of Dorpat, about its contribution to the training of scientific and pedagogical staff for Russian universities.Of particular interest is the historical essay of an ordinary professor YuryevskyUniversity (formerly Dorpat University) E. V.Petukhov [6] (1902), in which he notes that the activities of Professorial Institute were "one of the most significant phenomena" of the university's life, "brightly putting forward its scientific significance among other Russian universities in 1820s-1830s" [6, p.485].

The source base of the of domestic university education including Professorial Institute history remained understudied practically until the 1980-ies.This explains why so significant number of factual errors and inaccuracies was made when mentioning the activities of Professorial Institute in the works published in the 20th and early 21st centuries.

The historical research carried out in the late 1980s by V.E.Tamula "Professorial Institute and International Relations of the University of Tartu in the first half of the 19th century" [7] deserves special attention of the Russian and European higher school problems researchers. The author of this research, based on documents and archival materials, analyzes the process of professors' training for Russian universities in Dorpat focusing on the mediation mission of the University of Dorpat in relation to Russia and Western Europe. A German researcher Trude Maurer notes that in the first third of 19th century the University of Dorpat was "an

integral part of the network for the selection and invitation of professors not only for the Russian Empire, but also for the German-speaking world, and thanks to this, as well as to the abundance of foreign relations in general, it towered over the rest universities" [8, p.162-163].

The experience of Professorial Institute as a historical and pedagogical phenomenon is still understudied: the activity of this institution has not been studied systematically from the standpoint of the modern historical and pedagogical knowledge, that is also relevant in this work.

The concept of the classical university, based on a combination of research and teaching, rests on the domestic tradition, namely on the experience of the Dorpat Professorial Institute.The scientific study of this experience makes it possible to imagine how in the Russian pedagogical past the question how the future professors of Russian universities achieved the European level of professional training was settled.

2. Materials and Methods

An institute inside the functioning university, training the future professors who will become the founders of scientific schools in pre-revolutionary Russia, informal community of venerable scientists and hard-selected talented young researchers are all different facets of the Dorpat Professorial Institute.

The historical reconstruction [10] of Professorial Institute experience in the form of the integrated educational system, which gives an idea about the purpose, content, process and evaluation of the result of European-type and level professors training for Russian universities was carried out on the basis of historical modeling method, which is the means of source-study data generalization, their interpretation and systematizationin the research process[9].

The *target*component of the system included the new norms of the professor's professional activity.The graduate of Professorial Institute should develop the following skills: to provoke interest in the taught subject, to carry out fruitful research activity, to involve students in research activities.

The *informative* component of the system was represented by a set of disciplines which must be mastered by pupils.The curricula included both the disciplines needed to pass both a doctoral exam and additional ones that allowed for the comprehensive preparation of the future professor.

The *procedural*component of professors training system was its backbone. It included the forms and methods of educational process aimed at creating a sustainable focus on professional functions and pedagogical activity style mastery;ensuring the personal activity of pupils, their self-education skills development.

The study of archival documents related to the activities of Professorial Institute, the memories of his former students, allows us to conclude that the future Russian professors were trained by immersing them in the atmosphere of scientific research under the guidance of professors and mentors.When supervising independent work-

the professors and mentors were required to pay the main attention to a subject essence letting students solve side-issues themselves [11, p.1].The purpose of such independent work was to prepare the students for the daily scientific research activities.

Evaluative-reflective component of future professors training system included the control method of the achievement of the goal set by the emperor to Professorial Institute.At the end of each semester the tutors submitted a report on "successes and diligence" oftheir students to the Director of the Institute.Summing up the results of the first semester (27th February 1829), the director announced the curator, "Almost all the students of Professorial Institute understand and feel their important mission and justify it by their zeal towards science and laudable way of life.By this beginning it can be hopefully said that with the help of God, the beneficial intentions of His Imperial Majesty and the hope of the fatherland will be fulfilled by these young men" [12, p.1].

By the nature of interaction between subjects of educational and scientific activity,targeted European level and type professors training system established at Dorpat Professorial Institute is aresearch and pedagogical school.This concept is considered in the cultural and historical context of the first half of 19th century.

The main characteristics of the scientific and pedagogical school, as a system of Russian universities professors training, include:

1. Tutors, the founders (representatives) of scientific schools in specific scientific areas:V. Ya.Struve (DorpatandPulkovskaya astronomical schools) C. F.L edebour(DorpatBotanicalSchool),M.R.Rathke(Dorpat ScientificschoolCompa rativeEmbryology),F.Moyer(Dorpat Surgicalschool),I. M. H.Bartels(DorpatS cientificschool ofPure andAppliedMathematics),O.M.Engelhardt(Dorpat Scientific School of Mineralogy)F.K.G.Kruse(DorpatScientificSchoolof General History),G.B.Esche(Dorpat PhilosophicScientific School) [13];

2. Students, therepresentatives of all Russian universities,united by the purpose to study at Professorial Institute (preparation for pedagogicactivities in Russian universities);

3.Program (concept) for thepreparation ofprofessors-scientistsinaccordancewithupdatedstandards for theRussian university professor professional activity.

The important features of the scientific and pedagogical school development are: the existence of approved continuity mechanisms therein, formed traditions, individual pedagogical style of this school representatives.

The idea of continuity was originally laid in the basis of a new system of the specialized training of professors for Russian universities by Emperor Nicholas I: "We have worthy professors, but there are few of them and no successors to them;they must be trained by... and to this end, we must send about 20 of our best students to Dorpat for two years, and then to Berlin or Paris, not alone, but with a reliable mentor, for two years also;all these must be executed immediately" [14,

p.95 - 96].In this regard, Professorial Institute pays special attention to the issues of continuity, which are considered at "private" ("personal") level, their content includes "methods and tools of activity" [15]. This continuity of professional activity rules, style and tradition owed their origin to a particular era and specific personalities, from teacher-master to apprentice at Professorial Institute and the scientific and educational work of its graduates [16].The most important aspect for the scientific and pedagogical school of Dorpat Professorial Institute was not the fact that the student continues the case studies of his supervisor, but the fact that studying other subjects, he continues teaching in the same style as his mentor.

In the course of communication with their curators, "known for their scientific achievements", the pupils learnt how important it is for the future professor to possess extensive knowledge. This realization was an impetus for action, intense mental work. Dorpat provided all the necessary conditions for this: rich university library, as well as the personal libraries of the Institute professors, kindly procured to the students; a large amount of additional lectures and tutorials. Museum, botanical garden and anatomical theater provided the opportunity to test not only their knowledge, but also the research hypothesis. While studying at Professorial Institute the students were cultivated a taste for the use of visual methods in teaching, as evidenced by their efforts to purchase foreign teaching aids and tools for their future chairs at national universities.

The social environment was of no small importance in the formation of future professors. "With regard to the composition, students' life, their attitude towards the university, professors, and their relations between each other, the University of Dorpat introduced something completely different from other Russian universities", [17, p.48] wrote a professor of Moscow University, N. A. Lyubimov. From their first days at Tartu University the graduates of Professorial Institute marked good attitude to them, both on the part of professors and students. This was a significant factor contributing to the successful adaptation of young people to unfamiliar national culture, a new language environment. N. I. Pirogov, one of the graduates of Professorial Institute, wrote in his memoirs, "In Dorpat we are honoured as fully fledged professors, all the doors are opened for us; local professors, mostly elites, always favorably ask to visit them and pay visits themselves. Imagine, venerable old men, already somewhat known for their erudition, shake the hands of the inglorious young men" [cit. ex: 18, p. 15].

As for the relations with the students of Dorpat University, a former student of Professorial Institute, V. I. Lapshin wrote in his memoirs: "Dorpat students of that time, who practiced German duels a lot, decided at their corporations not to challenge the professors and students of Professorial Institute to a duel. And the reason for this was never proved" [19, p. 123].

The focus on mastering the research methods and techniques used by the professor-mentor was formed in the atmosphere of scientific and pedagogical school

of Professorial Institute. It enabled future professors to get involved in the seminars organized by the University of Berlin in the period of foreign scientific probation.

The usage of prosopographic method allowed compiling the collective biography of the professors studied at Dorpat Professorial Institute. This biography considers such aspects as the level of initial candidates' training for admission to Professorial Institute, study at Professorial Institute learning, research and teaching activities of Professorial Institute graduates, significant achievements in professional activity, social significance. This method made it possible to highlight the similarities in the professional style of Professorial Institute graduates admitted in the first third of 19th century, in their teaching of humanities, natural, mathematical and medical disciplines at Russian universities. They included:

- eloquence at lectures as the teacher's ability to motivate the student for his subject and research activities;
- readiness of the supervisor to realize himself as the teacher, his awareness of the value of this continuity;
- use of the entire armory of resources and teaching methods chosen individually by the teacher in accordance with the student's performance;
- the professor's great attention to a method, its equal importance to research activities;
- the professor's erudition, his ability to respond to possible his students' interests diversity and his readiness to encourage them to these interests;
- visibility, practical teaching of science at the level of its most recent achievements, inclusion of students in the microstudies feasible for them (expedition);
- high socio-pedagogical activity of the professor in the common educational issues (which was especially inherent in Professorial Institute graduates in the 1860s, when they were already well-known scientists).

The start of the young professors' career coincided with the adoption of the new Russian Universities Charter. All of then Russian universities received from Professorial Institute qualified reinforcements, enabling them to be engaged in reform process in accordance with the new Charter.

It was a new generation of domestic professors, "to become familiar with the ideas of the classical university and to add national character to the Russian universities through the creation of the first Russian scientific schools and rising the scientific activities of the university to the rank of a social phenomenon" [20, p. 20]. Russian universities, thanks to the works of Professorial Institute graduates acquired the image of national universities.

3. **Results**

The authors systematically reviewed the poorly studied historical and educational phenomenon of Dorpat Professorial Institute.

"Scientific and pedagogical school" as a strategic priority in professors train-

ing substantiated by the authors is a central category used in the research. Dorpat Professorial Institute represented a school for future professoriate training. The researchers managed to choose the right category that most accurately represents the analyzed phenomenon.

In the process of historical and pedagogical research, Professorial Institute pedagogical system was authentically reconstructed as a set of targeted, substantive, procedural and evaluative components of its activities from phenomenological point of view.

The set of historical and pedagogical research methods (historical simulation method, prosopographic method, study and analysis of archival documents) were used effectively. This made it possible to systematically and fully elucidate the historical facts of creation and activity of Professorial Institute.

The authors created a historical basis for the development of theoretical provisions to optimize the training of teaching staff for national universities at the present stage.

4.Discussion

The development of the Bologna Process in Europe at the turn of 20-21st centuries aroused increasing interest among domestic researchers in the problems of Russian and European university education systems, outlined a need to conduct a comparative analysis of the experience of solving scientific and pedagogical staff training problem in domestic and foreign education systems. Analyzing the Russian professors training methods in 18-20th centuries some researchers note that in most countries there was no "special professors training for teaching in higher education institution" [21, p. 214]. "Major achievements in science" considered to be the main indicator of the teacher's professionalism in most countries. A confirmation of this is found in the work of a professor of Berlin University, F. Paulsen [2], published in 1904. The generalizing fundamental work "Geschichte der Universität in Europa", 2004,published under the editorship of Professor Walter Rygge in Munich noted that the Prussian university model provided for professors training was, "designated for the training of scientists, future professors and researchers" through participation in workshops, internships in laboratories and clinics [22, p. 57].

Based on teaching staff training problem solution experience analysis carried out in domestic and foreign education systems, Dorpat Professorial Institute can be viewed as a historical and pedagogical phenomenon, extraordinary and unusual one. Domestic universities did not practice a similar training system.

Today's categorical arsenal does not contain any exact equivalent, able to absorb internal features and reflect the great historical significance of Dorpat Professorial Institute for national culture. In this regard, it was important to choose the right category, which would designate the phenomenon under study in the most appropriate manner. The comprehensive analysis of the Dorpat Professorial Institute suggests: it created a

professors *trainingsystem* for local universities, which by its nature of the interaction between the subjects of educational and scientific activities in the cultural and historical context of the first half of 19th century was a research and teaching school.

This atmosphere helped to form the norms for domestic university professor professional activity, to transfer the values of scientific and pedagogical activity from the teacher to the student: through an example - using the example of the professor-mentor; by opinions exchange and value attitudes formation. It gave rise to scientific and pedagogical traditions kept up and developed by the graduates of Professorial Institute in their professional activities [1].

The changes in the development of Russian science and culture in the first half of 19th century were due to the influence of domestic professors of the new formation, who saw themselves not only as teachers and scientists but also as an integral part of the cultural life of that time. These changes are manifested in the following:

- pedagogical education development, elaboration of theoretical foundations for the national pedagogy in 19th century thanks to the significant Professorial Institute graduates' contribution to thisbusiness, who associated their careers with teaching only;

- mainstreaming of scientific societies in Russian scientific potency development. The graduates of Professorial Institute, who gained supremeauthorityin academic community in the 40-50-ies of 19th centuryalready, were active members ofthesesocieties.Upontheirinitiativewerecreatedandproductively functioned new academic communities: Pirogoff'scherVerein (surgeons academic community), Community of Russian doctors in Moscow, St. Petersburg Pedagogical Society which were founded by the graduates of Professorial Institute, N. I. Pirogov, F. I. Inozemtsev and P. G. Redkin;

- mainstreaming of the Russian professor at the international level: domestic young scientists started being elected as members of various Western European academies and academic communities;

- wide range of Russian universities professors' teaching activities since 1830-s: public lectures, publications in scientific reviews, special periodicals establishment [23, p. 299].

5. Conclusion

The system of teaching staff training for the Russian universities established in the first third of 19th century at Tartu Professorial Institute is very culturally significant for modern national higher education and science development. This is especially important due to the fact that teaching staff training is currently focused on the development of these organizational forms and scientific activity development, the revival of the values and norms traditional for Russian civilization, including teaching ones. Such retro-analysis allows adequately putting the current changes in Russian higher education in the context of objective globalization, informatization and modernization processes into the history.

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俄罗斯的学员教育：1731年至1917年的历史话语
CADET EDUCATION IN RUSSIA: HISTORICAL DISCOURSE FROM 1731 TO 1917

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注解。 本文简要介绍了军校教育制度的形成和实质性发展，作为俄罗斯军队军官人员的职前培训。

关键词。 大学前军事训练，学员班，军校学员队，学员学校，军校教育，Nakhimov学校，苏沃洛夫学校。

Annotation. *The article provides a brief historical discourse of the formation and substantial development of the system of cadet education as a pre-professional training of officer personnel for the Russian army.*

Keywords. *Pre-university military training, cadet classes, cadet corps, cadet schools, cadet education, Nakhimov schools, Suvorov schools.*

Russia has a wealth of experience in organizing training in military preparatory schools designed to ensure that its graduates are ready to continue their education as cadets at military colleges.

The outstanding Russian naval commander FedorFedorovichUshakov wrote: “Raising a noble youth is the first and best way to establish good officers...” (Khazin O.A., p. 38).

Currently, pre-university military training is carried out in Suvorov and Nakhimov schools, cadet corps, cadet schools and classes.

The French word "cadet" is usually translated as "junior". However, according to research in the history of the cadet corps, this term is formed by the French from the Latin "capitellum", which means "little captain", "little head". The diminutive in the Gascon dialect “capdet” has the same meaning. That is, the exact meaning put by the French in the word “cadet” is “a small, future leader” (Isakov E.P.).

Historically, the first form of organization of training and education of noble children in order to prepare them for military service was the system of cadet corps (CC). In 1731, by the decree of the emperor of All Russia, Anna Ivanovna, in the image and likeness of the Prussian military schools, the first cadet corps was formed. He prepared not just professional military men, but highly educated people.

The official opening of the first cadet corps took place on February 17, 1732 in St. Petersburg, and the learning process there began in June 1732.

In one of the first provisions on the cadet corps (1886) we read: "The cadet corps are designed to deliver minors, general education and education appropriate to their purpose, to minors assigned to military service as an officer, mainly to sons of honored officers. ...Education in cadet corps ... has the main purpose of preparing young men being brought up for future service to the Sovereign and Fatherland - through the gradual, from childhood, developing in the cadets those true concepts and aspirations, which serve as a solid basis of sincere devotion to the Throne, conscious obedience to power and law and feelings of honor, goodness and truth"[ibid. P. 15].

Since that time, the educational process was based on the approach of taking into account the individual inclinations of students.

Upon admission to the CC, the exams were not provided for, from the applicants only the ability to read and write in Russian was required. The daily routine was barracks. We got up at 4 hours and 45 minutes. 6 hours were given for classroom lessons, 4 hours a day for drill exercises.

Classes in classes were conducted in accordance with the Regulations, which provided for the presence in the building of four classes. The first class was considered the fourth, the last - the first. In the fourth grade, they taught Russian and Latin, calligraphy and arithmetic. In the third - geometry, geography and grammar, in the second - fortification, artillery, history, correct "letter and style" in the letter, rhetoric, jurisprudence, moral, heraldry and other military and political (civil) sciences.

Consider some of the features relating to the content and teaching methods in pre-revolutionary CC.

The cadet was enrolled in the first (highest) class by a special decision of commanders, professors and teachers (in the case of outstanding academic results and personal aspiration). Pupils studied in this class. those military or civil sciences to which they had the greatest inclinations.

Much attention was paid to the study of languages, especially Russian, German and French, which were taught in all four classes. The Latin language was mandatory only in the fourth (first) class.

Understanding the need for students to form solid knowledge, it was consid-

ered necessary to repeat the material so that the cadets do not forget it in the following classes.

In the first three classes, cadets studied for five or six years. The third class ended with a public exam, and the cadets were given the choice of whether to continue their studies or go to the service (military or civil).

In 1756, when Count P. I. Shuvalov became the head of the Cadet Corps (by this time there were already two), humanitarian subjects were introduced into the educational process: geography and history. The first theoretical and practical recommendations on the organization of training and education of cadets are also associated with the name of Shuvalov: in 1758 he submitted a report to the Duma, which offered a curriculum with the study of 22 subjects for five years.In order to gain practical skills in conducting combat operations, practicing command and control and military service, two-month field exercises were introduced. At these exercises, senior cadets were to perform the duties of non-commissioned officers, corporals and privates. With the older cadets, all the juveniles were also sent to "look to" the conditions, learn some of the first duties. All documents of the educational process and all teachers were approved by Shuvalov himself, who always attended examinations and practical exercises. The project was signed on April 27, 1758, but the Seven Years' War delayed its implementation.

At this time, disagreements arose among the military state elite: some sought to make the created educational institutions purely military, while others were fascinating for a broad general education.

A significant improvement in the educational process began from the moment when S.Ya. Rumovsky - a famous mathematician, a connoisseur of many ancient languages.

In each company stood one officer on duty. The cadets got up at 5 o'clock. At dinner, be sure to read twice a week military regulations and articles, twice Russian and twice foreign newspapers. Lessons in classes were held for 8 hours a day. Supervision over the educational process was entrusted to one of the corps teachers.

They began to practice the trips of excellently successful cadets to other countries in order to familiarize themselves and raise the level of their knowledge in various fields of science.

Further improvement of the educational process led to the distribution of cadets by age (three ages): in the junior and secondary there were two classes, in the older - three; increased study of history and geography; introduced tactics and natural history; from exercise - horse riding. Study subjects were supposed to be conducted according to the table, that is, the curriculum, as at present.

Successful cadets were rewarded with silver and gilded medals that were worn in the buttonhole, they ate at a separate table and had a number of advantages.

During this time, the number of volumes of the library was increased, new physical tools were purchased, a natural history room was equipped, and an artillery laboratory was created.

After successful exams, cadets who excelled in science were handed out awards consisting of books and drawing instruments. For those who had poor results, reduced vacation and organized a training class, classes in which were made during the holidays.

Stay in each class was not limited to a certain period, and depending on the success, the student at any time could be transferred to the next grade level. Each cadet was established order of passage of school subjects; determined the number of items in which he should be engaged, issued benefits, paper and accessories. The cadet was simultaneously engaged in two or three sciences, attending classes on a schedule, and independently studying the material assigned to him. The teacher present ensured that the group was engaged so that the cadets did not interfere with each other by talking, laughing and walking. As soon as the student learned the discipline he was studying and finished the program offered to him, he would go on to the next subject and study it until the teachers found his knowledge sufficient.

Thus, at this time, an individual-type learning system was practiced, the general ideology of which is quite modern and, upon careful consideration, can serve as a prototype for the organization of distance learning. A similar organization of the educational process is currently observed in commercial educational institutions offering to those who wish to get a second higher education in order to retrain for another profession.

In 1830, the "Charter for military schools" and "General situation" were drawn up, as well as staffs and tables (Alpatov N.I.).

The charter was divided into three parts, in the first it was said about physical and moral education, in the second - about the mental education of the cadets, and in the third - distributional - about the management of military educational institutions.

From the 1830s, the process of uniting military schools into one structural unit began. In the Cadet Corps, they began to conduct both elementary (for children) and final (for adults) training of specialists for the army.

In 1836, the curriculum for the Cadet corps was approved (Table 1) (A. Solodukhin).

Table1

Subjects	Preparatory		General				Special		Total
	Classes								
	I	II	I	II	III	IV	I	II	
God'slaw	1	1	1	1	1	1	1	1	**8**
French	4	4	3	3	3	3	2	2	**24**
German	4	4	3	3	3	3	2	2	**24**
Russianlanguageandliterature	4	4	4	3	3	3	2	2	**25**
Maths	3	3	5	6	5	3	3	3	**31**
NaturalSciences	2	2	-	-	2	2	2	2	**12**
Geographyandstatistics	-	-	3	3	2	2	2	2	**14**
Politicalhistory	-	-	2	3	3	3	3	3	**17**
Jurisprudence	-	-	-	-	-	-	1	2	**3**
Calligraphy	3	3	1	-	-	-	-	-	**7**
Painting	1	1	1	1	1	1	-	-	**6**
Drawing	-	-	-	-	-	1	1	1	**3**
Militaryscience	-	-	-	-	--	-	7	8	**15**
	22	**22**	**23**	**23**	**23**	**22**	**26**	**28**	**189**

Analysis of the curriculum shows that a considerable time (almost 1/3) is devoted to learning languages (from grade 1 to last). A lot of study time was given to history, geography and natural sciences (physics, chemistry). However, the greatest number of hours was devoted to the study of mathematics, which indicates an understanding of the role of this academic discipline in the development of a person and a professional. Military science was studied only in special classes.

In order to assess success in studies in all military schools of Imperial Russia, a single 12-point scale was used, which characterized the knowledge of the Cadets (Cadets of Russia). In principle, this was a convenient system, which made it possible to fairly accurately characterize the students' knowledge.

12 points were given to the cadet if he showed excellent knowledge of the material studied, answered the questions clearly, logically formulated his thoughts, could defend his point of view in a dispute and at the same time conduct a dialogue in a free manner.

11 and 10 points were exhibited in cases where the pupil showed sufficiently deep knowledge of the past, answered questions confidently, made the right conclusions, spoke clearly and coherently.

The cadets received 9, 8, and 7 points when they showed a firm assimilation of the material studied, but did not quite clearly formulate their thoughts, answered with the help of leading questions, and were lost if they heard any objection from the teacher.

6, 5 and 4 points showed that the cadet basically understood the topics covered, with the help of a teacher he easily recalled what he missed when answering, but during the answer he did not speak very clearly and clearly, mixed different concepts or answered memorized word by word.

With 3, 2 and 1 points, the pupil knew almost nothing and “darkly and mistakenly understood” (with such points left for the second year).

The 12-point system of knowledge assessment had its advantages over the 5-point system adopted in civilian gymnasiums, since it allowed them to “shade” the knowledge of pupils and encouraged them to gradually achieve better results.

Further reorganization of the cadet education had both positive and negative sides.

In the period from 1863 to 1882, the Cadet Corps were divided into areas of training. Such a specialized system of training military specialists has been preserved to this day.

The preparatory departments (for children) were transferred to the category of military gymnasiums, where military teachers were replaced by civilians, the general direction of training was no longer focused on a military career, resulting in a decline in the level of upbringing and education, a drop in discipline and morality.

The second and third departments were transformed into military schools, where former high school students received special knowledge of military orientation.

In the period 1883 - 1918 - The cadet corps were restored in the same quality and carried out the preparation of pupils for enrollment in military schools.

According to the General Directorate of Military Schools of the Military Ministry, for 1908-1913. 84.8% of pupils of the cadet corps were sent for further training in military schools, 7.3% were refused in the direction due to health reasons, 7.9% of pupils did not wish to continue training in military schools.

The revolutionary changes in Russia led to the elimination of the pre-professional military training system (altogether there were 30 cadet corps in 1917), to the loss of the richest experience of moral and patriotic education of the younger generation (V.V.Isonov).

We must pay tribute to the teachers, educators and organizers of cadet education in Russia: their pupils for a long time continued the best traditions established in them in their studies.In the period from 1920 to 1944 - ten Russian cadet corps "went abroad" (they were in exile), where they continued to preserve the traditions of cadet education and education, which allowed almost all pupils of these corps to take up a decent position in life, and some became famous and respected people of their countries of residence. For example, in France, the corpus-lyceum of Emperor Nicholas II lasted until 1964.

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营销服务是高校院系教学管理的一个重要因素
MARKETING SERVICE AS A FACTOR OF PEDAGOGICAL MANAGEMENT OF DEPARTMENT IN THE HIGHER EDUCATIONAL INSTITUTION

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抽象。 在俄罗斯新的社会经济条件下，教育组织被迫成为活跃的市场参与者，独立塑造报价，提供和销售他们的教育服务。 寻求机会促进其教育服务和优化教学管理是相关领域。 在本文中，建立营销服务的特征被揭示为MiftahetdinAkmullah巴什基尔州立大学初等教育系理论与方法的教学管理的一个因素。

关键词：营销，营销服务，高等教育，推广，管理。

Abstract. *In the new socio-economic conditions for Russia, educational organizations are forced to be active market actors, independently shaping the offer, providing and selling their educational services. The search for opportunities to promote their educational services and optimization of pedagogical management are relevant areas. In this paper, the features of building a marketing service are revealed as a factor in the pedagogical management of the Theory and Methods of Primary Education Department of the MiftahetdinAkmullah Bashkir State Pedagogical University.*

Keywords: *Marketing, marketing service, higher education, promotion, management.*

The sociocultural stage of development of society which is characterized by rapid scientific and technical progress, global informatization and increase in a role of intellectual work causes the solution of the imminent current problems by transfer of an educational system to the mode of development and self-development, modernization and optimization of the organizational and economic mechanisms operating in it. Orientation to long-term achievement of success demands in turn need of perfecting of management in the most educational organization, development of new competitive strategy, independence of a conjuncture of education market, the organization of communication policy on formation of positive image.

The modern approach to the organization of educational process in a higher educational institution determined by the Act of the Russian Federation "About Education" [1] and the Concept of development of education for 2016-2020 [2] dictates need of the appeal to educational marketing which is focused on long-term prospects:

- satisfaction of educational demand through ensuring the best coordination of internal opportunities of establishment with requirements of the external environment,
- achievement of goals;
- associations of the participants of pedagogical process implementing innovative projects of strategic development of higher education institution within the uniform target concept.

Marketing in education is function of management on the substance and belongs to the top management of the organization [4].

Marketing management of higher education institution of department is a perfecting of management of its activity by means of concrete technologies of marketing, including – activity of marketing service. The marketing service doesn't deny importance of efforts on inducing of demand for educational services, and, absorbing it, transfers management to new, higher level of effectiveness and quality of training of shots of the top skills [3].

The mission of marketing service of department "Theories and techniques of primary education" (TTPE), of the M. Akmullah Bashkir State Pedagogical University (BSPU) is in providing the maximum satisfaction of potential consumers by means of respect for the following principles [5]:

- Carrying out a complex of market researches, providing the management of necessary marketing information for the benefit of development of the development strategy of department (the analysis of labor market, career guidance);
- The organization of a system of the marketing communications including development of PR-actions of formation and maintaining of public relations (scientific conferences, seminars, courses);
- Creation of the printing press for advance of department and its educational services.

The type of organizational structure of service of marketing of TTPE department in our research is defined as functional. The organizational structure of marketing service as auxiliary division of department includes the sector of market researches (internet marketing), the sector on advertizing and public relations (PR-manager), the sector of development of design led, "Department of assistance to employment and educational marketing of the M. Akmullah BSPU" and the Manager of TTPE department.

Specialists of marketing service are the students and the staff of department having necessary professional competences and skills. The marketing department consists of 4 people that are optimum quantity for division of department (figure 1).

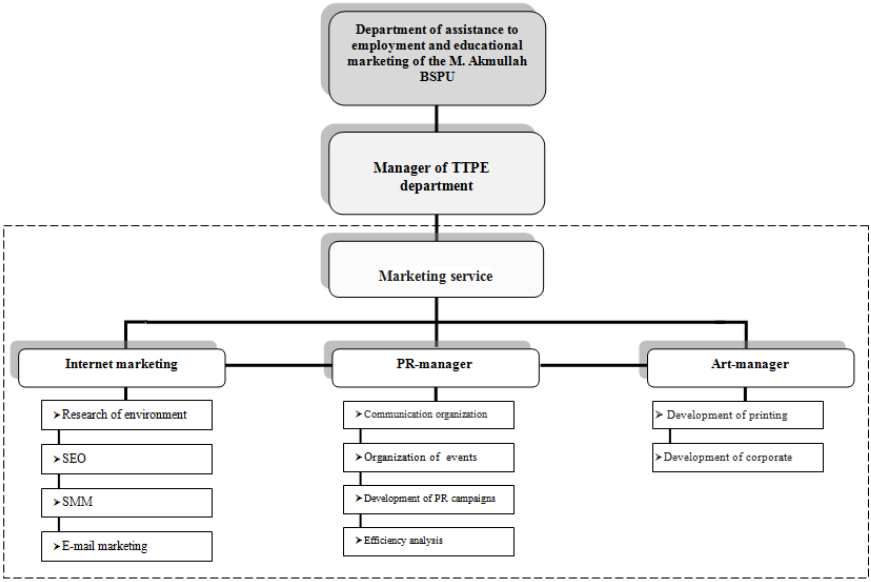

Fig. 1 - *Organizational structure of marketing service at TTPE department of the M. Akmullah BSPU*

Target priority of activity of the sector of market researches is carrying out internet marketing on studying of potential and actual consumers of educational services of department, a research of external and internal environment, collecting, processing and the analysis of data with the purpose of decrease of the indeterminacy accompanying implementation of the management decision, advance of new services and increase in number of potential consumers

The sector on advertizing and public relations is designed to form the communicative policy of department on two main directions - public relations (PR) and introduction of advertizing campaigns of educational services, the help in holding of conferences and the presentations.

The sector of development of design in the person of the art manager performs the following functions: develops the printing press, updates and "advances" the corporate style of establishment (a logo, a signature font, the letterhead, an envelope, booklets).

The advantage of this structure is fixing of each function to the specific expert, namely:

- Simplicity (is clear for all experts and employees);
- Laconicism and convenience (it is rather easy for construction);

- Accurate differentiation of the rights, duties and responsibility;
- Doesn't demand a large number of resources and additional financial investments.

Also, the department of marketing promotes the organization and advance of additional educational services of department. Let's stop on concrete experience of the consulting and diagnostic and developing “Entertaining Childhood” center which renders services in education. Primaryactivities of thiscenterare:

- Individual consultation on questions of diagnostics of the speech and general development;
- Individual consultation on questions of the organization and training on subject matters of elementary school: natural and mathematical, art and esthetic and humanitarian cycles;
- Individual consultation on questions of the organization and carrying out extracurricular activities: classes in origami "cockerel", "ship", "frog" with children of a younger school age; model operation of problem solving on driving with use of color paper, glue and cardboard; the interactive developing game for pupils of the initial classes "In the World of Professions"; lotto games - "Our multinational Bashkortostan", the "Sights of Ufa" developed by the teacher of department Savelyeva E. A. (it holds 5 patents in the different directions of extracurricular activities);
- Individual consultation of parents on the organization of work with children in house conditions. On the basis of the analysis of inquiries of parents additional paid services are developed. The period of rendering service is defined at signing of the contract between the educational organization and the lawful representative of the younger school student. Time of rendering service is carried out on the individual developed mode according to inquiry and volume of the chosen services. The volume of services the maximum volume of services is regulated by the requirements to an academic load of a younger school age presented to the sanitary epidemiological rules and norms. Educational work with the younger school student is carried out on the basis of individually developed scheduling of maintenance of development, education, education taking into account an age of the student, under the leadership of the teacher fixed under the contract for rendering paid educational service. Undergraduates, graduate students, educational psychologists, speech therapist, teachers of department of different subject domains, oligophrenologist can be involved in tutoring of children. Occupations will be organized on the basis of requirements to results of the main educational program of primary education in the context of Federal state educational standard of Primary education.
- Individual consultation on scientific and scientific and methodical problems of elementary school teachers, undergraduates, graduate students, doctoral candidates.And also holding master classes, trainings.

Calculation of service price is performed taking into account solvency of the customer; volume of social payments to personnel; scales of financing of the program of development of material and technical resources of department; presence of competitors; the conditions of pricing determined by Article 40 of the Tax Code of the Russian Federation [6]. At Department calculations for cash flow and the plan report about income and expenses for the current year and also the analysis of financial results of work for previous years, a turn of educational services, growth rates of a turn of services (from year to year), cost of services, the main expenses and the analysis about target use of money, the plan report about receipts of money are conducted.

Let's dwell upon substantial party of paid service "Individual consultation of correction of the speech" for children of 6-10 years directed to the general speech therapy inspection for identification of the level of development of children and identification of children with deviations of speech development, namely:

- Working on by formation of the correct sound pronunciation: to acquaint with exercises of articulation gymnastics, the correct articulation, often broken sounds;
- Completion of gaps in a lexical and grammatical system of the speech of children;
- Development of phonemic sounds and phonemic perception;
- Replenishment, systematization and activation of a lexicon, development of ability to use it in practice, to begin acquaintance to ways of formation of new words, to teach selection by a synonym, antonyms, etc.;
- Development and perfecting of visual and acoustical perception, attention and memory, observation in relation to the sound phenomena;
- Perfecting and inducing verbal thinking, ability to think, compare and generalize
- Development of ability to switching, ability to work at a particular speed;
- Development of ability to reminder;
- Development and perfecting of a shallow motility of fingers, manual skill, general motility;
- Inoculation of skills of control of the personal and others' speech;
- Formation of positive motivation to knowledge.

In the course of training with the child working on by sounds (phonetics) and phonemic processes is built; lexical and grammatical subject; temporary and spatial representations. Stimulation of thinking, attention and memory is carried out; working on by an articulation, finger-type and general motility.

The above-mentioned service on maintenance and other types of service allow department of marketing of department to carry out more efficiently the activity, to develop the capacity of department and to optimize its advance in education market.

Thus, in the modern conditions it's just necessary that the higher education institutions in general created a control system of the activity which would allow usingfullest its educational resources and opportunities taking into account requirements of education market. At the same time the created marketing service of department becomes one of defining vectors of pedagogical management and development of the educational organization.

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目前在萨马拉地区组织残疾人包容性教育的趋势
CURRENT TRENDS IN THE ORGANIZATION OF INCLUSIVE EDUCATION OF PEOPLE WITH DISABILITIES IN THE SAMARA REGION

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注解。 文章揭示了在萨马拉地区有效组织残疾人包容性教育的热点问题。在所有教育阶段与这些学生一起工作的教师可以发挥包容性发展的巨大作用。在这方面，行政当局正在积极努力增加残疾儿童和残疾儿童的教育和提高教育质量，这是教育政策和公民社会保护领域国家发展的优先领域之一。 俄罗斯联邦。

关键词：全纳教育，残疾人，无障碍教育环境，教育集群。

Annotation. *The article reveals topical issues of effective organization of the inclusive education of persons with disabilities in the Samara region. A huge role in the development of inclusion is assigned to the teacher who works with such students at all levels of education. In this regard, the executive authorities are actively working to increase the availability and improve the quality of education for children with disabilities and people with disabilities, which is one of the priority areas of state development in the field of educational policy and social protection of citizens of the Russian Federation.*

Keywords: *inclusive education, persons with disabilities, accessible educational environment, educational cluster.*

In the modern world, a huge role in the effective development of the intellectual abilities of young people belongs to the most important humanities, such as psychology and pedagogy, which forces humanity to reconsider their views in many areas of existence, in particular, in relation to inclusive education. Accord-

ing to the World Health Organization, approximately 10% of the world's population is people with disabilities, among whom 450,000 school-age children with different developmental characteristics live in Russia.

According to the data provided by the territorial department of the Ministry of Education and Science of the Samara Region, almost 8,000 students are studying in educational institutions of the Samara Region with the status of children with disabilities, which is 2.5% of the total number of schoolchildren. Out of these eight thousand children with disabilities, more than two thousand children with disabilities study at educational institutions in the Samara region, representing 32% of the total number of students with disabilities [1].

It should be noted that despite the legislative consolidation of the introduction of inclusive education in our country, there are quite a few barriers to its implementation, one of which is socio-psychological. It is impossible to learn to accept people with disabilities without giving healthy people an opportunity to understand the world of a person with psychophysical features. This can be done only in a single living space, not allowing the emergence of the so-called formal inclusion.

The meaning of inclusion is not to "endure" a child to the norm at any cost, but to change the external environment so that it not only accepts the other with his features, but also creates conditions in which he can fully live and develop. Inclusion is the ability to see in any child his strength and rely on it, and not to fix the weak.

Therefore, in the process of development of inclusion, an enormous role is assigned to the teacher, who works with the child at all levels of education. As is known, President of the Russian Federation V.V. Putin in 2013 in his message to the Federal Assembly, outlined the need for each teacher to master the techniques and technologies of working with children with different characteristics [2].

Improving the accessibility and improving the quality of education for disabled children and children with disabilities is among the state's priorities in the field of educational policy and social protection. This issue is regulated by the Commission for Disabled Affairs under the President of the Russian Federation (Presidential Decree No. 1201 of 21.08.2012) [4].

Today, after more than a decade after the adoption of the law on the social protection of persons with disabilities, it is still difficult to comprehend the grandeur of his plan. What executive mechanisms and at the expense of what funds will make it possible to change the social infrastructure for the unhindered access of persons with disabilities throughout Russia? How can we solve the global problem of the integration of persons with disabilities, which has no analogs in scale in world practice?

According to the leading researcher of the Institute of Socio-Economic Problems of Population of the Russian Academy of Sciences, E.V. Kulaginoy, the main problem of today's legislation is the fact that the focus is on children with dis-

abilities, and peripheral - to children with disabilities. In Russia, some children with disabilities are not included in the category of children with disabilities, thus initially laying the risk of violating the rights of children with disabilities to education in special conditions. In the constituent entities of the Russian Federation, there is a significant difference in the number of children receiving special education, which leads to different levels of pedagogical tasks, different financing, and the inability to effectively manage the special education system.

Over the past three years, the number of children with diseases of the central nervous system has increased in Russia (more than 30 thousand people), who are going to study in regular classes. The result of this trend is the situation when such children interrupt the educational route in the 4th grade, after which they continue their education in a correctional school.According to the Center for Special Education in the Samara Region, in 8 out of 13 districts in which correctional schools operate, more than 5,000 students with disabilities study, which is 1.5% of the total number of students in educational institutions in the region.

However, it is worth noting that there are children with diseases of the central nervous system, which are reflected in the development of the function of their intellect, which does not always lead to its correction. Therefore, with such children, on an individual basis, the work of the psychological, medical and pedagogical commission to determine the criteria and levels of their intellectual maturity should be carried out, as a result of which a corresponding conclusion is given about the possibility or absence of such to study in an educational institution.

Currently in Russia there is an increase in the number of disabled children transferred to home-based education, which is 17-18 thousand over the past two years, so children with disabilities and the mentally retarded often drop out of school. Over 5% of the total number of children with disabilities is in home schooling in the Samara region.

We can not say about the serious problems of staffing in educational institutions teaching children with disabilities and disabled children. Many teachers are not psychologically ready to work with people with disabilities; they lack the knowledge and skills to work with these children without anфcy barrier. Medical workers have been withdrawn from the kindergartens: orthoptist nurses and ophthalmologists who carried out the necessary treatment of children with visual impairment every day.Therefore, it is necessary to consider the issue of licensing of ophthalmologic offices in preschool educational institutions, as well as to provide such specialists with educational institutions, both inclusive and correctional. The first step in solving this problem was that the Samara region became one of the 17 regions of the country, where by the end of 2018 a model of an early help system for children with disabilities and their families was formed, but the training of personnel of professional organizations remains aloof.

Currently, we are faced with the problem of psychological and pedagogical support of students with disabilities in the process of their training. It is a mistake to assume that it includes the work of only one employee of an educational institution, for example, a tutor or a psychologist. According to legal acts, such as the "National Action Strategy for Children for 2018–2027"; "Available environment" 2016-2020 "; Federal Law "On Education in the Russian Federation" "Methodical recommendations on psychological and pedagogical support of students in the educational process in the context of modernization of education" and a number of others), psychological and pedagogical support consists in the coordinated work of the following specialists: a psychologist, a social teacher, a speech therapist, a defectologist, a medical worker (doctor pediatrician and psychiatrist), teachers, exercise therapy teachers, etc. In the organization of effective training for children with disabilities, this moment also deserves appropriate attention from the authorities executive authority.

Under the conditions of the obligatory form of organization of the educational process of the classroom system existing in Russia, the inclusive form of education is productive only for children with intact intelligence, who have a slight form of developmental disorders (visually impaired, hard of hearing, disorders of the musculoskeletal system, chronic diseases and some others). An adapted educational program is being developed for this category of children.

For students with special educational needs due to impairments and developmental disabilities, greater time periods are required, modification of the content of general education subjects, the inclusion in the curriculum of a number of specific subjects that are not in the curriculum for children with regulatory development, the involvement of a defectologist corresponding profile (oligophrenopedagogue, typhlopedagogue, deaf-and-dumb teacher, etc.).In addition, the most productive organization of the educational process will be the training of such children according to the adapted basic educational program, which is developed independently by the educational organization taking into account the FSES of general education at the educational levels and (or) the FSES

of education of children with disabilities on the basis of the basic general educational program needs of people with disabilities.

On February 20 of this year, in his Address to the Federal Assembly, Vladimir Vladimirovich Putin stressed that "the period of reflection has passed, we are obliged to move only forward, constantly picking up the pace of this movement. Now we need to change the situation for the better, and therefore the work of the executive at all levels should be harmonious, meaningful, energetic"[3]. This statement can be attributed to the organization of an effective education system for children with disabilities.

One of these steps, accelerating, in my opinion, the creation of inclusive processes, is the creation of inclusive educational clusters, which can include educational organizations of all levels of education: kindergartens, secondary schools, colleges, universities, correctional schools as resource centers, art schools, social centers, etc.

The idea of creating a cluster system of inclusive education is also due to the fact that, at the present time, children with disabilities in the community do not have the continuity of transition from kindergarten to general education organizations, and most of the parents of such children belong to the socially unprotected population child to a remote educational institution. If this problem is less noticeable in large cities of the Samara region, then, in the region's remote centers, villages of the region, it is one of the fundamental educational needs of children with disabilities.

The inclusive educational cluster allows solving a number of organizational and pedagogical problems. First, the most tangible solution in the clustering of inclusive education is to provide the educational process with personnel through the use of cumulative human resources. Secondly, the cluster allows the use of the aggregate material base in the training, rehabilitation and correction of children with disabilities. Thirdly, in the organization and implementation of inclusion in a cluster, public organizations, production teams, the parent community and just the residents of the microdistrict can participate.

There can be many types of clusters of inclusive educational organizations. Different clusters can be created in a microdistrict of a city or a village — their number and composition are determined by education authorities together with public organizations. In a small town, urban-type settlement or village, only one cluster can be created, which is able to accept all children into mixed groups of pre-school educational organizations and schools. Creating a cluster of inclusive educational organizations is important not only for children in need of special psychological and pedagogical support, but also for parents of children with disabilities who are particularly worried when transferring a child from one level of education to another.

In our opinion, it is important to create such an inclusive cluster, which would combine a kindergarten, school, the establishment of vocational education, correctional institutions, university, industrial enterprises, workshops, institutions of additional education, having an accessible environment for all categories of people with disabilities. In addition, work was carried out on adaptation and rehabilitation centers, resource training and methodological centers that provide advice on training and employment issues. Such a cluster is capable of realizing a three-pronged goal - the education, upbringing and socialization of each disabled child.

However, speaking of the creation of an inclusive educational space, it is impossible to say about the elimination of correctional education, which fulfills the important mission of teaching, correcting and rehabilitating a special category of children with disabilities. We are talking about flexible processes of socialization of a child with disabilities, the development of his natural inclinations and abilities. At the same time, the child should not be tied tightly to the correctional system - the transfer of students who are ahead of their peers to the general education system should be thought out so that they are not isolated from society.

Thus, while developing cluster inclusive education in the holistic inclusive educational space of the region, it is necessary to remember the ultimate goal of inclusion - preparing a person with disabilities for life, his full integration into society, his happiness, to which he has every right as each of us.

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UDC 17

经济活动的道德基础
MORAL FOUNDATIONS OF ECONOMIC ACTIVITY

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注解。 认为经济学是人际关系的一个领域。 人与人之间的关系受道德规范的支配。 显示出缺乏实用主义的道德观。 有人认为，一个人应该根据精神的优先权和个人的道德自我完善的目标而拥有不同的价值体系。

关键词：伦理教育，经济伦理，消费社会

Annotation. *Considered economics as one of the areas of human relationships. Relations between people are governed by moral norms. The lack of ethics of pragmatism is shown. It is argued that a person should have a different system of values based on the priority of the spiritual and with the goal of moral self-perfection of the individual.*

Keywords: *Ethical teachings, economic ethics, consumer society*

The economy is one of the spheres of human activity, and economic relations are one of the types of relations that people join. Communication between people as the most important aspect of their joint life and activity has always, in one way or another, been comprehended by them. Human activity, including relations between people, is not possible without certain norms, it cannot be independent in relation to morality. Accordingly, we can talk about the relationship between the economy and ethics. Thus, in the process of labor, certain moral relations are formed between people. This is, firstly, the attitude to social labor and participants in the labor process. Secondly, it is the moral relationship that arises when directing the interests of professional groups with each other and society. [1]

Around the XI-XII centuries., with the formation of medieval workshops and craft division of labor, there are the first professional ethical codes. Then, for the first time, in the workshop charters, a number of moral requirements arise in relation to their profession and the nature of work and their comrades in labor. But much earlier professional ethical codes were also known (for example, the “Hippocratic Oath”). Already much later, a theoretical theory of professional ethics

emerges. Initially, professional ethics arise as a result of the practical need to regulate the relationship of people of a particular profession, as a manifestation of everyday moral consciousness. This led to the formulation of certain requirements of professional ethics. Accordingly, both written and unwritten codes of conduct are gradually formed, the theoretical concepts of professional ethics are formulated. So over time, a certain tradition was created. To date, there are many ethical codes in relation to various professions, including the code of entrepreneur, banker, etc.

According to Marxist theory, it is the economy that determines the essence of the moral foundations of society, this or that kind of morality. Moreover, every class and even profession has its own morality. The difference between the bourgeois and the proletarian becomes the difference between Good and Evil in an absolute sense. An important role is given to the proletariat, which is called upon to free the world from evil in the form of surplus value. It identifies the economic category with the ethical - the exploitation of man by man.

In modern western sociology and psychology, the concepts that are opposite to Marxism are widespread, according to which the social is regarded as a derivative of the psychological, and not vice versa. These ideas assert the autonomy of ethics, and, accordingly, the dependence of the economy on it.

Thus, it is recognized that the success of any business depends not only on the quality of the goods or services produced. It is no less dependent on the quality of life of the people who produce this product or service. Moreover, human relations are now recognized as the main components of success. The old theory of Taylorism, according to which the worker is merely an appendage to the machine, which can be controlled solely through material incentives and a system of careful control, is replaced by the theory of human relations (E. Mayo), based on humanistic philosophy. This theory has become a leader in the field of modern management in developed capitalist countries. Also the concept of G. Ford, which was one of the first ethical and economic concepts, has a great influence. Ford believed that the professional activity must necessarily contain ethical common sense, which consists, in particular, that happiness and well-being are obtained only through honest work. Production should not just give out a product, but its goal is to create a source of joy from the world of things: strength and machine, money and property are not important in themselves, but are only useful as long as they contribute to freedom of life. At present, Ford's ethical and economic views are also of practical importance. For example, in relation to our country, some economic scientists have stated that one of the main reasons for the stagnation in the economy of the USSR was the predominance of technocratic management methods. [2]

In Russia, even in the pre-revolutionary period, the importance of strengthening the moral foundations of economic activity was recognized by many representatives of Russian economic and philosophical thought. It was recognized

that market relations make sense, they are viable and they can be reformed and improved, primarily through the use of moral means. Many Russian thinkers reflected on the spiritual and moral aspects of economic activity. It is humanism, morality that should be the supporting principles that determine the organization of the economy. Trade relations are largely based on trust, and moral principles of cooperation are necessary for their successful implementation. Many noted that it was necessary to apply the norms of Christian ethics to business activities. So, N. Berdyaev pointed out that in order for Russia to rise it is necessary above all a spiritual rebirth of the people, an internal revolution in it. Vl. Soloviev believed that it was impossible to separate the economic area from the moral. [2]

The beginning of the application of ethics to the economy was laid by Aristotle in his works "Ethics", "Nicomachean Ethics", "Politics". Any human activity must be subordinated to the achievement of good or happiness, and virtue is a means of achieving good. Then there is no economy, as well as another sphere of human life, by itself, not dependent on ethics.

These principles were later developed in the ideas and concepts of Catholic and Protestant theologians, who for a long time intensely reflected on the problems of business ethics. It was thanks to Protestantism that theoretical understanding of business ethics, the creation of business ethics, and the emergence of capitalism in Europe in the 16th century became possible. Since the medieval Catholic ideology argued that a person should not be immersed in worldly affairs, especially those associated with obtaining benefits, but should renounce everything mundane for his salvation, making money is necessarily immoral and subject to moral condemnation. Protestantism (in particular, Calvinism) denied such attitudes, opposing them with the concept of the individual vocation of man. Once a person's vocation can be involved in economic affairs, then it is endowed with moral and spiritual meaning. Then success in worldly affairs, wealth, is a sign of God's blessing, and the desire for well-being became a sign not of sinful ambition and greed, but of morality and righteousness. Thus, Protestantism gives moral sanctification to the activities of a businessman and forms a business ethic based on morality. The secular version of the Protestant business ethic is becoming an important part of Western social culture. And although the debate about whether there is an independent economic ethics, is still underway, it is undeniable that in conditions of economic freedom and competitive relations, the importance of ethical regulation is increasing. Nowadays, it is increasingly recognized that good ethics means good business; one can be both virtuous and successful in business, and accept that moral virtue is a prerequisite for success. [3]

But any ethical doctrine does not exist independently, by itself, but rests on a general philosophical basis and a specific doctrine about a person, his essence and the purpose of his life. This also applies to the modern economy.

So, gradually in the twentieth century. in the West, the philosophy of positivism and pragmatism is widespread. The emergence of positivism is associated with the development of natural science, the desire to understand the difficulties of its growth. The general epistemological problems of the emergence of positivism are the relativity of knowledge and the process of mathematization and formalization of the sciences. In their studies, the positivists interpret the process of formalization of knowledge as the independence of logical connections from objective reality, which leads to the expulsion of meaningful meaning from formalized theories. Positivism recognizes the unreliability and precariousness of theoretical constructions, preferring empirical methods of knowledge. The only criterion for the applicability of formal theories is their convenience, simplicity, etc. Thus, neopositivism fits with pragmatism, calling for guided not by any metaphysical truth (which, generally speaking, does not exist), but by sense-use.

Pragmatism is the American form of the development of positivism. This was facilitated by certain historical conditions. Thus, at the end of the 19th and the beginning of the 20th century, production in America began to flourish, which was a prerequisite for the emergence of faith in the limitless possibilities of enrichment among businessmen. Accordingly, "making money" has become the most honorable and useful activity, and thus everything began to be assessed in terms of monetary value. Thus, utilitarianism became a typical viewpoint, evaluating any act only from the standpoint of benefit and material gain. Pragmatism became his philosophical justification. And if in Protestant ethics material success is directly related to the moral life, then, with the denial of God and the presence of truth (including universal moral values), the way of activity of a modern businessman also changes. Since a person is assessed in accordance with what he does, and not what he is, what his inner essence is, the individual well-being and the possibility of achieving wealth and happiness under the conditions of the "American way of life" are put forward as the goal of human existence. The meaning of life is to find a comfortable place under the sun, and all means are good for this, since the main and only moral commandment of the pragmatist is "do what pays off". According to pragmatism, it is the criterion of benefit or benefit that authorizes any immoral act, so long as this act does not entail harmful consequences for the person committing it. Thus, a man, energetic and strong-willed, imbued with the spirit of individualism and egoism, becomes an ideal of man. He becomes a "hero", in contrast to the rest of the "masses", "crowds", which is blind and helpless if not influenced by the "hero", "superman". Only the "hero" gives direction to the movement of the crowd while he is "in fashion", and then for one reason or another, the next "hero" replaces it.

Thus, the formation of the so-called consumer society based on the pleasure principle is gradually taking place. As a result of the economic crisis of the 1930s, the nature of capitalist production changes significantly. Since there was a real

danger of a socio-economic and political catastrophe, this forced the ruling class to make serious concessions and adjustments. The new situation led to a decrease in the severity of the former social contradictions and conflicts and created conditions of existence that were completely acceptable to humans and extended to almost two thirds of society. As a result, production ceased to exist only for the sake of production and profit, and began to focus on people, and consumption ceased to be limited within the framework of the struggle for physical existence, a means of survival. Now production exists for the mass consumption of material goods, to which a certain system of values and attitudes corresponds. So, since the manipulation of consciousness and, accordingly, consumption is the basis of economic benefits, the full moral and spiritual development of a person is no longer necessary, is not an important value.

Thus, one of the main, if not the most basic, problem at present is the crisis of spirituality, the crisis of moral and ethical norms in modern society. The previous religious justification of morality, where God was the legislator and the source of moral law, has long lost its position. The project of rational justification of morality, the impulse of which was set in the era of the Enlightenment, crashed in the early twentieth century. Both of these concepts considered the objective significance of moral norms for a person as their basis. The dominant importance now is the doctrine of emotivism, according to which all value judgments (all moral judgments) are nothing but an expression of preference, attitude or feeling. Accordingly, material values become the main values. [4]

Consumer society of the two guides life, defining the purpose and meaning of human life settings "to have" or "to be" chooses to "have." Thus, alienation, described by Karl Marx, arises: the structure of society (division of labor, private property) is such that the results of human activity, the products of labor are alienated from man and transformed into the power that dominates him, which leads to the alienation of people from each other. Moreover, the alienation from a person of the results of his work also means that in the alienated form comes his own generic essence of a person - his universal ability for creative creative activity, that is, self-alienation of a person occurs. And liberation is impossible without overcoming alienation and appropriating to them its generic essence. [5]

So, the worldview of the consumer society leads him to an existential crisis, an existential vacuum. It has already become clear that the economy depends on ethics: following ethical laws leads to business and economic success. But it turns out that just taking moral norms into account in our activities is not enough. The focus of pragmatism on pleasure, pleasure leads, as it turns out, to emptiness: if there is no higher, existential meaning and purpose of life, then there is no satisfaction either. There is a paradox: striving for pleasure, you do not get it. Man turns out to be more than desire for pleasure.

Even Aristotle talks about the purpose of man. But he sees the highest good or happiness not in sensual pleasures and material goods, but in spiritual satisfaction, in that state of mind that arises from a sense of fulfilled duty, the fulfillment of one's purpose by a person. The means to achieve happiness is virtue, that is, a moral category. Aristotle believed that the purpose of a man lies in self-improvement, self-affirmation of his personality as a spiritual being.

He considered sensual inclinations and passions as properties of an irrational part of the human soul. For the domination of reason over sensuality, it is necessary not renunciation, not a means of deliverance from the world, but a condition for the correct choice of a person's purpose, appropriate way of life and actions. Improvement of the person should occur through cognitive activity, an active attitude towards reality and the acquisition of power over desires and passions. Virtue is a consciously chosen stock of the soul, consisting in the possession of the middle between two kinds of depravity, one of which is from excess, the other from lack. Accordingly, both excessive wealth and poverty are extremes that should be avoided. [6]

State regulation of the economy leaves little room for the development of creativity and initiative. Ethics under capitalism requires greater maturity from a person (psychological and moral), because implies that he should be able to sacrifice profit for the sake of moral values, for the sake of another person, the surrounding nature, etc. Since there is no external restriction, then a person will have greater freedom, which also implies greater responsibility. Freedom of choice increases the number of solutions, and they must be carried out by ethical means and in the name of morally justified goals. This means that a person should have a different value system, based not on pragmatism, but on the priority of the spiritual and having the goal of moral self-perfection of the individual.

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形而上学斗争背景下科学范式的转变
CHANGE OF SCIENTIFIC PARADIGMS IN THE CONTEXT OF METAPHYSICAL STRUGGLE

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本文提出了对区分与非歧视形而上学斗争背景下科学理论发展的新解释。 这种斗争在概念上证实了文化历史过程中科学范式的变化。

关键词：科学哲学，形而上学，文化，制度，宗教，歧视，神秘，非经典范式，认识论二元论，混沌，实证主义。

Annotation.*The article proposes a new interpretation of the development of scientific theory in the context of the struggle between distinguishing and non-discriminating metaphysics. The change of scientific paradigms in the cultural-historical process is conceptually substantiated by this struggle.*

Keywords: *philosophy of science, metaphysics, culture, system, religion, discrimination, the occult, non-classical paradigm, epistemological dualism, chaos, positivism.*

Science does not exist outside and regardless of the metaphysical semantic field. Metaphysics is the fundamental level defining meanings, and science is service, theoretical, expressing these metaphysical attitudes in various theories and concepts. But (!) Is always only within the framework outlined by these metaphysical attitudes. So, in the so-called “secular culture”, where science is emancipated from the metaphysics of theism, it is not at all exempt from metaphysics in general, but only becomes the spokesman for metaphysics different. What is it?

Everyone knows that in its fundamental philosophical basis (the originator of which is R. Descartes) the novelty of the “new” science is that it is emancipated from Christian metaphysics. This is not quite true, more precisely, this is not true at all. The fact is that the so-called new science (the science of the new time), in its fundamental semantic foundation, is not emancipated from Christianity specifically, but from a *theistic,* that is, from a *differentiating ontology*. We will explain. We

are misled by the fact that the development of a scientific theory is represented as one single main line, successively penetrating all epochs. And all the substantive disagreements presented in conceptual variants and schools (ontologism - psychologism, materialism - idealism, rationalism - empiricism realism - nominalism, etc., etc.) are within this single theoretical paradigm, defining its further development with its dialectical struggle. Thus, their struggle is an exclusively internal struggle, and it, as the position of something finite within this infinite highway, leads to the development of this highway, polishing its perfection.

So - "this is not the truth." In fact, the whole history of science (by science, we mean precisely the theory, the philosophical substantiation of the natural and humanitarian disciplines) is represented by *the struggle of two lines*. Moreover, with the victory of one of them, the other does not cease to exist, but simply goes into the shadows, is supplanted, ceases to be covered. Indeed, in any scientific study, the metaphysical (semantic) or methodological level is present (explicitly or hidden) necessarily. Therefore, it is simply impossible to banish metaphysics from science, and all positivist pathos, in this case, is designed for simpletons. The main task, on the solution of which all the forces of the "progressive" philosophy are thrown, is not the destruction of the metaphysical (semantic) level, **but the concealment of it.**It is necessary to divert attention from him, to lead him into the shadows, to hide. Why? **Because it is changing!** And it is not changing for the better. It is conceptually formalized by the ancient Greek sophists and has since developed as a shadow, "alternative" line parallel to the classical scientific highway.

Each of these philosophical lines is a conceptual interpretation of a completely specific metaphysics (semantic basis) - either magical-occult (hiding behind secularism), or religious-theistic. And these metaphysical, semantic foundations are hostile and irreconcilable. Therefore, each of them is embodied in its specific ways of comprehending and perceiving reality. And each systematizes this reality according to its structural principle, which is not only different for them, but directly opposite.

Religious worldview is based on the metaphysics of distinction (both qualitative from good from evil, light from darkness, truth from falsehood, norm from pathology; and structural from essence from properties, forms of substantial from accidental forms) and therefore is expressed in value, differentiating ways of thinking and perception. This structural distinction is based on the distinction of semantic, value, moral, racial, sexual, age, blood, etc.Therefore, civilizations appear only on this distinguishing metaphysics. And this means that all cultural and historical forms of human existence - the family, the nation, the state - are built on it. And the classical scientific theory based on distinction is just an element of the general civilization system in which it is embedded and in which only it can

develop. Science, after all, does not exist separately, in an airless space — it is always embedded in a certain civilization system.

Therefore, non-classical science (alternative, nondiscriminating), being in a discriminating system (of any civilization), will inevitably discord with it, loosening it and destroying it. The history of modern philosophy is, in essence, the history of the struggle not against metaphysics in general, as they want to present it, but against *the metaphysics of discrimination*.For example, the apogee of the development of modern analytic philosophy in the face of Feyerabend's epistemological anarchism openly proclaims that: "There is no concept — no matter how" absurd "or" immoral "it may seem — which he would refuse to consider or use, and there is no method that he considered unacceptable. The only thing that he speaks against openly and unconditionally is universal standards, universal laws, universal ideas, such as "Truth", "Mind", "Justice", "Love" **and the behavior prescribed by them...**"[2].

Occult thinking and perception - this nondiscrimination is not only qualitative but also structural, it is a mixture of everything and everyone. It is this occult source that leads to a doctrinal rationale for the mixing of racial, cultural, sex, age, religion, and even species. It is from here that the theories of chaos that are so fashionable now come about - its self-organization, its positivity, its preference, its controllability. The source of all these glamorous theories of "controlled chaos" is precisely here, in the occult metaphysics of nondiscrimination. And structurally, this nondiscrimination (confusion) is formalized in networks, i.e., in transnational, *above-discriminating structures* of corporatetocracy - financial, political, social, etc.

Thus, the scientific theory that arises in this occult paradigm and serves it only serves the metaphysics of nondiscrimination, chaos in various ideological options (positivism, sociological nominalism, political behaviorism, methodological individualism in the theory of rational choice, pragmatism, utilitarianism, etc., etc.), forming nondiscriminating, *tolerant* ways of perception and thinking. ***It does not at all expel metaphysics, but only changes it.***It is clear that discriminating thinking, value is at the same time supplanted and marginalized. And, the traditional society, left without its conceptual justification, turns out to be completely helpless before the pressure of ideologies expressing parallel, marginal-occult mysticism, in which the contours of the shadow highway are clearly visible, originating not from Socrates, Plato and Aristotle, but from Anaxagoras, Protagoras, Proclus, Bruno, etc.Thus, the modern positivist theory (on which the entire liberal system is built - political, economic, social, ethical) is no new science, but only a *new* stage in the development of the ***old shadow*** gnostic-sophist line. And all the conceptual variants of the modern "scientific paradigm" are not the development of some abstract science (which is absent at all), but the development of a completely

definite alternative, *nontraditional* theory.All this is politely called *non-classical* theory. Metaphysics remains, this is the semantic level, which is always there. It simply changes from the distinctive (theistic) to the nondiscriminating (that is, the magical-occult). In Gumilyov, for example, such things are interpreted as a "historical event" —that is, breaking of ties. Well, the break of the previous connections leads to the creation of new, already on the winning, nondiscriminating version, and therefore to the creation of a completely different system in its structure - the network, the global-total.

To hide this revolution, it is necessary to conceptualize the autonomy of thinking, that is, its independence from the moral-volitional and spiritual sphere; and thus ***hide the connection of certain theories with a certain type of people.***In scientific theory, the concept of "natural man" is embodied in the concept of "natural mind", that is, pure, theoretical thinking, separated from the spiritual-volitional sphere! Thus, the process of the famous "epistemological dualism" is launched, in which thinking is separated from the spiritual (religious and moral-volitional) sphere. This epistemological dualism and becomes the basis of all modern scientific theory. This new installation is embodied in the two parallel lines of Descartes (the substance of the thinking and the length of the substance), still, by the way, dominant in the intellectual worldview.

Already, Thomas Aquinas concedes to knowledge (philosophy) the whole territory of what can be cognizable by the "natural mind": over the "natural mind," Aquinas at the same time dissects the whole integrity of the cognitive process.It was such among the Greeks, that is, of course, among the most significant thinkers of Greece; It was the same among early and late Christian theologians - until the XIII century ... This opened up a new path for purely philosophical creativity, which not only began to dispense with the religious foundation ("upper floor") later, but gradually set out on the path of complete autonomy, now being built into the principle ... The whole mistake of Aquinas was that he takes the concept of "natural mind" as an immobile concept, whereas the matter in the Christian world is not at all about "Christianly using" reason, but about Churches to find reunion nenie and *transformation* of the mind.For a Christian, the mind is not the "lower" floor of its spiritual integrity, but the living sphere of his spirit, where the grace-filled rays of the Church penetrate. Separating the mind from faith, philosophy from theology, means limiting the light of Revelation only to the sphere of the spirit that is turned to God - to believe that life in the Church does not open the way for the transformation of our whole being, imprinted by the action of original sin. Having torn off the scientific thinking from the religious sphere, it is then separated from the sphere of moral and volitional, that is, ***discriminating.***The integral integrity of the cognitive process of the living human spirit is dissected and dissected. Separated from the discriminating volitional sphere, the cognitive process

begins to be interpreted as a dead scheme of abstract judgments, but: "Every self-determination of thought is extraordinarily responsible, because when a thought defines something *outside* of itself, then the definition connects only the subject that has been defined for thought. When a thought defines *itself*, the restriction is introduced not into one or another object, but into the very *thought*, into the very *organ* that operates with all the contents of the thought, i.e. the restriction is introduced into the entire totality of the imaginable "[4].

The whole philosophical thought of the New and Newest Time, - V.F. Ern believes, - defines itself as a ratio. That ratio was the basis of the great highway of the new philosophy, which stretches from Descartes to Kant, from Kant to Hegel and from Hegel to modern transcendentalism.

Rationalism, according to V.V. Zenkovsky [5], deals with the phenomenon, with its imaginary self-sufficiency and, consequently, with the loss of reality in it. And in its highest manifestation, transcendentalism, rationalism reinterprets the material of knowledge in the sense that it embraces "phenomena", that is, the "shadow" of being, its "law" and not "reality", its logical structure, and not reality. Thus, Descartes and those who followed in his footsteps were forced by their very position to ignore in their thoughts activity, dynamism, and volitional self-determination, which *are not seen*, but only *felt* in themselves by thought; and which, in fact, can never become a pure, visual *object* of thought.This pure passivity ratio is determined by the very method of self-determination of thought: "The direction, the ancestor of which was Descartes, proceeds to self-determination in a very specific *way.* First of all, it takes thought as a pure *object,* that is, it makes thought the subject of passive contemplation, which is mental *vision* ...The thought-object thus presented is clearly not what the thought-subject is in its inner activity. Passive contemplation ... can open and fix in thought only those signs of passivity and only that static structure that is *not* in the thought-subject, which are caused not by the objective and real properties of thought, but by artificial conditions of consideration "[6].

Separating this theoretical ratio from ontology (that is, clearing the mind from the real spiritual and volitional basis), rationalism turns it into a dry lifeless husk, which is then crushed and swept, mixing everything with everything, the positivists. ***Thus, the removal of science from the religious discriminating (ontological) context starts the process of its self-destruction, and the New Western philosophy in its main line only rationalizes and systematizes this process.***For example, the transition from Cartesian philosophy to Kant is accomplished by psychologizing thinking, and in Hegel, being is already derived from thought as its moment. The ancient metaphysics, Yurkevich believes, correctly saw the ideas of truth in categories and identified reason and truth. Kant, however, Plato's eternal truths (ontological ideas), that is, knowledge of the mind about the truly existing, turned

into functions of the subject, into formal methods of the view and presentation of the content, which is a modification of our inner feeling.

Functions are the modes of action of the mind, providing unity of ideas in judgments. When categories, that is, forms under which something is conceived, are brought under the physiological notion of function, this will prescribe the nature of events ***that are indifferent to truth.***In fact, when we combine ideas — which are always given in the empirical definition of inner feeling as events, and not as truth — under categories in judgments, we refer them to the original and unchanging consciousness of truth, and not to the consciousness of "I," as Kant claimed; in which a person is satisfied not with the consciousness of truth, but with the fact that, as a result of summarizing the data of the inner feeling under the categories, he is conscious of himself as thinking and, therefore, acting in the field of not personal states, but the general consciousness.That is, satisfaction, according to Kant, consists in the fact that a person, as soon as he thinks, has so much in front of the eyes of his activity. This error, according to Yurkevich [7], gave rise to a philosophical system that teaches that unconditional thinking makes an endless process of peacemaking and the history of mankind only in order to have the identity of our activities before the eyes of the conscious human spirit - i.e. Hegel's system . Thus, it was Kant who initiated the direction of metaphysics unprecedented in history, for which the laws of the action of the knowing subject are, at the same time, the products of these actions of the knowing subject and the consequence is the foundation of itself.

By removing the qualitative distinction (bringing categories under the physiological notion of functions), the idealism of the "new" philosophy then destroys the distinction and structural - between essence and phenomenon, both substantial and accidental: "Idealism in a legitimate struggle against empiricism, which hoped to add the very essence of the soul and impressions, smoothed the distinction between *the consciousness*, in which the soul cognizes the reality given to it in external and internal experience, and *the substantial soul*, which is indisputable, like all things in the world, it belongs to her own peculiar laws and modes of activity.Similarly, the difference between the phenomenon and the thing in itself is recognized by modern philosophy not as *metaphysical*, as Kant believed, but *epistemological,* that is, the terms *phenomenon* and *essence* are denoted by different degrees and perfection of our knowledge and understanding: knowledge of the phenomenon becomes, as far as its perfection, knowledge of the essence " [eight]. It remains just the functionality and impersonal process for the sake of the process.

This is the transition from the line of Plato, Aristotle to the dead-end line of sophists and Meletians, absolutizing the process and dissolving in it any stability, norm, essence — both ontological and personal. Both in *moral* life and in knowledge, a person begins and ends with subjective movements!Thus, the rejection of a

theistic discriminating metaphysics (the deduction of science from a religious, ontological context) is inevitably followed by ***a methodological nondiscrimination,*** which is already conceptually shaped by positivism and neopositivism. The logical conclusion of this striving for self-destruction is epistemological anarchism, where everyone is free to invent his own concept; it cannot be compared with other concepts, for there is no basis for such a comparison; therefore, everything is permissible and everything is justified.In the face of epistemological anarchism, the philosophy of science has come to speak out against science itself.

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雅库特文学复合句的表现力解读

EXPLICATION OF EXPRESSIVITY OF COMPOSITE SENTENCES IN YAKUT LITERATURE

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抽象。本研究的目的是揭示和分析雅库特文学文本中复合句的表达性。所使用的主要方法是归纳法，其他方法是语境和分配分析方法。文学作品的语法是揭示其优点的复杂研究课题。句子的数字，结构和语义参数对于它们在作品的文体质量中的作用是非常宝贵的。研究者经常利用复合句句的特殊和一般性问题来限制自己。复合句在文学风格中的文体语体风格能力首先通过其结构手段实现，其次是文本中的语义表现。反对，观点，对立，还原作为具体的语法手段和诗歌形象，特定的语法手段和诗歌形象在文学和新闻语言中被广泛使用，但在官方文本中几乎不存在。在文学文本中，具有表现力的复合句子，还原，复制，位置 – 词汇重复，平行，主题 – 流派序列等。 ，位置 – 词汇重复，反演，平行，主题 – 流变序列，被认为是自然和风格形成。

关键词：表现力，复合句，还原，并行。

Abstract. *The aim of the study is to reveal and analyze expressivity of composite sentencesin Yakut literary texts. The main method used is inductive, with additional ones being the methods of context and distributive analysis.Syntax of a literary work is a complex research subject in terms of revealing its advantages. Numerical, structural, and semantic parameters of sentence are invaluable in relation to their role in stylistic quality of a work. Researchers often restrict themselves with particular and general problems of use of composite sentence syntax. Extralinguistic stylistic capabilities of composite sentence in literary style are realized, first, through their structural means, second, their semantic manifestations in text.Anaphor, epiphor, antithesis, reduction, gradation, positional-lexical repetition, paralleling, theme-rheme sequence, etc. as specific syntax devices and poetic figures are widely used in literary and journalistic speech but are almost absent in official texts.In literary texts composite sentences with expressive means, reduction, positional-lexical repetition, inversion, paralleling, theme-rheme sequence, are perceived as natural and style-forming.*

Key words: *expressivity, compound sentence, reduction, paralleling.*

Introduction. Syntax of composite sentence in Turkic languages is different from that of Indo-European languages. In Turkiclanguages, composite sentences are classifiedaccording to the structural principle, i.e. character of connection of subordinate andmain clauses, into synthetic, synthetic-analytical, and analytical, with the first two types dominating, being perceived by the "person of Altaic hypotaxis" and with the third type being just "supplementary".

In the Yakut languageas in Turkic languages, simple sentences are divided into simple and monosubject-polypredicative, composite sentences are divided into complex, compound, and multimember composite sentences – multimember hybrid composite sentences and compound sentences of complicated structure. Depending on functional style, possible linguistic means able to express specifics of a style in the best way are selected and used.

Speechsystemacyis built upon communicative-functional extralinguistic basis of each functional style. This systemacycan be referred to according to the main style characteristic of each functional style: scientific as generalized-abstract and emphasized logical; journalistic as informative-influencing; literary as expressive-figurative; official as regulative-obligatory.

Author's speech of a literary work can be a research subject as a unique individual linguistic phenomenon.

Background. The language of literature is different from functional styles having first of all 'practical' functions in three ways:

1) the*aesthetic function* closely related to figurative reflection and representation of reality;

2) *specifics of the linguistic standard*;

3) much greater *openness*, i.e. wide use of not "its ow"' vocabulary but that of all functional styles and all types of spoken language [2].

In the fundamental work by E.I. Ubryatova on syntax of the Yakut language there are some observations of specifics of use of composite sentences in works of Yakut writers [3].

The language of literature, the language of classical writers of national literatures is the most important source for research into the literary language. There have been no studies analyzing composite sentences in literary texts. The purpose of this work is to reveal and analyze expressivity of composite sentences in texts of Yakut literature.

Research methods. The main method is inductive, in particular, the methods of context and distributive analysis were used.

Results and discussion. Syntax of a literary work is a comprehensive research subject to reveal its advantages. Quantitative, structural, and semantic parameters of sentence are invaluable in revealing stylistic characteristic of a work. However, researchers often restrict themselves to investigation of particular or general problems of use of composite sentence syntax.

Anaphora, epiphora, antithesis, reduction, gradation, positional-lexical repetition, parallelism, theme-rheme sequence, etc. as specific syntactic devices and poetic figures are widely used in literary and journalistic speech and are almost not found in official texts.

So, extralinguistic stylistic potential of composite sentence is realized in literature through, first, their structural means, second, their semantic representation in text.

Reductions of compound sentences in literature enliven a narrative, make it more intimate, stress, emphasize. N.A. Gabyshev expressed character's being admired by heroine's voice through reduction (aposiopesis – incomplete, interrupted sentences) of the subject compound sentence: *Киһи кинини сөбүлүү санаа бат хотуна да, эмиэ да киһилии аһынаҕын – икки үөрэнэр кырачаан кыыстаах, соҕотох, хамнаһа кыра буоллаҕа, уонна – итинник куһаҕан майгылаах. Оттон көрүҥүнэн уонна таҥнарынан – хоп курдук дьахтар эбээт, бэл быакаллан, хааман дэйээрэн аастаҕына – эр киһи эр эхараҕа хатаныах курдук.* (***Уонна били күлэрэ!***) 'Though this person is not very liked by people but, still, one feels sorry for her – two daughters she is raising alone, and the salary must be very small, such a bad temper she has but her appearance and how she dresses – a beautiful woman, you can't deny it, when she passes by – no man goes without turning back to look at her. (***And how she laughs!)***'

Here, the sentence is reduced *(Уонна били* [*күлэрэ*) *сыттаҕа!*] or (*Уонна били* [*күлэрэ*) *баардии!*]. The reduced construction expresses admiration of the young man for the heroine's voice.

Positional-lexicalrepetition.In the short story by A.I. Fedorov *Dasha* excess of repetitions is stylistically justified as it expresses supplementary information of expressive character: emotional-expressive meaning of being in love, uncertainty, mysteriousness, e.g.: [*Иван* ***хараҕа хап-хара***], [***баттаҕа эмиэ хара, будьурхай***] (A. Fedorov). 'But his eyes are always so black-black, the hair is curly'; [*Иван* ***хараҕа хап-хара***], [***баттаҕа будьурхай***...] (A. Fedorov) 'Ivan's eyes are black-black and (his) hair is curly-curly'; [*Кини* ***хараҕа хап-хара***], [*оттон* ***баттаҕа буп-будьурхай***...] (A. Fedorov) 'His eyes are black-black and the hair is curly-curly'.

Repeating, lexically not changing compound sentences provide the short story with remarkable tone.

Inversion. Inverse word order is expressive is stylistically significant, e.g.: [*Этэллэр дии*], **(*Харбин куорат отой нуучча куората диэн...*)** (S. Ermolaev). 'As they say, the city of Harbin is in general the city of Russians …';[*Эн эрэ буруйдаахххын*] **(*мин манна кэлбиппэр!*)** (S. Ermolaev) 'Only you are to blame for me having come here!' Subordinate predicative units being inversed become new rheme centers.

Parceling. Parceling is referred to as a phenomenon of the dynamic aspect consisting in dividing a sentence into some independent phrases for expressive reasons, e.g.: *Бу айанныыр харчыбыт этэ дии! Өйдүүгүн дуо?* (***Дойдубутугар айанныыр!..***) (S. Ermolaev). 'This was money that we were supposed to leave for! Understand? (***That we were supposed to leave for the homeland for!..)'***

Using parceling the most important parts of sentences are emphasized, stressed, i.e. creating a new rheme center. In thiscaseparcelinghas emotional-stressing function related to emphasizing emotional-estimative meanings in the utterance – anger, censure, hopelessness. The wide use of parceling provides the work with emotional richness, expressivity.

Parallelism. In linguistics, parallelism is referred to as relation between repeating images, motifs in a literary work expressed in identical order of similar elements, members of sentences in two or several adjacent sentences.

In research on syntax of the Yakut language E.I. Ubryatova, along with numerous types of period, puts out parallelism as the most common formф of composite sentence in the language of poetic folklore. She refers to parallelism as "combination of two or more identically built and often analogue in content sentences in a composite sentence" [3]. Let's illustrate: *Хара умнастаах, хатыылаах лабаалаах, / Хатыгас сэбирдэхтээх хара ыарҕа / Харааран, халыйан барда, / Кэрэ бэйэлээх киистэтин кэппит / Күөх унаар тыа / Күөгэйэн киирэн барда* (P. Oyunskiy, NyurgunBootur) '… black basket willow, having turned black, to spread started, / … green wide forest, to spruce up started'.

N.N. Efremov also notes that parallel constructions in epic build epic formulas, following, as other linguistic means, the law of fixed word order "specification + specified" of the language [1].

E.I. Ubryatova, noting that the presence of assonance and alliteration is not obligatory in parallelism, believes that the latter strengthen harmony and internal connection of the members of parallelism [3]. She points to prevalence of parallelism in Yakut folklore and also notes that "particularly often it (parallelism) can be found by writers closely related to traditions and poetics of oral folklore" [ibid, 566] and that parallelism in works of A.E. Kulakovskiy is the main form of sentence [ibid, 567].

In Yakut prose, parallelism frequently occurs in short stories by P.A. Oyunskiy, e.g.: [*Күдэн оргуйбута*], [*холорук ытыллыбыта*], [*үс үрэх өрүтэ мэҥийбитэ*], [*алта ахпа таҥнары часкыйбыта...*] (P.A. Oyunskiy) 'The fog lifted, the storm raged, three streams together answered, six ravines sharply howled …'

Parallelism can also be expresses by compound sentences: [*Улам-улам* ***(үөрбүт) үөрүүтэ***, ***(кыайбыт) кыайыыта*** *суолталарын сүтэрэн, кини хараҕар күдэн буолан көттүлэр, туман курдук уостан, сүтэн бардылар...*] (P.A. Oyunskiy) 'Gradually all his ***joy that he had gained with conquering, all***

his victories that he had won, lost any sense, started before his eyes melting in the air, disappearing as a fog…'

[*Дьахтар өттө, кыыс өттө — кыайбыттар дьоллоро*, ***(тэлгэнэр) тэллэхтэрэ,*** **(*саатыыр*) *сааталлара*** *буолбуттара*...] (P.A. Oyunskiy) 'And women and girls became trophies of conquerors, broads that they were amusing with on bed, pleasure that they were delighting their lust'.

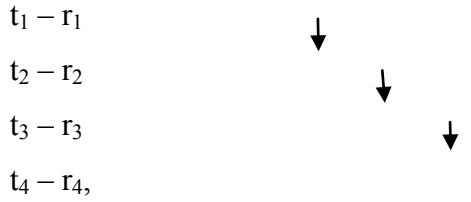
Here, in both cases assonance strengthens consonance and internal connection of the members of parallelism.

Parallelism can be considered a specific syntactic means of the Yakut literary language where parallel connection is usually emphasized by synharmonic arrangement of phonemes which affects the reader aesthetically most of all. Parallel constructions provide a literary work with high style, a special emotional tone.

Theme-rheme sequence.Communicative continuity of components is important for text. Each utterance in regard of communication is related to the previous one and advances the message from known to new, from given, original to the core. As a result, a theme-rheme sequence, chain forms. Text as a communicative unit presupposes such connection of utterances where each following one contains some minimal information already available in the previous utterance [4].

Each utterance moves the information forward, departing from the previous one which is expressed through repetition of the given information [ibid, 30].

N.S. Valgina represents structure of such an inter-phrase unity and its communicative prospects:



where *t* and *r* are the terms of actual segmentation *theme* and *rheme*. New information is represented by rheme constituents of an utterance, moving information forward, with rheme constituents fixing the starting points of utterances, they put together separate utterances connecting, integrating them, and providing continuity – informative, communicative, structural [4]. Rheme of the previous utterance becomes repeated information in the theme constituent of the utterance: r_1 gives t_2; r_2 givest_3, etc. So, theme-rheme sequence shows accumulation of communicated information.

In N.E. Mordinov's *Motuo* there two points where the author arranges an inter-phrase unity through theme-rheme sequence. In the first case, theme-rheme

sequence proceeds through simple sentences: *Мин оҕо эрдэхпинэ* ***күнаайы*** *онон сылдьар этим.* ***Күн аайы****. Ол эрээри, хочо дуу, алаас дуу иннибэр эмискэччи нэлэс гына тустэхтэринэ, мэлдьи үөрүүлээхтик соһуйар буоларым. Илиибин былас таабытынан халдьаайыны тацнары* ***сүүрэр буоларым. Ол сүүрэн иһэн*** *хайдах эрэ* ***саталлаахтык өрө ыстанан кэбиспит киһи,*** *алааһы-хочону үрдүнэн элиэ тии көтөн талбаара туруох курдук этэ.* ***Саталлаахтык эрэ өрө ыстаммыт киһи...*** (N.E. Mordinov – Amma Achchygiya)

These repetitions emphasize lyricism of the text. They become "steps" through which the authors give the reader an opportunity to "climb up" higher feelings experienced by the character.

In the second case, theme-rheme sequence is expressed by compound sentences of time, e.g.: *Ким киирдиҥ бу?..*[*Мин оҕом Мотуо түүн үөһүн саҕана маны или ибэр туттаран кэбиспитэ уонна ... уонна сарсыарданан,* (***халлаан саҥардыы сырдаан эрдэҕинэ...***) ***баран хаалбыта...***] (N.E. Mordinov – Amma Achchygiya)

Ол киэһэттэн бэттэх сүүрбэ төгүрүк сыл ааста. (***Халлаан саҥардыы сырдаан эрдэҕинэ***) (***кэрэ, сэмэй кыыс оҕолор*** *кэлбэт гына «****баран хаалбат»*** *буолалларын туһугар*) [*дьоллоох олоҕу тутар үгүс дьону кытта үөрэнэн, үлэлээн, мин киэҥ сирдэринэн сырыттым...*]

In the first case, the compound sentence of time (***халлаан саҥардыы сырдаан эрдэҕинэ...*** 'when it was starting to dawn') is used in the monologue of grandma Motuo in direct meaning. But in the second case, the repeated by the narrator compound sentence (***халлаан саҥардыы сырдаан эрдэҕинэ...*** *сиэттиспитинэн* ***бардар бара туруоххут*** 'and you'll go holding hands') sounds as a blessing. This author's implication is stressed by parallel connected repetitions expressed by a starting phase of action.

According to N.S. Valgina, the choice of "verbal clothes" for representing repeated information in each consequent theme component of utterance is objectively substantiated and turns from an intuitive process into a consciously controlled and managed one [4].

So, in the short story by N.E. Mordinov – Amma Achchygiya compound sentences of time arrange theme-rheme sequence that provides internal integrity.

Reduction of compound sentences is widely used by N.A. Gabyshev; positional-lexical repetition is used by A.I. Fedorov; inversion and parceling are used by S. Ermolaev; parallelism is found by P.A. Oyunskiy; theme-rheme sequence is used by N.E. Mordinov.

Conclusions. Thereby, composite sentences with expressive means such as reduction, positional-lexical repetition, inversion, parceling, theme-rheme sequence are natural constituents of style in literary texts.

Thanks

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俄罗斯企业社会责任形成的现代条件
MODERN CONDITIONS FOR THE FORMATION OF SOCIAL RESPONSIBILITY OF BUSINESS IN RUSSIA

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注解。 本文分析了企业社会责任领域社会实践的主要方向。 分析和评估在俄罗斯运营的一家公司的活动。 该论文证明，公司的企业社会责任具有经济效益和战略合理性。

关键词：责任，企业社会责任，企业社会责任，社会报道。

Annotation. *This article analyzes the main directions of social practices in the field of corporate social responsibility. The analysis and assessment of the activities of one of the companies operating in Russia. The paper proves that the company's corporate social responsibility is economically efficient and strategically justified.*

Keywords*: responsibility, social responsibility of business, corporate social responsibility, social reporting.*

Speaking as the main link of the economy, any organization, as an economic entity, has a certain degree of isolation and has in the property, economic management or operational management of certain movable and immovable property, material and financial assets. However, their isolation cannot be complete and exclusive, especially in the part of the obligations that they have to their employees, the state and society as a whole.

A significant role in the development of modern society and the practice of corporate governance is played by the social responsibility of business, which defines the organization's obligations to contribute to the economic development of society, improving the quality of life of its employees and the local community.[1]

In modern conditions of development of market relations and the strengthening of globalization processes of world economic relations, Russian business is still in its infancy.

[1] Corporate social responsibility: questions of theory and practice. Ed. Perekrestov D.G. Povarich I.P. Shabashev V.A. [Electronic resource]. - Access mode: http://www.monographies.ru/ru/book/section?id=4587

Sustainable development of business in the long term is possible only if it is able to timely perceive the basic principles of corporate social responsibility. Then, in this case, business can become an accomplice in socially important areas of society, create and maintain decent working conditions for its employees, increase loyalty and strengthen competitiveness in the market.

Based on the analysis of the annual reports of the company "Star" for 2015-2017.[2], including on the social responsibility of business, we will make an assessment for each of the directions of social policy.

The evaluation was conducted on a 5-point scale (from 1 to 5). The results are presented in Figure 1.

[2]Annual corporate report of the company "Star" for 2015, 2016, 2017 (the appeal date 01.02.2018).

Направление	Показатель	Эталонное значение	Экспертная оценка	Простой индекс $K_i = \frac{K_ф}{K_{эт.}}$
Институциональное оформление СОБ	Документационное закрепление социальной политики с подробной детализацией	5	4	0,8
	Наличие специального отдела, отвечающего за реализацию социальной политики	5	5	1
	Наличие коллективного договора	5	4	0,8
Система учета социальных мероприятий	Наличие ежегодных отчетов по КСО, соответствующих лучшим международным стандартам	5	3,5	0,7
	Внедрение международных стандартов социальной отчётности	5	4	0,8
	Оценка эффективности осуществляемых социальных инвестиций	5	2	0,4
	Примеры социальных программ	5	5	1
Комплексность социальных инвестиций	Развитие персонала	5	5	1
	Охрана здоровья труда	5	4	0,8
	Природоохранная деятельность и ресурсосбережение	5	5	1
	Поддержание добросовестной деловой практики	5	5	1
Комплексная интегральная оценка конкурентоспособности (∑K_i)				0,93

Picture 1.

Initial assessment of Star social responsibility

As we see, according to the assessment data, Star's social responsibility has the strongest positions in terms of the complexity of social investments. This means that the company's social responsibility extends to the main areas of its interaction with contractors and the local community.

The weakest point is the system of recording social events. The main problem here is focused on the lack of transparency of financial information with regards to the implementation of corporate social responsibility (CSR), as well as the lack of an assessment of the economic efficiency of social investments.

A significant drawback is the limited number of users of reporting information. The remaining indicators are the value of "average" or "above average." The total integrated social reporting index is 0.93.[3]This, in general, indicates a fairly high level of social responsibility and indicates that the main problem is the accountability and transparency of the information provided.

In general, it should be noted that the activities of the Star organization in the field of social responsibility are regular, and its basic principles are not only formally declared, but are also reflected in the daily life of the company's employees and those around them.

Thus, the so-called "quality" indicators of the effectiveness of Star social responsibility were considered. Next, it is advisable to refer to the study and evaluation of its quantitative indicators.

A quantitative assessment of the effectiveness of social responsibility of business in its most general form is based on the correlation of the benefits (results) obtained as a result of carrying out socially-oriented activities and the costs incurred for their realization (social investments). It should be remembered that not all the results and benefits are quantifiable, and some do not manifest themselves only in the long term.

Along with the assessment of the company's social responsibility, in the course of the study, a survey of Star personnel was conducted in Moscow.

The study was conducted using the author's sociological survey in April 2018. Star employees took part in the study, the sample was 173 people. The main goal of the research was to study the staff's opinion on the company's social responsibility.

69% of the respondents consider the provision of safe working conditions, production of high-quality products and social protection of employees as the most significant characteristics of Star's social responsibility.

Evaluating the benefits of business while respecting the principles of social responsibility, respondents rated the provision of positive public image, growing public confidence in the company's activities, expanding the customer base and increasing the loyalty of the company's staff most highly.

[3]Mironov M.G. Your competitiveness [Text]: Scientific book; Moscow; 2013

Employees of the company consider the development and support of personnel (62%) as the main direction of social responsibility, the following in the ranking of areas are honest business practice and development of the local community (18%). Evaluating the factors that hinder and promote the development of the company's social responsibility practice, its employees - the respondents identified, on the one hand, the lack of effective support and encouragement of socially responsible companies from the state (48%), and on the other hand - the promotion of best practices of social responsibility and information population about social projects and programs of companies (26% each).

The overwhelming majority of respondents (57%.) are aware and feel the social responsibility of their company towards personnel, 35% - towards society and authorities, and 8% do not consider the company socially responsible.

Summarizing the results of the study, we can say that, in general, Star company approaches its business very responsibly. It cares not only about its economic indicators, but also about consumers, suppliers, the environment and society as a whole, and puts the concept of social responsibility of business into the basis for developing a strategy for its development. Social responsibility of business is realized mainly in three directions: ecology, employees and society as a whole. Therefore, it can be said that the company's corporate social responsibility is economically efficient and strategically justified. In addition, it enhances the company's image in the eyes of external and internal stakeholders, and also serves as the basis for sustainable business development in the long term.

However, the results of the study allow us to offer several recommendations for improving the practice of corporate social responsibility for Russian companies:

• A feature of Russian companies, in contrast to Western representative offices, is the lack of full access to social reporting on the corporate social responsibility of a company. The preparation and publication of social reporting in accordance with international standards can be not only a progressive form of corporate social management, but also an important tool for capitalizing and developing the business reputation of companies.

• Along with the development of internal social responsibility aimed at personnel, increasing the efficiency of work, dedication of the company, attractiveness in the eyes of potential employees, it is necessary to develop external social responsibility, which allows to increase the authority of the company in the territory of residence and customers, government and other stakeholders.

Summing up and talking about the latest trends in the development of corporate social responsibility in Russia, I would like to say about the significant impact of corporate social responsibility on the formation and initiation of fundamentally new large-scale projects and programs in the field of sustainable and social development of the country.[4]

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现代克里米亚俄罗斯旅游业的创新发展方式
INNOVATIVE WAYS OF DEVELOPMENT OF RUSSIAN TOURISM IN THE MODERN CRIMEA

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抽象。 本文反映了其“旅游领域”对国家经济的关键作用。 可以描述为在活动的所有领域中全球变化的区域需要详细的评估和描述。 克里米亚是一个由于其政治和历史决定而彻底改变地区的明显例子。 这项工作的主要目标是从该地区，最近邻地区和整个俄罗斯之间的文化交流的角度评估开放新建筑物 – 克里米亚桥的重要性。 这对于旅游业的创新发展和改善该地区的形象极为重要。

关键词：克里米亚，克里米亚桥，民族传统，事件旅游，文化多样性。

Abstract. *The paper reflects key functions of the country's economy performed by its' tourism sphere. A region which could be described as being under global changes in all of the fields of the activity requires a detailed evaluation and description. The Crimeais a bright example of drastically changing region due to its political and historical decisions. The main goal of the work is to evaluate the rate of importance of opening of a new architectural object - Crimean Bridge - from the point of view of cultural exchanges between the region, both closest neighbor territories and the whole Russia. It is extremely important for innovative development of tourism and improving the image of the region.*

Keywords: *Crimea, Crimean Bridge, national traditions, event tourism, cultural diversity.*

One of the key areas of the economy of our country is tourism. According to the latest UNWTO World Tourism Barometer, "...international tourist arrivals worldwide increased by 7%in 2017, reaching a total of 1 billion 322 million people [13]. This direction of the economy plays many functions: from entertainment and recreational to educational and peacemaking, as it forms the friendliness of representatives of various regions of the country and foreign citizens in relation to the receiving party and vice versa. For the Crimea, this is especially important because the region is famous for its cultural diversity and historically rich ethnic composition of the population.

In connection with the opening of the Crimean Bridge, a new transport connection of the mainland of Russia to the peninsula, an urgent need to analyze the tourist sphere of the Crimean region appears.The purpose of this work is to assess the degree of importance of opening a new transport and architectural object -Crimean Bridge in terms of the exchange of cultural features between the region, its neighboring territories and all of Russia, as well as the innovative development of the tourism industry in Russia, which enhances the image of the region.

As a basis for conducting a scientific study, the works of such specialists in various fields of science studying the peculiarities of tourism development in the Crimea were taken: V.A. Logachev, E.V. Chernobay, V. Marinin, V. Komarova, etc. For analysis conditions of the development of the Crimean region in connection with changes in political and economic conditions was used information of statistical services, including the Public Opinion Foundation, as well as unique data on the project, presented on the official site of the construction of the Crimean bridge. On the basis of the studied data of the UNWTO and the news services, the main trends in the development of the Crimea in the conditions of the construction and opening of the Crimean Bridge are determined.

The study was conducted on the basis of such scientific methods as synthesis, analysis, and probabilistic-statistical assessment; axiomatic method; empirical research.

The political and economic climate is not the only change that entailed a referendum on the withdrawal of Crimea from Ukraine and a petition to the head of the Russian Federation to annex the peninsula. An important task along with strengthening the economic situation of the region is to popularize the political and cultural aspects of its history.According to surveys of the Public Opinion Foundation, 27% of respondents expressed concern that the annexation of Crimea to Russia had a negative impact on the lives of ordinary citizens [9]. Despite the general positive mood of the citizens of the Russian Federation regarding the return of Crimea to the Russian Federation, it is worth considering the opinion of the opposition-minded citizens of the country.However, 67% of respondents to the question of whether the annexation of Crimea will benefit the country as a result responded that they would benefit. At the same time, against the background of positive sentiment in general, there is a certain stratum of the population in Russia who believes that Crimea was annexed to the Russian Federation recklessly, mistakenly believing that people living on the peninsula are culturally and historically belonging to the Ukrainian people.

According to current census data of Russians, 68% live in Crimea [11,12]. Who is the other 32%? These are Ukrainians, Crimean Armenians, Crimean Tatars, Karaites, Krymchaks, Greeks, Poles, Mordovians, Georgians, Germans, and many other nationalities [11,12]. Positive conditions for the development of tour-

ism and the economy in Crimea have developed historically [2].Each nation in the region equally develops a national identity and is ready to share with the surrounding features of its unique and ancient cultures. For example, the Crimean Tatars, Krymchaks and Karaites do not exist anywhere in the world.According to the legislation of the Russian Federation, each national minority equally has the right to develop national identity and preserve culture, which in turn means popularizing knowledge about the national characteristics of ethnic groups living in a certain territory [3].

It is raising of the awareness of all residents of Russia traveling around the Crimea, about the inhabitants of the region, about its history and cultural features, will increase the interest and respect for the historical steps of the region.This will expand the focus of the tourist product (new themes and forms of tourism). Considering the cultural potential of the region as a basis for creating thematic routes, excursions, expositions and folk arts events, it is worth paying attention to the fact that the development of event tourism projects will provide an opportunity to increase interest to the Crimean region.

Nowadays, the main tourist destinations of the Crimea are associated with summer holidays and the warm season, which lasts from March to October, as well as with the heroic military past and the present of the Crimean cities. Interest to the peoples living in Crimea, as well as in their cultural and historical values will potentially increase the flow of tourists and extend the duration of the tourist season.

Due to the fact that each nation professes its religion, it is distinguished by its unique national cuisine and language, in the Crimea there is a great opportunity to organize cultural centers, museums, interactive clubs, fairs and master classes devoted to national cuisines, holidays, costumes and history of nations living in the Crimea.This will attract visitors: specialists and people interested in national cultures, as well as representatives of similar beliefs or nationalities, in order to gain inexpressible experience and impressions from the meeting and exchange of cultural heritage.

Due to the fact that the message with the Crimea has already been established by air, as well as by roads, potential visitors of the region have the opportunity to visit Crimea by car, having planned for themselves not only visiting museums, beaches and palaces, but also new events that will immerse guests of the peninsula in the atmosphere of authentic Taurida. This type of tourist attraction is characterized by a mixed type, because guests of the city choose to visit not only historical sites, but also certain events held in the region (Chrysanthemum Ball in Nikitsky Botanical Garden, Bike Show, Navy Day in Sevastopol, gastronomic and historical festivals and much more). The main feature of modern visits is that most often, planning a vacation, travelers choose as a basis: a special date, event or festival

and build the whole trip based on it. After the commissioning of the Crimean Bridge, the increase in demand for the Crimean tourist product in connection with the launch of the road to the peninsula says Alexei Chernyak, the head of the Committee on the Sanatorium-Resort Complex and Tourism of the Parliament of the Republic of Crimea, [7]. According to him, the eastern regions of the peninsula in the tourist season of 2018 took the leading position in popularity. The most surprising fact was that not only Yalta, as usual, was also popular, but also Kirov district, BolshayaFeodosiya and Koktebel, which were less known to holidaymakers.

According to the infographics of the official site of the Crimean Bridge project [8], the region is waiting for economic recovery and price stabilization due to lower prices for the delivery of building materials and other goods and products from the mainland. It is important to note that the general climate created by the well-established communication of Russia with the Crimea will contribute to the cohesion of the country's citizens and their desire for spiritual unification and exchange of experience.

Despite the controversial rumors [4,6], the opening of a road connection through the Crimean Bridge opens up unlimited opportunities for all areas of the region's activities. It is important to take advantage of these opportunities. Due to the fact that the bridge will allow access from the nearby regions to the Crimea much faster, it is worth starting to develop a hospitality strategy that is adequate to the capabilities of the Crimean infrastructure, which will have the physical ability to accept an increased number of guests and offer a sufficient number of parking spaces to those who want to come to Crimeaby car.

In order to effectively distribute funds that will flow to the region along with the growth of tourist flow [8,10], it is worthwhile to begin activities to expand the tourist season and introduce innovations. Innovations in this field represent new areas of tourism that meet the interests of modern travelers.

These days, the advanced direction of tourism is event tours, which cover the whole range of important events held throughout the world [1]. In his work ArutyunovaZh.H. asserts that event tourism encompasses such a diverse audience of tourists that among the events held "there will certainly be something interesting even for those who are not touched by the comfort of narrow Swedish streets or the greatness of ancient temples.It is difficult, for example, to find a fan who does not dream to attend the World Cup finalspersonally, and a rare movie fan never wanted to be at a film festival. Not to mention that any of us will surely be attracted by the opportunity to take part in a colorful carnival and fully immerse themselves in the culture of the country"[1].

Thus, the most promising regions that can become platforms for various thematic events will be those that, by historical and cultural parameters, represent the richest source of ideas and opportunities to attract visitors. Climatic condi-

tions of the region that will allow holding conferences, festivals, film screenings and exhibitions for a long period (8-9 months a year) will further increase the chances.Climatic conditions in the Crimea and Sevastopol are suitable not only for regional and national events, but can also allow for carrying out on the Crimean sites, provided that the infrastructure is sufficiently developed, events of a higher level and scale. Event tourism in combination with business tourism will create an excellent basis for the development and effective functioning of tourism and other sectors of the economy of the Crimea region throughout the year.

If we compare the two priority areas that need to be promoted in the region for its development, we can come to the conclusion that the image of the territory is directly related to innovative introductions in tourism. This is due to the fact that the image of the region covers all spheres of its activity, including the development of tourist attractiveness, the positive dynamics of development of the economic and other spheres of the regional economy.

The development of tourism in the region is one of the ways to quickly form a positive image of the territory as a platform for life, work and leisure. This is possible due to the introduction of innovative areas and technologies of business, in particular in the form of creating tourism products at the level of demand of modern society, the use of which will lead to the recognition of the region as corresponding to modern trends and interests of society.

The Crimean region is known for its rich history, heritage, mild climate and cultural diversity, which creates the basis for the successful integration of the region's national traditions into the modern multicultural society of the country. At the same time, establishing relations between the region and mainland Russia makes it possible to develop not only mutual respect for all citizens of the Russian Federation and their cultural literacy, but also one of the leading sectors of the country's economy - tourism.

Thus, the Crimean Bridge is a unique object of architecture, which redirected the course of interaction of the region in all areas of activity. Moreover, the construction of the Crimean Bridge was the impetus for the exchange of cultural characteristics, provided additional communication with the region, which in turn creates the necessary conditions for the maintenance and development of the economy and opens the field for work on creating a favorable image of the region. As a result of the study, the following conclusions were made:

• The opening of the Crimean Bridge, a new unique transport facility on the mainland of Russia with the peninsula, highlights the need for a comprehensive analysis of the main components of the tourism sector of the Crimea region and the attraction of innovative ways to develop the industry.

• The most promising approaches to the development of tourism activities are the creation of platforms for new thematic events based on the adaptation of local

historical and cultural features of the region. Such events should be natural for a particular region events, then they will provide increased opportunities to attract visitors.

• An important task, along with strengthening the economic position of the region, is to popularize the political and cultural aspects of its history.

• The climate of Crimea and Sevastopol, which provides a rich recreational potential for 7 months, is favorable both for holding regional and national events at the Crimean sites, as well as events of a higher level and large scale, provided the necessary level of infrastructure development.

• Innovative introductions in the field of tourism ensure the formation of the most attractive image of the territory.

• Development of innovative approaches in the development of tourism in the region, including event tourism is one of the promising ways to quickly form a positive image of the territory, attractive from the point of view of living, working and relaxing conditions. At the same time, it is extremely necessary to introduce information directions and business technologies, the application of which will lead to the recognition of the region as corresponding to modern trends and public interests.

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牙医职业责任保险的前景与法院风险分析
PROSPECTS OF PROFESSIONAL LIABILITY INSURANCE OF DENTISTS AND ANALYSIS OF COURT RISKS

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注解。 考虑到2013 – 2017年牙科病例司法实践的研究，本文讨论了俄罗斯联邦医生的职业责任保险问题。 对医生保险的主要可能性和主要司法风险进行了比较分析。 提出了医疗组织通过法院判决进行的支付结构研究的结果。 经确定，97%的索赔中包含了精神损害赔偿要求，牙科治疗费用的回报占索赔总数的73%。

关键词：牙科法庭实践，医生职业责任保险，牙科保健质量。

Annotation. *The article deals with the issues of professional liability insurance of doctors in the Russian Federation, taking into account the study of judicial practice in dental cases for 2013-2017. The comparative analysis of real possibilities of insurance protection of doctors and the main judicial risks is carried out. The results of the study of the structure of payments carried out by medical organizations by a court decision are presented. It is determined that the claims for compensation for moral damage were contained in 97% of the claims, and the return of the cost of dental treatment in 73% of the total number of claims.*

Keywords: *court practice in dentistry, insurance of professional responsibility of doctors, quality of dental care.*

The Institute for Professional Liability Insurance (PLI) for medical workers, whose postulates were laid down in 2011 by Federal Law of 21.11.2011 No. 323 “On the Principles of Health Protection of Citizens in the Russian Federation” (Article 79), is intended to be the guarantor of the rights of medical workers to insure the risk of their professional responsibility and a protective mechanism for patients.

The study of scientific publications devoted to this topic, definitely gives you the opportunity to talk about the positive assessment of the very idea of the PLI of doctors and awareness of the significance, effectiveness and necessity of introducing the mechanisms of the PLI of doctors into practice [1-5]. Analysis of the results of sociological research among patients, doctors, students of medical

universities shows a positive attitude of society towards the introduction of doctors of PLI [6,7]. However, despite this, to date, this type of insurance has not become mandatory in the Russian Federation and is carried out only in the form of voluntary insurance. The share of contracts for the PLI of doctors according to insurance companies is extremely small. According to the INGOSSTRAH insurance company, 50-60 contracts of PLI of doctors are concluded per year, and the main clients are plastic surgeons, dentists, gynecologists, ophthalmologists, pediatricians and general surgeons.In the structure of premiums, the main position for 2017 was compulsory third-party liability insurance (25.80%), the share of voluntary medical insurance is 14.33%, and the article which PLI of physicians is determined to is 3.42% of the total premium collection [8].

Our study was initiated by searching for an answer to the question about the low demand for the services of PLIdoctors among the medical community in the Russian Federation. In particular, insurance products offered at the Russian market for doctors PLI s were reviewed and court practice related to defects in dental care and medical errors over the past 5 years was studied. The purpose of the study was to determine the adequacy of the offers of insurance companies to the dental needs.

The materials were the contracts of the 10 leading (top) insurance companies of the Russian Federation (RF), which had the highest reliability ratings of international agencies and the collection volumes of which together constitute 75% of the total premium collection for 2017 [8]. To study the judicial practice, all decisions and definitions for 2013-2017 published on the official websites of the courts were selected. After the criterial selection, the study involved 1314 court decisions of courts of general jurisdiction of all regions of the Russian Federation.

Results and discussion

In studies of the contracts of the PLIs of doctors, a significant discrepancy was revealed in the conceptual apparatus, the formulation of the concepts “insurance case”, “defect of medical care”, “insurance premium” and “insurance contributions”; in determining the objects of insurance, tariff rates and payment conditions. The lists of exclusions from the scope of insurance liability raise questions, in particular, for example, such exclusions:

- Damnification, “the cause of which was a professional error, which could not be determined, considering the state of the science and technology at the time of the insured activity”;
- Non-compliance of the obligations with the contractwithin the terms specified therein or the provision of a medical service to the patient, the quality of which does not comply with the terms of the contract, mandatory requirements and / or the patient's ideas about the final result of the service, etc.

In addition, in the contracts of PLI doctors it is indicated that harm is not reimbursed in terms of requirements for payment of fines, penalties, interest (arising from the failure to perform or improper performance of the contract for the provision of dental services) and the return of the cost of services rendered. Limits of liability per one insured, injured or insured event are not always justified or compensation for court costs and expenses for experts is provided. It was these circumstances that provoked the need to study judicial practice in order to determine the structure and volume of basic payments.

The analysis of court decisions on dental matters allowed us to form a list of basic payments according to the frequency of occurrence, the size and percentage of satisfaction of patients' claims by the courts. In a comparative analysis of the basic payments and conditions of the PLI doctors determined:

- In the basic contracts of the PLI doctors do not have the possibility of compensation for moral harm, and in the existing judicial practice of dentistry such compensation is requested in 97% of claims, it is satisfied by the courts in 53% of those requested, i. e. in every second case. The growth rate of the claims of patients satisfied by the court for compensation for moral harm was 28% over 5 years. The size of payments determined by the courts for the same period increased by 50%. It should be noted that there is a possibility of expanding the contract in terms of compensation for non-pecuniary damage with an increase of tariff rates, but the existing limits to 100 thousand rubles. often do not cover the compensation determined by the court, the maximum size of which reaches 2 million rubles.
- Payments for various types of penalties for violations of the rights of the patient, which are an exception to the scope of insurance liability, were awarded to medical organizations in 17% of the total number of cases, and were requested by patients in 35% of claims. At the same time, the maximum amount of payment was also almost 2 million rubles.
- The requirements for termination of the contract and return of the cost of dental treatment were contained in 73% of cases and in every third case from the requested (37%) were satisfied.

Negative attitudes are caused by the absence in contracts of some insurance companies of the possibility of pre-trial settlement of conflicts between a patient and a medical organization, when an insurance case recognizes only claims for damages to health and life in court, or a court decision that has already entered into force on the obligation to compensate for harm health and life of the victim. The main task of the PLI is to resolve the conflict at the pre-trial level, which favorably affects the reputation and spends less resources of the medical organization. Certain difficulties cause problems of compensation for harm to health in the absence of defects in the provision of medical care.

But, despite the existing difficulties, we are all well aware that insurance of professional responsibility of doctors is the most civilized way to solve problems, and this is proved by the practice of developing civil law relations in various countries of the world.

According to our research over the past 5 years, the increase in the number of cases where the patients' requirements were fully or partially satisfied was 4.13% (from 53.54% in 2013 to 55.75% in 2017). The sum of total payments determined for medical organizations, on average, is 14 times higher than the cost of dental services rendered.Moreover, for surgical dentistry this indicator was significantly higher, total payments 92 times higher than the cost of services, for therapeutic dentistry - 19 times, for orthodontic - 8 times, and for orthopedic and implantological care only 2-3 times [9].

Taking into account the negative dynamics of the annual increase in the number of cases relating to poor quality dental care and the growing number of lawsuits that are recognized as justified, the development of the institute of medical professionalism in the Russian Federation should be considered an extremely urgent task. But a rational, informed decision lies in the plane of the transformation of the regulatory legal acts governing the process and the state support of the compulsory software for doctors.

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威利斯环的解剖变异与脑血管疾病发展的关系
THE RELATION BETWEEN THE ANATOMICAL VARIATIONS OF THE CIRCLE OF WILLISAND THE CEREBROVASCULAR DISEASE DEVELOPMENT

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注解。 影响全世界约900万人的脑血管问题的原因之一是大脑底部动脉环的发育和结构的异常。 因此，威利斯圈的船舶分布差异问题至今仍然具有高度相关性。 了解动脉床分支的形态特征，以及相应的大脑各部位血液供应的形态特征，为理解脑循环的发育机制以及可能性提供了关键。 成功的显微手术干预。

关键词：Willis环，闭合和闭合形式，动脉瘤，脑血管疾病（CVD）

Annotation. *One of the causes of cerebrovascular problems that affect about 9 million people in the world are the anomalies of the development and structure of the arterial circle of the base of the brain. Therefore, the question of the variance in the distribution of the vessels of the Circle of Willis remains highly relevant today. The knowledge of the morphological features of the distribution of the branches of the arterial bed and, accordingly, of the blood supply to various parts of the brain, provides the key to understanding the developmental mechanisms of the cerebral circulation, as well as the possibility of successful microsurgical interventions.*

Key words: *Willis circle, closed and unclosed forms, aneurysms, cerebrovascular diseases (CVD)*

The purpose of this research was to study the variants of the distribution of the vessels of the Circle of Willis, and their relation with the development of the CVD.

Introduction: The classical anatomical structure of the arterial bed of the human brain is reflected in the "International Anatomical Terminology" and represents the anastomotic system that connects the two arterial basins: the internal carotid artery and the vertebrobasilar arteries located on the base of the brain. Willis circle according to Trushel N.A. (2015) in 34.35% has a typical structure [9]. Hypoplasia of the Willis circle arteries occurs with a frequency of approximately 60% of cases (Osborn 1999) [14]. The atypical structure can have both individual arteries and a whole complex of vessels belonging to the anterior and / or posterior semicircle of the circle of Willis [3].

A large component of the factors influencing the formation of various variants of the arterial circle of the base of the brain is genetically determined(Belenkaya R.M.1979). So, in the case of the absence of reduction of embryonic vessels - anastomoses during the laying of the arterial bed of the base of the brain, primitive auditory, hypoglossal and trigeminal arteries appear. The appearance of the latter, the most frequent option - up to 1% [14]. The constitution of the skull can influence the structure and distribution of the arteries: thus, the occurrence of the classical structure of Willis circle in brachycephalus is 1.3 times higher than in meso-and dolichocephalus [8, 11].

A. Gorbunov indicates a change in the morphofunctional state of the arterial bed during ontogenesis, which is manifested in the tortuosity of the arteries course and looping, and occurs 2 times more often in the age group from 41 to 50 years old than in the group aged 22-30 years [2].

Based on a variety of different options for the structure of the arterial circle of the large brain, it is customary to divide it into typical and atypical (variants). Non-classical variants are represented by the following forms: closed and unclosed (by the presence of the posterior and anterior connective arteries), with asymmetrical arteries diameters on the right and left, with an atypical onset of arteries, as well as various types of vessel formation (trifurcation, quadrification) or structure (hypoplasia, aplasia) and other parameters [1, 6, 12, 15].

Material and Methods: The research was conducted on 22 fixed preparations provided by the Department of Human Anatomy of the NSMU. Methods of acute preparation, as well as morphometry were used (measuring the diameter and length of the arteries).

Results and discussion: The following data were obtained during the study. The typical structure of the Willis circle was observed in 18.2% of cases, of which open-ended with the absence of the right posterior communicating artery (PCoA) - 13.6%. Non-classical options, to a greater extent, were associated with the asymmetric structure of the circle. Asymmetry of arterial diameters accounted for 31.82%, and vascular hypoplasia was found in 59.09% (among them, vertebral artery, anterior connective artery (ACoA), anterior cerebral artery (ACA), PCoA

in the majority - 27.3%). Aplasia of the anterior, posterior connective arteries had an equal frequency and amounted to 27.2% in total. In the absence of ACoA, the anterior cerebral arteries were anastomosed at one point and then dispersed again (13.6%). The Recurrent artery of Heubnerdeparted from the post-communicative segment of ACA and was found in 13.6%, with a greater frequency for the left half of the Willis circle. The anterior connecting artery (ACoA)was duplicated in 13.6%, and with the same frequency there was a variant of its fork-like bifurcation, facing the right side. The rarest variants were: funnel-like beginning of theposterior communicating artery near the middle cerebral artery (MCA), ACoA fenestration and posterior trifurcation of the internal carotid artery (ICA) - 4.55% each. The atypical structure of the cerebellar arteries revealed different levels of anterior inferior cerebellar artery discharge from the basilar artery, as well as the presence of 2 upper cerebellar arteries.

During the study the most atypical variant of the Willis circle which may have contributed to ischemic brain damage was revealed. There was observed rear trifurcation of the right ICA. HypoplasticPCoA (the right one departs from the basilar artery), the right ACA and two ACoAwere found. So in the case of occlusion of the right ICA, the entire right half of the human brain cortex will undergo ischemia. Inflow from the vertebrobasilar basin or from the left ICA will be difficult due to hypoplasia of the connective arteries. We can not exclude a high risk of rupture of the arteries with a sharp rise in blood pressure.

Morphometric measurements of blood vessels, such as the diameter of the arteries and the length of the arteries up to a certain segment or to the bifurcation point, corresponded to the values given in the scientific studies of V. V. Krylov (2011) and N.A. Trushel. (2015) [6, 9]. The average value for each measured artery was within the limits indicated by these authors. However, isolated deviations were observed: thus, the outer diameter of the basilar artery exceeded the mean values by 1.26 times (5.5 mm versus 4.37 ± 0.56), and the outer diameter of ACA was 1.39 times (4.1 mm versus 2, 95 ± 0.65). The length of the PCoA (25 mm) was 1.8 times the average values (13.82 ± 3.89).

The relationship between the anomalous version of the structure of the Willis circle and the development of CVD is obvious. Among those suffering from human brain vascular diseases in 66.7% of cases, the atypical structure of the arterial circle of the brain was observed [2]. I. Kirichenko (2010) points to the role of circulatory disorders of the vertebrobasilar system in the development of auditory dysfunction [5]. Lavrentyev A. notes among the causes of brain ischemia, pathological changes (including tortuosity) of large extra and intracranial arteries (2011) [7]. In a scientific study Trushel N.A. (2015) unilateral aplasia of PCoA was found in 25.0%, bilateral in 20.0% in patients with CVD [9]. Cerebral infarction (up to 24%) with ischemia of a vast area of the brain results in occlusion of the internal

carotid artery during its posterior trifurcation. The structure of the arterial network affects the development of such vascular lesions as aneurysms. Dzhindzhikhadze R.S. (2017) gives the frequency of localization of giant vessel aneurysms of the base of the brain:ACoA– 31.1% and MSA - area of division into branches - 33.3%, PCoA - 17.7% [4]. Aneurysm ruptures lead to hemorrhages with the subsequent development of cerebral hemorrhagic infarction. Atypical variants of the circle of Willis, as a rule, leading to a pathological change in the structure of blood vessels, can develop in the CEH. This must be considered for prediction and for the prevention of pathological disorders.

Conclusion: The variant anatomy of the circle of Willis is notable for its considerable diversity. A typical arterial circle of the brain occurs with a frequency of about 19% of cases. Abnormal variants (such as hypoplasia, aplasia) lead to disruption of the brain blood supply, hemorrhages, and as a result, to the development of cerebrovascular problems, the growth of which is observed today. Knowledge of the features of the distribution and structure of the arteries of the base of the brain is important for the prevention, prognosis and effective treatment of various cerebrovascular disorders.

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非洲尖锐鲶鱼的生殖系统的发育（Clariasgariepinus，Burchell，1822）在个体发育中的发育。

THE DEVELOPMENT OF REPRODUCTIVE SYSTEM OF AFRICAN SHARPTOOTH CATFISH MALES (*CLARIAS GARIEPINUS, BURCHELL, 1822*) IN ONTOGENESIS

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注解。本文介绍了非洲尖锐鲶鱼雄性生殖系统的研究结果，从出生后发育的早期阶段开始直至2岁。结果显示，在男性青春期，性腺指数增加了6倍。在此期间，性腺发育已经从I期进入成熟期。在9个月的发育中，性腺的质量从0.07g（在2个月时）增加到9-10g（在9个月龄时）。在非洲鲶鱼的人工繁殖条件下，完全性腺和精子成熟永远不会发生，因此激素刺激是繁殖所必需的，这确保了生殖细胞成熟到V阶段，在此阶段可以进行受精。根据细胞学和组织学标准，男性的生殖系统可以从9个月大时激素诱导进行人工产卵。然而，在这个年龄段，精子浓度为200亿/ cm3，仅在一岁半时达到600亿/ cm3;精子的受精能力同时增加了一倍半。已经确定，雄性的生殖系统仅在2岁时达到最大成熟。

关键词：非洲尖锐鲶鱼，生殖系统，性腺，成熟期，性腺指数，生殖细胞。

Annotation. *The article presents results of a study of reproductive system of African sharptooth catfish males, starting from the earliest stages of postnatal ontogenesis until the age of two. It was shown that during the puberty of males the gonadosomatic index increased 6 times. During this period, the gonads in their development have gone from I to IV stage of maturity. For 9 months of development, the mass of gonads increased from 0.07 g (at the age of two months) to 9-10 g (at 9 months of age). Under conditions of artificial breeding in the African catfish, full gonad and sperm maturation never occurs, therefore hormonal stimulation is necessary for reproduction, which ensures the maturation of the germ cells to stage V, at which fertilization is possible. According to cytological and histological criteria, the reproductive system of males can be hormonally induced*

from 9 months of age for artificial spawning. However, at this age the sperm concentration is 20 billion / cm^3, and only at one and a half years old it reaches 60 billion / cm^3; the fertilizing ability of sperm at the same time increased by one and a half times. It has been established that the reproductive system of males reaches maximum maturation only at the age of two.

***Key words**: African sharptooth catfish, reproductive system, gonads, maturity stages, gonadosomatic index, germ cells.*

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Aquaculture in Russia is one of the main areas ensuring the country's food security. The development of aquaculture solves the most important national tasks: it provides the population with fish and other aquatic organisms, reduces import dependence, preserves aquatic biological resources and biodiversity.

In the diet of the inhabitants of Russia, fish has a special role, since it is one of the main foods. However, in recent years, in most regions there is a shortage of fish. Fish consumption per capita in 2016 in Russia as a whole decreased to 50% of the physiological norm.

The development of aquaculture of fast-growing fish species is capable of changing the situation with the shortage of fish and fish products in the domestic market. Industrial aquaculture plays an important role in this process.

The need to accelerate the development of intensive technologies of industrial aquaculture requires new fundamental knowledge in the field of developmental biology of fish with a high growth rate, endurance, the ability to survive at high density of landing, low demands for oxygen, resistance to diseases.

African sharptooth catfish - *Clarias gariepinus* meets these requirements. This species of fish has a high growth rate, is hardy, is adapted to a high density of landing, has an epibranchial organ that allows the use of air oxygen for breathing. *Clarias gariepinus* has a deli meats and is recommended for dietary and baby food.

African sharptooth catfish is a common commercial fish farming facility in the Netherlands, Poland, Germany, the Czech Republic, Italy, the USA, China, Thailand, Brazil, Kenya, the Philippines and in a number of other countries; Since 1994, it has been introduced into industrial aquaculture in Russia, but has not yet received wide distribution [1]. Climatic conditions of most regions in Russia do not allow cultivating *Clarias gariepinus* in natural waters, it is grown mainly in industrial aquaculture in enclosed spaces. This heat-loving species in winter requires heating. The optimum temperature for growing the catfish is 26^0 C. At this temperature, the African catfish can increase the biomass of 1.2-1.5 kg or more for 6 months. Other types of fish are not able to demonstrate this result. Currently, the genetic potential of the productivity of this species in the conditions

of industrial growing technologies is not fully disclosed [2]. Under conditions of artificial breeding, the African catfish loses the ability of natural reproduction. Reproduction of this species in industrial aquaculture is possible only with the use of hormonal stimulation, capable of ensuring the maturation of germ cells [2, 3].

Material and research methods.

The object of the study was the males of the African catfish at different stages of postnatal ontogenesis. African catfish was growed in the tank of a closed water supply (RAS) Laboratory of Experimental Biology and Aquaculture at the Faculty of Veterinary Medicine and Biotechnology, Ulyanovsk State Agrarian University.

In African sharptooth catfish, starting at 2 months of age, the gonad maturity stages were investigated using the Kiselevich scale, the gonadosomatic index — as the ratio of testicular mass to fish body weight, expressed as a percentage, as well as sperm quality [4]. To obtain milt from the males, the abdominal cavity was opened. In the presence of mature sperm, the milt acquired an opaque milky color. The immature gonads of males had a transparent color and smaller sizes.

Research results.

The fry of the African sharptooth catfish males over a 9-month period of cultivation gained a weight of up to 997 ± 149.6 g (Fig. 1). Also, in the initial stages of postembryonic ontogenesis, the male testicles developed intensively. Gonadal weight increased from 0.07 g at the age of two months to 9-10 g at the age of 9 months (Fig. 2).

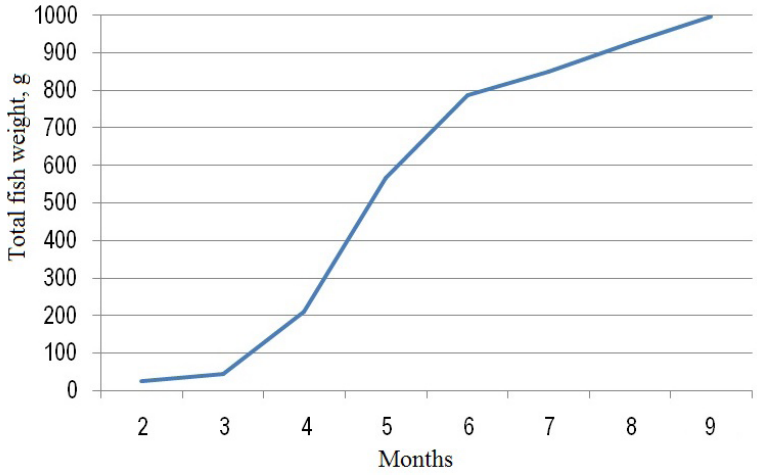

Fig. 1. *Clarias gariepinus fry growth dynamics*

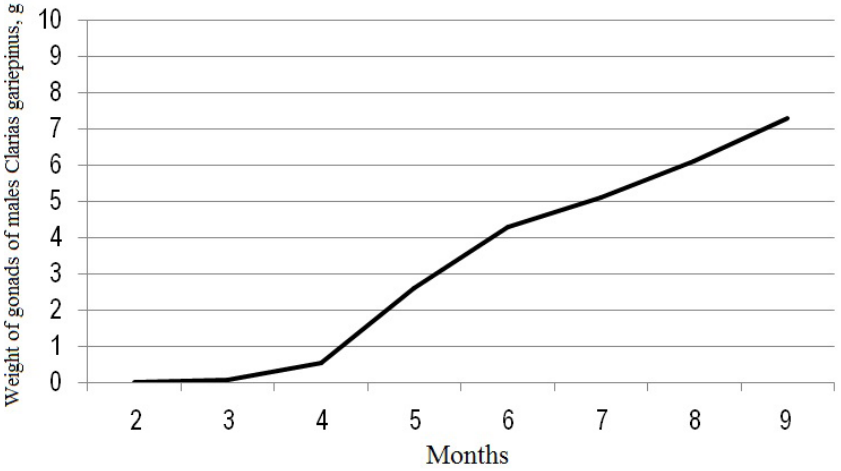

Fig. 2. *Dynamics of ripening gonads of males Clarias gariepinu*

External sexual differences of the African sharptooth catfish males and females began to manifest themselves at the age of 2.5-3 months. At this age, the distinctive feature of males was the presence of a urogenital papilla, which has an elongated and pointed appearance. At the age of 2-3 months, the degree of gonad maturity corresponded to stage I on the Kiselevich scale. At this age, at autopsy, the testes of catfish are visually indistinguishable and not developed.

At the age of 3.5 months in the abdominal cavity of males can be found a rosette with many petal shaped outgrowths. This formation resembles the tentacles of a squid. In females such a formation was not found. Therefore, we reasonably believe that it is part of the male reproductive system.

At the age of 3.5-4 months, the catfish testes in their development fully corresponded to stage II on the Kiselevich scale. On the cords there are noticeable darkened thickenings in which the testes can be identified.

At the age of 5-6 months, the testes were characterized by a III degree of development, they had a more extended part at the base of the testis and narrowed in the back. Their surface was pink and shiny, they themselves were transparent, germ cells were not noticed.

Gonads in 9 month old males are well developed, they corresponded to stage IV of development. At this age, the testes reached definitive sizes, but were not mature. As before, they were transparent, and there was no milky-colored semen on the cut.

With age, the maturity coefficient of the catfish males increased. The gonadosomatic index of males of 3 months of age with an average biomass of 43.3 ± 8.6 g was 0.16%, in males of 4 months of age with an average biomass of 210 ± 42.1 g - 0.25%, in males of 5 months of age weighing 567.4 ± 113.4 g - 0.45%, in males 6

months old weighing 786 ± 117.9 g - 0.54%, in males 7 months old weighing 850 ± 127.5 g - 0.72% , in males of 8 months of age weighing 926.6 ± 139.4 g - 0.87%, in males of 8 months of age weighing 997 ± 149.6 g - 0.93% (Fig. 3).

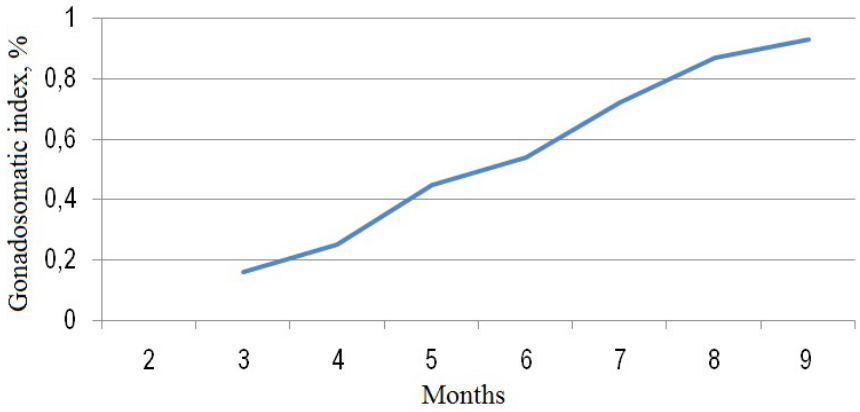

Fig. 3. *Age dynamics of gonadosomatic index.*

In one and a half and two year old males, weighing more than a kilogram, subjected to hormonal induction, the weight of the testes increased 4-5 times. Gonadosomatic index increased to 1.35%. In connection with the formation of a large number of spermatozoa, the testes of males acquired a milky-white color; the gonads corresponded to IV-V stage of maturity on the Kiselevich scale.

According to the results, the most pronounced response to hormonal stimulation is given by males who have reached age of two years. The concentration of sperm in the ejaculate volume unit increased with age. So, the concentration of sperm in males of African sharptooth catfish of 9 months was 18.9 billion / cm^3, at the age of 1.5 years - 55.6 billion / cm^3; and for two-year-old males - 65.7 billion / cm^3. According to the results, the most pronounced response to hormonal stimulation is given by males who have reached two years of age.

In determining the ratio of live and dead sperm, it was found that in males of African sharptooth catfish of 9 months of age, most of the ejaculate was characterized by an assessment of 4 points, at the age of 1.5 years - 5 points; and in two-year-old males - 5 points. In male of African sharptooth catfish aged of 9 months, the sperm had a fertility rate of 60 ± 1.5%; from the half-year old males, they received sperm with high fertility - 90.7 ± 2.7%. In two-year-old males, the activity of sperm was the highest and was characterized by the highest fertility - 95.7 ± 3.2%.

Conclusion.

Our results allow us to conclude that in the reproductive process it is most appropriate to use two-year old African catfish males, which give a pronounced response to the hormonal stimulation of spermatogenesis and having the best qualitative and quantitative indicators of semen.

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在工业水产养殖中TREKREZAN和SPOROTHERMIN的作用下，非洲犀牛（Clarias gariepinus，Burchell，1822）中肌肉组织氨基酸谱的形成

THE FORMATION OF MUSCULAR TISSUE AMINO ACID PROFILE IN AFRICAN SHARPTOOTH CATFISH (*CLARIAS GARIEPINUS, BURCHELL, 1822)* UNDER THE ACTION OF TREKREZAN AND SPOROTHERMIN IN THE INDUSTRIAL AQUACULTURE

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抽象。本文介绍了适应原trekrezan和益生菌孢子粉对非洲尖锐鲶鱼肉氨基酸组成的影响的估计结果。作者发现，用trekrezan和sporothermine进行的饲料富集使非洲鲶鱼肉中的所有氨基酸显着增加。根据实验组必需氨基酸的检测，色氨酸和蛋氨酸是限制性的。

在对照组中，色氨酸，蛋氨酸和异亮氨酸。在实验组和对照组中，亮氨酸和赖氨酸的含量都占优势。已经确定将trekrezan的适应基因和运动蛋白的益生菌引入非洲鲶鱼的饮食中刺激蛋白质代谢，富集肌肉组织的氨基酸组成。在适应原和益生菌的背景下获得的食品是活鱼和新鲜鱼，可以归类为功能性产品，因为其特征在于必需氨基酸含量增加。

关键词：工业水产养殖，非洲尖锐鲶鱼，氨基酸，适应原，益生菌，营养价值。

Abstract*. The article presents results of estimation of adaptogen trekrezan and probiotic sporothermin influence on the amino acid composition of the African sharptooth catfish meat. The authors found that feed enrichment with trekrezan and sporothermine provides a significant increase in all amino acids in African catfish meat. According to examination of the essential amino acids in the experimental group, tryptophan and methionine were the limiting ones.*

In the control group, tryptophan, methionine and isoleucine. Both in the experimental and control groups, the content of leucine and lysine prevailed. It has been established that introduction of the adaptogene of trekrezan and the probiotic of sportermine into the diet of the African catfish stimulates protein metabolism, enriching the amino acid composition of the muscle tissue. The food product ob-

tained on the background of an adaptogen and probiotic is live and fresh fish, can be categorized as a functional product, as it is characterized by an increased content of essential amino acids.

***Key words**: industrial aquaculture, African sharptooth catfish, amino acids, adaptogen, probiotic, nutritional value.*

The studies were carried out under the grant of the Russian Foundation for Basic Research. № 18-016-00127

The studies were carried out under the grant of the Russian Fund for Fundamental The most important condition for the intensification of fish and fish products manufacturing is the organization of rational and complete feeding. At present, the range of the fish feed market is quite diverse. At the same time, it should be borne in mind that the nutritional status, safety and health status of fish directly depends on the balance of the feed in nutrients, vitamins.

In this regard, in order to increase fish productivity and product quality, it is necessary to organize full feeding, which includes not only the main nutrients - proteins, fats, carbohydrates, but also biologically active substances - adaptogens, probiotics, vitamins [3 , 7].

When growing fish in a closed water supply, there is an intense accumulation of metabolic products in the habitat, which has an adverse effect on the fish's body. This situation can be corrected by introducing probiotics and adaptogens into the composition of fish feed.

Introduction to the diet of probiotics allows you to colonize the intestines of fish grown in closed waters, probiotic cultures in order to improve immunity. The effect of the use of probiotics is achieved as a result of direct antagonistic action against pathogenic microorganisms [3, 7, 10].

The use of adaptogens contributes to the increase in the natural resistance and the adaptive potential of fish organism, expands the rate of reaction in relation to biotic and abiotic factors.

The nutritional and biological value of food is determined by the value of their constituent substances. The aim of our study was to assess the effect of the trekrezan and the probiotic of sporothermin on the amino acid composition of the meat.

Materials and research methods. The work was carried out in the laboratory of experimental biology and aquaculture of the UlyanovskAgrarianUniversity and the laboratory of veterinary-sanitary examination of the Federal State Budgetary Institution “SimbirskReferenceCenter for Veterinary Medicine and Food Safety”.

Clarium catfish was chosen as an object of study. The age of the fish at the beginning of the experiment was 6 months. The experience lasted for 2.5 months. For the experiment, the fish was divided into 2 groups - control and experimental,

20 animals each. The groups were distributed in a capacities of 300 liters, each of the modules functioned autonomously. The water temperature in all pools was maintained at the same level of 26 ° C, the oxygen content in the water was at 4 mg / l. Enhancing and maintaining hydrochemical indicators of water quality were carried out in the usual way.

The feeding of fish was carried out by extruded feed Aqarex. The fish food of the experimental group was enriched with trekrezanom and sporo-term (Table 1.). Probiotic was introduced into the feed by irrigation in the amount of 0.2% by weight of the feed. Adaptogen was also introduced into the feed by irrigation in an amount of 0.03 g / kg.

Table 1

The scheme of the experiment

Group	n	Feeding features
Control	20	Basic diet (BD)
Experim.	20	The basic diet + probiotic "sporothermin" 0.2% by weight of the feed and adaptogen trekrezan in the amount of 0.03 g / kg

Feeding was done 3-4 times a day manually as it was eaten. The temperature of the water in the tanks was maintained at 26 ° C. Temperature, oxygen and pH were measured three times a day. The hydrochemical indices under study were within the limits acceptable for the cultivation of the catfish. The control and measurement of the content of biogenic elements in water was carried out using express kits from Tetra. The determination of the amino acid composition of the muscle tissue of fish was carried out on the Hitachi AAA 835 amino acid analyzer. The control of the amino acid composition of the muscle tissue was performed at the control slaughter of experimental African clarias.

Research results. Amino acids are the most important bioelements involved in the synthesis of biologically active compounds (proteins, enzymes, hormones). In addition, they integrate the main metabolic fluxes in the body. In terms of the number and variety of functions in energy metabolism and the synthesis of secondary products, amino acid metabolism takes the first place in the metabolism of a living organism [1, 6].

The value of amino acids for the body is primarily determined by the fact that they are used for the synthesis of proteins.

In addition to protein synthesis, amino acids are involved in the formation of many other important biological compounds: purine and pyrimidine nucleotides, serotonin, melanin, histamine, adrenaline, etc.

Amino acids increase the body's resistance to the action of extremal environmental factors, and have immuno-and phagocyto-stimulating effects [1, 2, 6].

According to literary sources, insufficient valine content contributes to a change in osmoregulation in fish [1, 6]. With a lack of methionine, lipid metabolism may be impaired, with a reduced content of threonine, the synthesis of many biologically active substances is impaired [8].

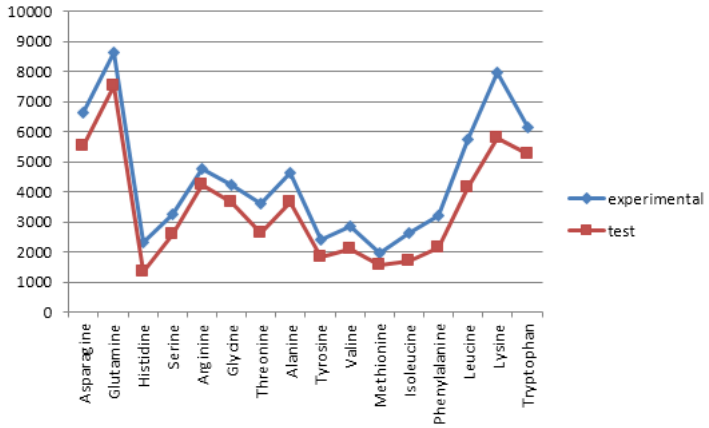

Fig. 1. *Amino acid composition of the muscular tissue of the African catfish (in terms of dry substance), mg / 100 g*
from left to right - aspartic acid, glutamic acid, histidine, serine, arginine, glycine, threonine, alanine, tyrosine, valine, methionine, isoleucine, phenylalanine, leucine, lysig, tryptophan, blue – experimental group, red – control.

In fig. 1 shows the amino acid composition of the muscular tissue of the African Catfish. Amounts of glutamic acid (8635 and 7527 mg / 100 g), aspartic acid (6640 and 5531 mg / 100 g), leucine (5767 and 4137 mg / 100 g) and lysine (7986 and 5787 mg / 100 g) were dominant in both probes.

At the same time, it should be noted that the amount of all amino acids with the introduction of trekrezan and sporothermine into the fish ration significantly increases.

According to the results of our research, all the essential amino acids were found in the muscle tissue of the studied fish.

Analysis of the results obtained revealed that tryptophan (59 mg / 100 g) and methionine (1987 mg / 100 g) were the limiting of the essential amino acids in the experimental group. In the control group, tryptophan (21 mg / 100 g), methionine (1569 mg / 100 g) and isoleucine (1687 mg / 100 g).

Both in the experimental and in the control group, the content of leucine and lysine prevailed (Fig. 2).

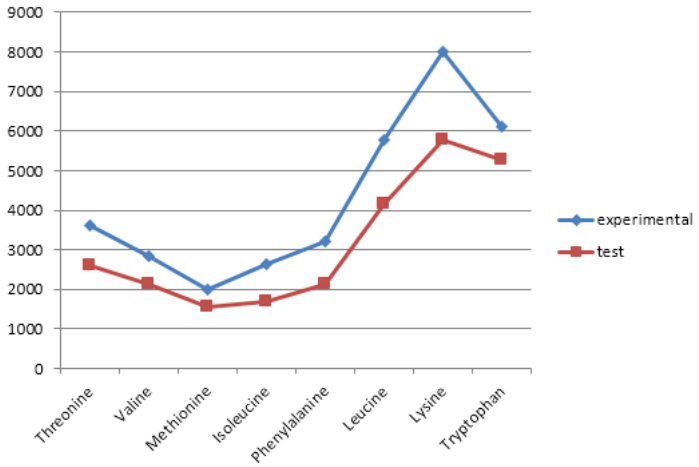

Fig. 2. *The content of essential amino acids in the muscle tissue of the African sharptoth catfish (in terms of dry matter), mg / 100 g; in order from left to right:threonine, valine, methionine, isoleucine, phenylalanine, leucine, lysine, tryptophan, blue – experimental group, red – control.*

Conclusion. Based on our studies, we concluded that the adaptogen of trekrezan and the probiotic of sporothermin introduction into the African Clarias diet stimulates protein metabolism, forming a full range of amino acids in the mouse tissue of fish.

The introduction of probiotic and adaptogen allowed to increase the content of all essential amino acids, to the greatest extent - lizin, which is one of the most deficient amino acids [4, 5, 9]. Lysine and tryptophan, the level of which has also increased, are the growth factors of the organism. On the background of probiotic and adaptogene, the content of sulfur-containing amino acids, in particular, methionine, increased in the muscular tissue.

At present, in the food industry, upon receipt of a functional fish product, raw materials are biotransformed [1, 2]. This technology is fraught with remote consequences. When processing raw materials, many trace elements are lost, vitamins such as B_6 and E are destroyed; the quality of fats is significantly reduced, natural cis-isomers of fatty acids are transformed into trans-isomers dangerous for health and are actively oxidized [4, 5, 9].

In this regard, the proposed method of obtaining a functional fish product - live and fresh fish, characterized by an increased content of essential amino acids, is more promising than the traditional one.

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青年拳击者呼吸系统的功能
THE FUNCTIONALITY OF THE RESPIRATORY SYSTEM OF YOUNG BOXERS

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注解。 该研究旨在评估年轻拳击手呼吸系统的功能。

Annotation. *The study aims to evaluate the functional capabilities of the respiratory system of young boxers.*

Material and methods. *The survey involved 36 boxers of the 1st sports category, 24 teenagers without sports category from the Republican boarding school No. 5 of the sports profile in Ufa, and 30 teenagers of 14-15. The surveys were conducted in a special preparatory period. The functionality of the respiratory system of young boxers was assessed using breath-hold tests on inhalation and exhalation (Genchi and Stanga's tests).*

Results. *The expiratory breath hold rates for first-rate boxers are in the range of normal values, for boxers without a sports category and teenagers not involved in sports, the results are considered unsatisfactory. The average group indicators of breath-holding at the maximum of inspiration in boxers with category are evidence of the presence of physical fitness. For boxers without a sports grade, breath holding is within normal limits for healthy but untrained individuals.*

In adolescents who are not involved in sports, breath holding is considered unsatisfactory.

Conclusion. *Actual functional status, respiratory muscle power, fitness level, motivation to perform the test, volitional component influenced a significant increase in the breath-holding time both during inhalation and exhalation in young athletes compared with similar indicators of their peers who are not involved in sports. Special training of the body's resistance to oxygen deficiency will create the prerequisites for the development of special endurance, help the young boxer to fight without knocking down his breath during attack and defense.*

关键词：呼吸系统功能，呼吸吸气/呼气保持，年轻的拳击手。

Key words: *respiratory system functionality, breath inhalation / exhalation hold, young boxers.*

Introduction. It is known that boxing is a tempo, intense sport. And with any intensive work, the body needs more oxygen, so holding the breath will adversely affect the body's functional capabilities [2]. Experienced coaches teach their pupils to breathe nose and mouth at the same time at a safe distance from the enemy, and when moving closer to the opposer, go to short rhythmic nasal inhalations [3, 6].

The importance of studying breathing when performing boxing exercises is determined by the fact that the work of the breathing apparatus is performed in very unfavorable conditions. A lowered chin, clenched teeth and a mouth guard make breathing difficult. However, this avoids serious injuries (tongue bite, jaw sprain). Lowering the chin protects against knocking blows and helps to fix the head well.

When performing defensive exercises, exhalation creates a noble ground for a counterstrike. In addition, when xhale, abdominal muscles contract, thereby protecting the abdominal organs and many nerve centers. And the absence of air in the lungs prevents breathing and protects against knock-out when struck into the body.

Consequently, proper breathing and the ability to hold your breath in some situations greatly affects the quality of a boxer, such as special endurance [5].

In this regard, it is very important to study the body's resistance to oxygen deficiency with the help of functional tests with breath holding. The purpose of the study is to identify the functionality of the respiratory system of young boxers.

Organization, methods and research techniques. The examination of athletes was carried out in a special preparatory period on the basis of the State Budgetary Educational Institution "Republican Boarding School No. 5 of the sport profile" in Ufa. At the beginning and at the end of the study, the boxers underwent an in-depth examination at the Republican Medical and Sports Clinic and were considered healthy. The admission of young athletes to the survey was carried out on the basis of the written consent of the administration of the boarding school and with the direct participation of the coaches.

In terms of the training process, 36 boxers of the 1st sports category were examined, 24 teenagers without sports grades (boxing experience was 3–4 months) and 30 teenagers not involved in sports.

Were used functional tests with breath holding (Genchi's and Stanga's tests).

Genchi's test - test with a breath delay after an exhalation. Having made a regular exhalation, the subject was holding his breath. The duration of the breath hold was recorded by a stopwatch. The stopwatch was stopped at the moment of inhalation.

Test Stanga - test with breath during inspiration. The subject undertook a deep (but not maximum) inhale and held his breath as long as possible. The duration of the breath hold time was recorded with a stopwatch. At the time of expiration stopwatch stopped.

Mathematical-statistical processing of the experimental material was carried out using Microsoft Excel editor and Statistica 6.0 software package.

The results of the study and their discussion. Table 1 presents the results of the functional tests analysis on the breath of young boxers, allowing to assess the body's resistance to hypoxia and hypercapnia.

Table 1

Indicators of functional tests with breath of boxers 14 - 15 years (young men of younger age group)

Indicator	Boxers with category (n=36)	Boxers without category (n=24)	Non-sports teenagers (n=30)	Confidence level, p=
	1	2	3	
Genchi's test, sec	37,03±4,2	27,73±4,0	18,90±4,3	1 – 2 = 0,001 1 – 3 = 0,001 2 – 3 = 0,001
Stange's test, sec	59,08±3,3	52,2±3,6	28,90±3,2	1 – 2 = 0,021 1 – 3 = 0,001 2 – 3 = 0,001

Genchi's functional test helps to understand how well the body is provided with oxygen, this test determines the degree of fitness of the athlete's body. From the data presented in Table 1, it can be seen that the results of a Genchi's test for first-rate boxers are in the normal range; boxers without a sports discharge and adolescents who are not involved in sports managed to hold the breath at 27.73 s and 18.90 s, respectively. These results are considered unsatisfactory.

Breath hold at the maximum inspiratory rate of first-rank boxers was 59.08 sec., this result is considered good and indicates the presence of physical fitness. For boxers without a sports discharge, breath holding is within normal limits for

healthy but untrained individuals. In adolescents who are not involved in sports, breath holding was 28.90 s., this result is considered to be unsatisfactory and may indicate the presence of problems with the respiratory system.

Functional tests with breath-hold characterize the functional abilities of the respiratory and cardiovascular systems, the Genchi test also reflects the body's resistance to oxygen deficiency. The ability to hold the breath for a long time depends in a certain way on the functional state, power of the respiratory muscles, age, sex, body position, fitness level, motivation to perform the test, volitional component that plays a crucial role in performance [1, 4]. All of the above factors have influenced a significant increase in the breath-holding time both on inspiration and expiration of young athletes compared with similar indicators of their non sportive peers.

Conclusion. Special training of the organism's resistance to oxygen deficiency, in our opinion, will create the prerequisites for the development of special endurance, help the young boxer to fight without killing breath during attack and defense.

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管理医疗预防程序中教师心血管系统的功能状态
THE FUNCTIONAL STATE OF THE CARDIOVASCULAR SYSTEM OF TEACHERS IN THE ADMINISTERING HEALTHCARE PREVENTIVE PROCEDURES

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注解。 本文介绍了教师在管理医疗预防程序时心血管系统指标的分析。

Annotation. *The article presents an analysis of the cardiovascular system indicators in teachers while administering healthcare preventive procedures.*

The aim *of the study is to identify the functional state of the cardiovascular system of teachers during healthcare preventive procedures.*

Materials and methods*. The study involved 87 teachers aged 25 to 60 years. Participants in the study were divided into three subgroups depending on the length of professional experience. Evaluation of the cardiovascular system functional state was carried out by indicators of blood pressure, heart rate and adaptive potential. Dynamic electroneurostimulation was used as preventive measures on the DENAS-Vertebra-02 device.*

Results. *After the use of preventive measures, there is a decrease in blood pressure among teachers of all groups. This fact is determined by the positive effect of electroneurostimulation on the operation of the capillaries and, accordingly, on the pressure value.*

Heart rate is sensitive to emotional experiences of any kind, so after taking preventive measures, heart rate decreased in all groups. After the course application of dynamic electroneurostimulation, the indicator of adaptation capacity in all groups began to correspond to the level of satisfactory adaptation.

Conclusion. *The cardiovascular system functional state indicators can be used as a rapid assessment of the functional state of the organism as a whole. Prophylactic procedures using dynamic electroneurostimulation sessions can be used to improve the adaptive performance of teachers.*

关键词：动态电刺激，血压，心率，适应能力。

Keywords*: dynamic electroneurostimulation, blood pressure, heart rate, adaptation potential.*

Introduction. Since numerous works the dependence of the cardiovascular system functional state on the experience of a specialist [6, 7] is shown, and there are no data on the functional state of the cardiovascular system of teachers in the course application of dynamic electroneurostimulation on the DENAS-Vertebra-02 device, in this study such data was statistically analysed with the determination of the average values and the error of the representativeness of the average, taking into account the confidence probability**.**

The aim of the study is to identify the functional state of the cardiovascular system of teachers during healthcare preventive procedures.

Organization, methods and research techniques. The study was conducted in 2018 using the resources of the laboratory of psychophysiology and experimental psychology BSPU named after M. Akmullah. The survey was attended by 87 teachers aged 25 to 60 years, which were divided into three subgroups depending on the length of professional experience.

Dynamic electroneurostimulation on the DENAS-Vertebra-02 device was used as preventive measures for teachers. In this study, Mode «A» was applied, which is aimed at treatment, rehabilitation, secondary prevention of chronic diseases, prevention and treatment of stress, increasing the overall adaptive capacity of the body during strenuous physical and mental work, physical and mental fatigue, chronic fatigue syndrome, and difficulty awakening in the morning and drowsiness during the day, sleep disturbance in the evening and insomnia, increased irritability [3, 8, 9].

A total of 10 electromassage sessions of 23 minutes each were conducted for each woman of the first experimental group. They used the first, minimum level, when the subject did not experience any subjective sensations or felt a slight vibration in the area of influence under the electrodes.

The results of the study. Statistical characteristics of teachers' cardiovascular system functional state, taking into account the experience of professional activity are presented in Table 1.

Table 1

Statistical characteristics of teachers' cardiovascular system functional state, taking into account the experience of professional activity (n = 87)

Groups of subjects, age (years)	Stages of the experiment		p
	Before preventive measures	After preventive measures	
Systolic blood pressure, mm Hg			
10 – 20 (n=27)	118,56±12,22	106,67±17,32	>0,05
21 – 30 (n=39)	131,54±16,40	118,85±13,32	<0,05
over 30 (n=21)	137,15±14,33	125,29±8,28	>0,05
p	>0,05* <0,05** >0,05***	>0,05* <0,05** >0,05***	
Diastolic blood pressure, mm Hg			
10 – 20 (n=27)	75,67±12,21	69,44±10,73	>0,05
21 – 30 (n=39)	89,69±16,06	78,46±8,98	<0,05
over 30 (n=21)	88,57±11,38	80,86±9,75	>0,05
p	<0,05* <0,05** >0,05***	<0,05* <0,05** >0,05***	
Heart rate, beats per min.			
10 – 20 (n=27)	83,89±9,9	66,33±6,98	<0,01
21 – 30 (n=39)	84,62±11,74	68,62±5,62	<0,01
over 30 (n=21)	77,15±11,56	64,00±8,94	<0,05
p	>0,05* >0,05** >0,05***	>0,05* >0,05** >0,05***	
Adaptive capacity of the cardiovascular system, conv. units			
10 – 20 (n=27)	1,71±0,33	1,47±0,34	>0,05
21 – 30 (n=39)	2,27±0,42	1,99±0,32	>0,05
over 30 (n=21)	2,42±0,3	2,18±0,21	>0,05
p	<0,01* <0,01** >0,05***	<0,01* <0,01** >0,05***	

***Note**: p - significance of differences. * reliability of differences between persons 1 and 2 of the probationary groups, ** reliability of differences between the 1st and 3rd probationary groups, *** reliability of differences between the 2nd and 3rd probationary groups.*

From the data presented in Table 1, it can be seen that during the course of the study, the systolic pressure indices of the teachers of all probationary groups were below the age norms. It is known that nerve overvoltages, inactive lifestyles, unhealthy diets, disturbed sleep patterns [1, 2, 5] contribute to a decrease in systolic blood pressure.

The representatives of the third probationary group (women over the age of 50 years) are aggravated by the hormonal changes in the body. During menopause, the level of estrogen changes, which leads to a weakening of the vascular wall tone.

A different picture emerges when analyzing diastolic blood pressure. So, for teachers with the experience of 10 - 20 years DBP is slightly below the norm. Such a reduction in DBP may be caused by a deficiency or an excess of hormones in the body, a deficiency of beneficial micro and macro elements and vitamins as a result of tight diets and the consequence of severe stress. However, it is not always low DBP is evidence of pathology. At simultaneous decrease in systolic and diastolic indicators, as in this case, most often we are talking about physiological hypotension. Such a state, one might say, innate, accompanies a person all his life and does not interfere too much with his working rhythm. According to expert estimates, about 5% of young people accidentally learn that they have reduced systolic and diastolic pressure, because they feel great in this state [1]. Teachers with an experience of 21–30 years and more than 30 years have a slight increase in DBP (by 6.8% and 5.5%, respectively), which may be due to a decrease in the elasticity of the aortic walls, which become thinner with age atherosclerotic plaques.

It should be noted that after carrying out healthcare preventive procedures, significant differences ($p = 0.001$) of SBD and DBP occurred in teachers with experience of 21-30 years. Systolic pressure decreased by 9.7%, diastolic by - 12.5%, this fact suggested that the application of dynamic electroneurostimulation on the DENAS-Vertebra-02 device had a positive effect on the capillaries, respectively, and on the pressure value.

Analysis of heart rate indicators revealed significant deviations from the norm (70 - 75 beats / min) for teachers with work experience up to 30 years, an increase in heart rate to 83.89 beats / min, that in our opinion, was the result of emotional and intellectual stress characteristic of professional activity the subjects. For teachers with work experience of 21–30 years, the heart rate was 84.62 beats / min, at a rate of 75–80 beats / min. This indicator in subjects with experience up to 30 years was slightly different from the norm, this is most likely due to the fact that teachers with great experience have considerable experience compared to young teachers and more calmly react to high workload, which is characterized by the expansion of the emotion economy.

The heart rate indicator is very sensitive to emotional experiences of any kind, therefore it is quite obvious that after administering healthcare preventive procedures, the heart rate decreased in all groups: in people with experience up to 20 years by 20.9%, in group with experience from 21 to 30 years - by 18 , 9%, in the probationary group for more than 30 years - 17%.

As part of the survey of female teachers, the level of cardiovascular system adaptive capacity was investigated according to the size of the adaptive capacity of the circulatory system (ACCVS, conv. units). The calculation of the values of the ACCVS revealed a satisfactory adaptation of the cardiovascular system with work experience of up to 20 years.

Intensity of adaptation mechanisms in persons with work experience of 21 - 30 years and over 30 years (2.27 ± 0.42 conv. units and 2.42 ± 0.3 conv. units, respectively), may be a reflection of neuro-endocrine and energy-metabolic processes changes in elder women, as well as the possible onset of a “crisis of routine work” or a “crisis of extensive work experience”, which, according to some authors, may manifest dissatisfaction with their work, the need to change the scope of activity [4].

A teacher’s crisis with a long history of work is a period in professional activities when, in order for professional growth seeking and positive self-realization, he must reconsider the established stereotypes of his professional activity, correlate the results of his work with the social and educational needs of a changing society and child, to find available opportunities to use and develop their experience, which is not always possible and leads to exhausting stress adaptation mechanisms.

Необходимо отметить, что после проведение профилактических мероприятий произошло уменьшение показателя расчетного показателя АПссс во всех группах, но достоверно значимых различий выявлено не было (p>0,05), в тоже время данный показатель стал соответствовать уровню удовлетворительной адаптации.

Заключение. Показатели функционального состояния сердечно-сосудистой системы можно использовать в качестве экспресс-оценки функционального состояния организма в целом. Профилактические процедуры с использованием сеансов динамической электронейростимуляции можно применять для повышения адаптационных показателей преподавателей. It should be noted that after the implementation of healthcare preventive procedures there was a decrease in the indicator of the estimated ACCVS index in all groups, but no significant differences were found (p> 0.05), at the same time this indicator began to correspond to the level of satisfactory adaptation.

Conclusion. Indicators of cardiovascular system functional state can be used as a rapid assessment of the organism functional state as a whole. Preventive procedures using dynamic electroneurostimulation sessions can be used to improve the teachers' adaptation indicators.

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INSECTA TRICHOPTERA的自然保护区«BASTAK»
INSECTA TRICHOPTERA OF THE NATURE RESERVE «BASTAK»

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注解。 本文介绍了位于犹太自治区境内的国家自然保护区«Bastak»的毛翅目动物群研究结果。 已确定的布鲁克斯物种清单包括来自34属和17科的55种。
关键词：毛癣菌动物群，自然保护区«Bastak»，两栖动物昆虫。

Annotation. *The article presents the results of a study of the fauna of Trichopteraof the state natural reserve «Bastak», located on the territory of the Jewish Autonomous region. The list of identified species of Brooks includes 55 species from 34 genera and 17 families.*
Key words: *trichoptera fauna, the nature reserve «Bastak», amphibiotic insects.*

The Bastak nature reserve is located in the Jewish Autonomous region North of Birobidzhan. The reserve was established in 1997. Its area is 91771 hectares. The territory of the reserve is divided into flat and mountainous parts. The mountain part is represented by the spurs of the Bureinsky ridge, the southern lowland-the middle Amur plain.

The reserve has a dense river network. All the rivers in the reserve belong to the basin of the Amur river. The largest rivers of the reserve are Bastak and Carennac. Their catchment areas situated entirely within the territory of the reserve. This allows you to have an independent self-developing geosystem.

The territory of the reserve «Bastak» is an Ecoton. It is located in the transition zone between different natural areas. Here there is an interaction of communities with the predominance of Northern polar and southern subtropical species of plants and animals. The change of landforms from mountain to plain also contributes to the formation of unique ecosystems.

Systematic studies of insects of the reserve «Bastak» began in 2003.However, until now, special studies of the species composition of amphibiotic insects, as well as other representatives of freshwater fauna in the reserve has not been conducted.

The need to study aquatic insects, especially in background areas unaffected by anthropogenic influence, is important because many of them are bioindicators and are widely used in freshwater monitoring. Especially important are representatives of the groups of the *Ephemeroptera*, *Trichoptera*, *Plecoptera*, which make up the ERT indicator complex, and are considered indicators of clean, unpolluted water.

In 2018, the first special hydrobiological expedition was carried out, the purpose of which was to study the freshwater fauna of insects of the reserve, study the living conditions of hydrobionts, determine their bioindication significance in order to further develop a system of regional freshwater bioassessment for the Jewish Autonomous region.

Gathering material was carried out mainly on the main rivers of the reserve Bastak, Hlynyanka, Big Carennac, the Average Carennac (Fig. 1). For a more complete coverage of biota, studies covered different types of watercourses and their areas – mountain, semi-mountainous and flat.

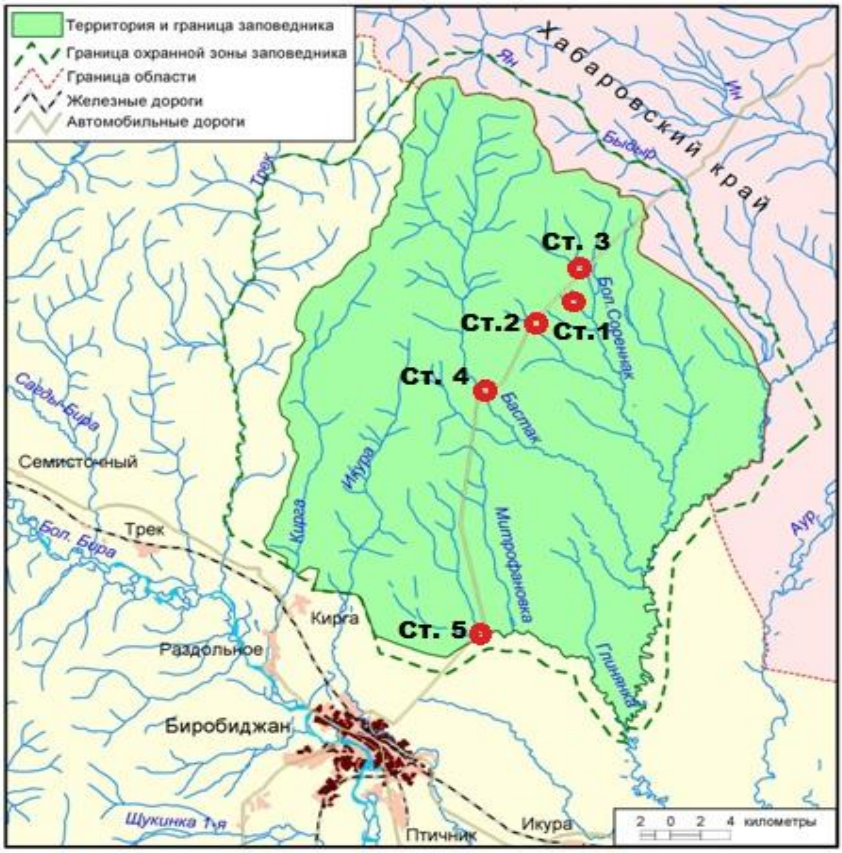

Fig. 1. *Places of sample collection in the nature reserve «Bastak»*

At each point, benthos and imago of amphibiotic insects were collected in the daytime. In the evening, light traps were installed to collect imago, which were exhibited from 22 to 22: 30 hours. Benthos was selected in two ways – directly from the soil and wood residues in the river bed, and with the help of a bottom net by the method of forced drift [1].

Day collecting of amphibiotic insects was carried out by mowing of coastal vegetation with the help of entomological net. Night fishing of insects was carried out with the help of traps of two types – screen and alcohol (Fig. 2), in both cases the UV lamp output of 20 volts (20W Aspectek Ultraviolet Tube). A total of 18 sampleswerecollected.

Fig. 2. *The collection of adults on the screen (left) and spirit trap (right)*

Benthic and imago charges were recorded with 85% ethanol. The initial disassembly and preliminary determination was carried out in the field at the Bastak reserve cordon. A detailed definition was conducted in Bioraznoobrazie Federal scientific center of RAS, Vladivostok. In the list of brook species presented below, the families included in them, genera and species are arranged in alphabetical rather than systematic order, as is currently the case in faunal articles. The list includes only those species that were collected during the expedition from 10 to 15 July 2018.

List*Trichoptera*

1. Family*Arctopsychidae*

1. *Arctopsychepalpate*(Martynov, 1934)

2. Family*Brachycentridae*

2. *Brachycentrusamericanus* (Banks, 1899)*
3. *Mirasemagelidum*McLachlan, 1876*

3. Family*Ecnomidae*

4. *Ecnomustenellus*(Rambur, 1842)*

4. Family*Glossosomatidae*

5.*Agapetus*(*Synagapetus*) *inaequispinosus*Schmid, 1970*
6. *Agapetus*(*Agapetus*) *sibiricus*Martynov, 1918
7. *Glossosomaaltaicum*(Martynov, 1914)*
8. *Glossosoma intermedium*(Klapalek, 1892)

5. Family*Goeridae*

9. *Goerasquamifera*Martynov, 1909
10. *Goeratungusensis*Martynov, 1909*

6. Family*Hydropsychidae*

11. *Amphipsycheproluta*McLachlan, 1872

12. *Cheumatopsychechinensis*(Martynov, 1930)

13. *Cheumatopsycheinfascia*Martynov, 1934

14. *Hydropsycheorientalis Martynov, 1934*

15. *Hydropsyche*sp. 2

16. *Macrostemumradiatum*(McLachlan, 1872)*
17. *Potamyia* sp.

7.Family*Hydroptilidae**

18. *Hydroptilachinensis*Xue& Yang, 1990*

8. Family*Lepidostomatidae*

19. *Lepidostomaalbardanum*(Ulmer, 1906)
20. *Lepidostomaelongatum*(Martynov, 1935)

9. Family*Leptoceridae*

21. *Ceracleaexcisa* (Morton, 1904)*
22. *Ceraclealobulata* (Martynov, 1935)
23. *Ceracleariparia*(Albarda, 1874)*
24. *Ceracleashuotsuensis*(Tsuda, 1942)*
25. *Ceracleasibirica*(Ulmer, 1906)
26. *Ceraclea*sp. 1*
27. *Leptocerusmoselyi* (Martynov, 1935)
28. *Mystacides*sp.*
29. *Oecetislacustris*(Pictet, 1834)*
30. *Oecetistestaceatestacea*(Curtis, 1834)*
31. *Oecetis* sp.*
32. *Setodes*sp.
33. *Triaenodeslevanidovae*(Morse & Vshivkova, 1997)
34. *Triaenodespellectus*Ulmer, 1908
35. *Triaenodesjakutanus*1910*
36. *Triaenodesunanimis*McLachlan, 1877*

10.Family*Limnephilidae*

37. *Asynarchusamurensis*(Ulmer, 1905)*
38. *Dicosmoecusjozankeanus* (Matsumura, 1931)*
39.*Hydatophylaxsoldatovi*(Martynov, 1934)*
40. *Nemotaulius* sp.*
41. *Pseudostenophylaxamurensis* (MaLachlan, 1880)*
42. Limnephilidae gen.sp. (larvae)

11. Family*Molannidae*

43. *Molannamoesta*Banks, 1906

12. Family*Phryganeidae*

44. *Hagenellasibirica* (Martynov, 1909)*

13.Family*Polycentropodidae*

45. *Neucentropusmandjuricus* (Martynov, 1907)*
46. Polycentropodidae gen. sp. (females)

14.Family*Psychomyiidae*

47. *Lypedaurica* Ivanov &Levanidova, 1996*
48. *Psychomyiaflavida*Hagen, 1861
49. *Psychomyiaforcipata*Martynov, 1934
50. *Psychomya* sp. 1 (female)

15. Family*Rhyacophilidae*

51. *Rhyacophilamongolica*Levanidova, 1993*
52. *Rhyacophilaretracta*Martynov, 1914*
53. *Rhyacophila*sp. 1 (female)

16. Family*Stenopsychidae*

54. *Stenopsychemarmorata*Navas, 1920*

17. FamilyThremmatidae

55. *Neophylaxrelictus* (Martynov, 1935)*

Thus, the number of species of Brooks collected during the expedition includes 55 species from 34 genera and 17 families. In the list of streamers specified for the reserve «Bastak» previously cited 32 species [2]. In the updated, supplemented list we have included another 29 species (in the list marked *), which were not previously specified for the territory of the reserve «Bastak». Collections of caddisflies made in different ways and in different phases of metamorphosis, has shown that trichopteran reserve is quite diverse. Subsequent expeditions to the areas of the reserve with different relief and hydrographic conditions, as well as in different seasons of the year should significantly add to the list of Trichoptera of the Bastak reserve, the hydrofauna of which remains poorly studied to date.

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不同年龄女性与体重相关的心律变异特征

FEATURES OF CARDIAC RHYTHM VARIABILITY IN FEMALES OF DIFFERENT AGES ASSOCIATED WITH BODY WEIGHT

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注解。 在第二个童年和青少年期间，对实际健康女性的心律变异性（CR）的光谱指数进行了分析。 血液循环参数，总频谱功率（TP），极低频率（VLF，%VLF），低频（LF，%LF）和高频（HF，%HF）光谱带的绝对和相对波功率值的平均值 估计。 具有高体内脂肪含量的第二个童年和青少年年龄的女性的心律变异性的特征在于自主神经系统的副交感神经组分的增加。 随着心律的减少，副交感神经活动增加。

关键词：心律变异性，脂肪体重，交感迷走神经平衡。

Annotation*. The analysis of the spectral indices of cardiac rhythm variability (CR) in practically healthy females during the second childhood and adolescence has been carried out. Average values of blood circulation parameters, total spectrum power (TP), absolute and relative wave power values in very low frequency (VLF,% VLF), low frequency (LF,% LF) and high frequency (HF,% HF) spectral bands were estimated. Cardiac rhythm variability in females of the second childhood and adolescent age with a high content of body fat is characterized by an increase in the parasympathetic component of the autonomic nervous system. An increase in parasympathetic activity occurred with a decrease in cardiac rhythm.*

Keywords*: cardiac rhythm variability, fat body mass, sympathovagal balance.*

Introduction

Among modern methodological approaches to assessing the state of the cardiovascular system and the body as a whole, an essential place belongs to the analysis of cardiac rhythm variability (CR). In addition to performing hydrodynamic functions, the cardiovascular system plays the role of a coordinating link in the relationship between the mechanisms of regulation and information with the morphological structures of the body [cit. by 1]. Recently,

bioimpedancemetry has been widely used to assess body component composition [2]. It should be noted that the works devoted to the study of indicators of CR variability and body composition of the body are few. The purpose of the study is to study the characteristics of cardiac rhythm variability in females of different ages, depending on the content of fat mass in the body.

Methods

A transverse study of practically healthy individuals from the second childhood period was conducted - 70 females aged 10 years (from 9 years 6 months to 10 years 5 months 29 days) were examined. Also practically healthy adolescents were examined (from 16 to 20 years old) - 63 females (age 18.6 ± 1.04 years). All subjects or their representatives signed an informed consent to participate in the study in accordance with the requirements of the 1975 Helsinki Declaration (revised 1983).

The study of PC variability was carried out using the Poly-Spectrum-8\EX electrocardiograph using software from Neurosoft Company (Ivanovo, Russian Federation). At rest, a cardiac rhythmogram was recorded at short 5-minute intervals in the position of the patient lying on her back, with quiet breathing and the absence of external stimuli. Cardiac rhythms were recorded (beats/min). The following time indices were determined: SDNN — the standard deviation of the R-R intervals; RMSSD — the standard deviation of the inter-interval differences; pNN50 – the rate of contiguous intervals differing by more than 50 ms. In spectral analysis, VLF was estimated as wave power in the very low frequency range, LF — wave power in the low frequency range, HF — wave power in the high frequency range, TP — total power of the spectrum. The analysis was carried out with the calculation of the power spectrum of oscillations in three frequency ranges: 0.004-0.08 Hz (very low frequencies - VLF); 0.09-0.16 Hz (low frequencies - LF); 0.17-0.5 Hz (high frequencies – HF).

Component body composition was assessed using the apparatus for bioimpedansometry ABC-01 "Medass", which allows to determine the fat body mass (FBM) and lean fat free mass (LBM). The classification of fat body mass was performed according to centile tables for the corresponding sex and age [3].

Statistical processing of the material was carried out using the software SPSS 21.0. In the tables, quantitative attributes with a normal distribution are presented as arithmetic mean (M), standard deviation (SD), values with a non-normal distribution - as a median (Me) and percentile ranking (Q25-75-25 and 75 percentile). Data samples were checked for normal distribution, for which the Kolmogorov-Smirnov test was used at a significance level of $p < 0.05$. For comparison of two independent groups with a normal distribution, one-factor analysis of variance (ANOVA) was used. For comparison of two independent groups with abnormal distribution, the two-sample Mann-Whitney test was used.

Differences in the values of the parameters studied were considered statistically significant at the 95% probability threshold ($p < 0.05$).

Research results

Currently, a lot of attention is paid to childhood obesity. However, in the group of young females studied by us, ¾ (76%) had FBM% below average, low and very low. Only 14% had normal FBM% and 10% above average. Individuals with obesity (FBM% - above 90 centile) were not detected. The body fat content in 2% (N=1) of the young females examined by us can be characterized as very low, in 3% - as low (N=2), in 12% - as below average (N=8), in 58% - as average (N=37), in 15% - as above average (N=9), in 7% - as high (N=4), in 3% - as very high (N=2). For the analysis of CRV, preliminary processing of the results allowed us to identify three groups both young and adolescent females according to the fat content in the body. The fat content in the body of the members of the first group was characterized as very low, low, below average (below the 25th centile). The fat content in the body of the members of the second group was characterized as average (from the 25th to the 75th centile). The fat content in the body of members of the third group was characterized as above average, high, very high (above the 75th centile).

It is known that the SDNN indicator reflects the cumulative effect of the vegetative regulation of blood circulation. Normally, this temporal indicator characterizes the activity of the parasympathetic part of the autonomic nervous system, while a decrease in its values indicates an increase in sympathetic influences on the cardiac rhythm. In our study, the mean SDNN values of 10-year-old females increased from the first group to the third. RMSSD also reflects the contribution of the parasympathetic division to the regulation of cardiac activity. The higher the RMSSD values were, the higher the parasympathetic activity was. Females of the third group were characterized by pronounced vagal activity on cardiac rhythm. Analysis of pNN50 revealed a similar picture: the activity of the autonomous control loop was most shown in females of the third group (Table 1). There was also a tendency to increase these indicators in the first and third groups of females, although the differences were not statistically significant (Table 2). RMSSD was also higher in females of the third group (Table 2). Analysis of pNN50 showed that the activity of the autonomous control loop was most shown in females of the third group (Table 2).

The next stage was a spectral analysis of CR variability. It is known that spectral analysis allows to investigate the activity of individual levels of cardiac rhythm control [4]. In the third group of females of 10 years of age, a marked predominance of the parasympathetic regulation link was observed, which was confirmed by an increase in the absolute (HF, ms^2) and relative (HF%) power of oscillations of the high-frequency component of the cardiac rhythm compared to

the first group (Table 1). The indicator of the state of the vascular tone regulation system LF% was higher in the representatives of the second group. The power of the VLF% of the spectrum reflects the state of the cardiovascular subcortical center and psychoemotional stress, and is also a sensitive indicator of the control of metabolic processes [5]. Mean VLF% values were higher in females of the second group.

Table 1

The temporal and spectral indices of CRV in females of 10 years of age with different body fat contents

Indicators	Groups								p
	1 (N=53)		2 (N=10)		3 (N=7)		Σ (N=70)		
	M	SD	M	SD	M	SD	M	SD	
CR	90,2	12,61	86,5	9,04	82,2	9,21	88,8	12,02	P_{1-3} =0,099
SDNN	62,8	20,45	68,3	19,83	71,0	23,07	64,4	20,53	
RMSSD	58,3	28,42	59,7	17,98	85,0	47,83	61,1	30,23	P_{1-3} =0,028
pNN50	23,1	20,98	20,9	20,14	43,9	27,50	24,9	22,17	P_{1-3} =0,019 P_{2-3} =0,034
CV	9,2	2,50	9,9	3,47	9,6	3,26	9,4	2,70	
	Me	Q_{25-75}							
VLF	901,0	603,5–1970,0	2492,6	3767,02	824,3	284,21	5842,0	36202,54	
VLF%	30,2	11,65	28,2	14,94	25,2	15,54	29,4	12,45	
	Me	Q_{25-75}							
LF	1141,0	598,5–2701,5	2494,8	2021,38	1166,6	705,47	6058,8	36493,46	
	Me	Q_{25-75}							
LF%	32,7	27,1–44,85	35,4	10,64	30,2	13,86	36,9	23,90	
	Me	Q_{25-75}							
HF	1179,0	627,0–3053,0	1970,6	1565,74	2117,7	1644,36	2506,2	5988,21	
HF%	35,1	17,53	36,4	18,67	44,7	22,04	36,3	18,10	
	Me	Q_{25-75}							
TP	4154,0	2056,5–8067,0	7231,4	5537,26	4110,3	1993,39	14512,9	78490,95	
LF/HF	1,68	1,707	1,43	1,184	1,02	,846	1,58	1,577	

Note: groups 1 - body fat content is lower than the 25th centile, 2 - 1 - body fat content is from the 25th 75th centile, 3-1 - body fat content is higher than the 75th centile.

Comprehensive assessment of indicators (according to the study protocol) of CRV showed that in females of this age, the sympathetic component of the autonomic nervous system dominates in the regulation of CRV. Nevertheless, the results of our study demonstrate that in females with low (sympathicotonia 26%) and normal (sympathicotonia 31%) fat body mass, the influence of the sympathetic nervous system is stronger on the variability of CR than in females with elevated (sympathicotonia 20%) FBM%. In the first (58%) and second (59%) groups of females, the percentage of individuals with a predominance of parasympathetic influences on the cardiac rhythm is slightly lower compared to the third (70%) group. In the second and third groups of females, there is a tendency to a decrease in cardiac rhythm (Table 1).

In the first group of females, the prevalence of the spectral power of the slow-wave VLF and LF ranges in the CR spectrum, and the calculated index on their basis, LF / HF, was found, indicating an increase in the contribution to the regulation of CR by both the sympathetic link and the central control loop [6], including humoral and psycho-emotional influences [5]. When comparing the spectral indices of CR variability in the third group, we observe (Table 2) an increase in the absolute (HF, ms^2) and relative (HF%) power of oscillations of the high-frequency component of the cardiac rhythm compared to the first and second groups.

In the second and third groups of females, the LF/HF ratio is lowered compared to the first group (Table 2), which indicates an increase in the parasympathetic component of cardiac rhythm variability [7]. The magnitude of the sympathovagal balance coefficient LF/HF (Table 2) in all groups of females indicates a predominance of parasympathetic influences (<1.5) on cardiac activity [8].

Comprehensive assessment of indicators (according to the study protocol) of CR variability showed that in the first group of females the percentage of individuals with predominantly parasympathetic influences (63%) on heart rhythm was slightly lower compared to the second (75%) and third (79%) groups (Table 2). In the second and third groups, there is a tendency to a decrease in cardiac rhythm (Table 2).

Conclusion

Thus, the study results of the CR variability showed that with an increase in the amount of fat mass in women of the second childhood and adolescents, the parasympathetic link predominates in the status of the autonomic nervous system.

Table 2

Temporal and spectral indices of CRV in females with different body fat contents

Indicators	Groups								p
	1 (N=11)		2 (N=36)		3 (N=16)		Σ (N=63)		
	M	SD	M	SD	M	SD	M	SD	
CR	74,5	9,97	68,2	8,80	67,7	8,44	69,3	9,15	P_{1-2} =0,066 P_{1-3} =0,067
SDNN	67,2	28,13	58,4	16,83	73,3	33,65	64,8	25,67	
RMSSD	64,0	24,67	60,8	25,99	86,3	56,88	69,3	38,91	P_{1-3} =0,047
pNN50	31,7	24,30	34,6	22,18	43,3	28,12	36,7	24,46	
CV	8,2	3,20	6,6	1,87	8,0	3,07	7,3	2,63	
VLF	1472,6	1437,96	1037,1	740,66	1187,6	790,52	1172,0	927,81	
VLF%	28,3	11,56	32,9	13,61	28,2	15,18	30,5	13,66	
LF	2277,4	3050,06	776,9	619,43	1104,3	646,50	1183,3	1544,01	P_{1-2} =0,009 P_{1-3} =0,056
LF%	34,6	14,21	22,7	9,69	24,6	10,37	25,7	11,63	
HF	1870,8	1465,74	1597,3	1162,95	3676,2	4227,76	2289,5	2672,30	P_{2-3} =0,017
HF%	37,1	16,34	44,3	13,42	47,2	21,21	43,7	16,75	
TP	5227,3	5478,54	3411,3	1836,09	5968,2	5214,37	4564,6	4067,63	
LF/HF	1,35	1,259	0,58	0,308	0,72	0,551	0,78	0,721	P_{1-2} =0,004 P_{1-3} =0,027

Note: groups are designated similarly table 1

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兔肾动脉结构的特点
THE PECULIARITIES OF ARCHITECTONICS OF RENAL ARTERIES IN THE RABBIT

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注解。 在同名动脉的兔肾血管化躯干中，d = 0.3㎜±0.1㎜，其被划分为分区，这些血管的长度与形成网络的较小直径的动脉略有不同。

关键词：肾，兔，动脉，直径

Annotation*. In the rabbit kidney vascularized trunk of the homonymous artery, d=0.3 mm±0.1 mm, which is divideddichotomically, the length of these vessels is slightly different from the latter depart smaller diameter arteries that form the network.*

Keywords*: kidney, rabbit, arteries, diameter*

Numerous order rodentia, it covers about 3000 individuals. Order rodentia is adapted to a variety of living environments, they are ecologically universal in their organization, have a large number of features in connection with adaptations to living conditions. The available information on the morphology and vascularization of the urinary organs in placental organs cannot fully satisfy the needs of modern clinical science, but they require clarification, addition, and perismization of the available information. Therefore, the aim of our study was to study the features of the blood supply and architectonics of lagomorphic kidneys.

The objects for the study were rabbit carcasses (n = 4). In the study of the vascular apparatus of the rabbit kidney, the following methods were used: anatomical preparation, vascular corrosion, morphometry.

Rabbit kidneyhave a bean-shaped form, are located in the lumbar region and have an asymmetric arrangement relative to the spinal column. The asymmetry in the topography of the studied objects (on the left - in the region of 3-4, on the right

- 1-2 of the lumbar segment), can be explained by the displacement of neurotomes during the period of embryonic development of the animal. The blood supply to the kidneys is carried out by the trunk of the renal artery, d = 0.3 ± 0.1 mm, which originates from the abdominal aorta with a relatively large formation and has laterocaudal direction.

The distance between the renal trunks is 1.8 ± 0.2 mm. The trunk of the renal artery in the gate of the organs is divided dichotomously into two (Fig. 1), identical in diameter, the dorsal and ventral renal arteries. The lengths of the renal arteries of the right and left sides are slightly different from each other and equal to 2.8 ± 0.3 mm. Arteries lie in connective tissue septa in fascial cords, located lateral to perineurium. The ureter and the fatty capsule of the organ of the same name are fed from the renal artery. Interlobar arteries of smaller diameter, d = 0.1 ± 0.2 mm, 4-5 branches, in a branching type, are moving away from the renal arteries. Interlobar arteries (Fig. 2) on the border of the cortical and medullary layers change the direction of the course and form the artery arteries. From the latter in the direction of the cortical layer are the radial arteries. Radial - intralobular arterioles turning into vascular glomeruli. A portion of the intralobular arterioles gives agglomeular branches reaching the capillaries located in the cortex of the organ. All the above listed branches anastasize among themselves, forming a capillary network. The pattern of branching, which is expressed in the alternation of the direction of the branches of different orders from the system of longitudinal to the system of transverse directions.

In the area of the ganglia, the large vessels feed the nerves of the sympathetic trunk and its branches. Each ganglion of the sympathetic trunk fits rows of vascular branches, which are immersed in the thickness of the ganglion and form a system of ordinal branches and their capillaries, forming a variety of shapes, of unequal diameter.

There is a pattern of topography of the nerves on the intravascular renal vessels (1), this division into ascending and descending branches. The descending branches of the overlying trunk are anastomized with the ascending branches of the underlying trunk. That is, in each nerve trunk there are continuous anastomoses between the vascular branches entering at certain intervals in the thickness of the nerve.

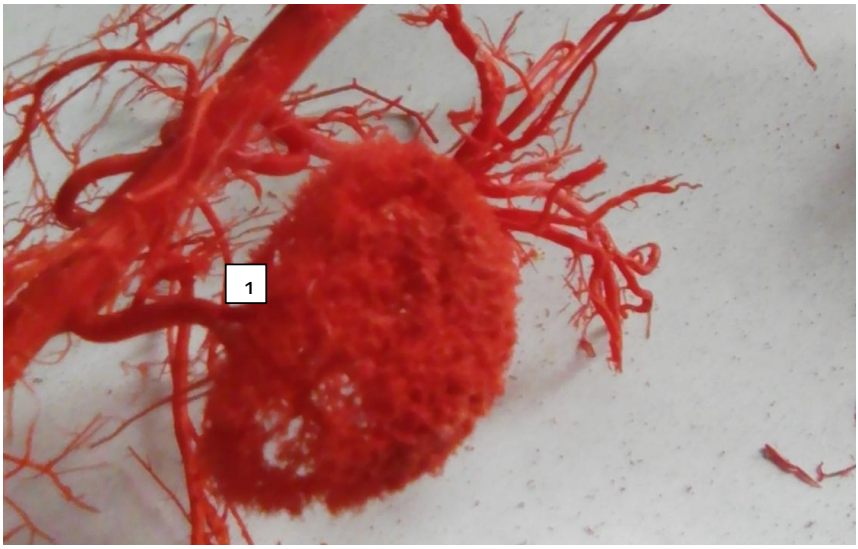

Fig. 1. *Right renal artery in a rabbit (corrosive drug)*

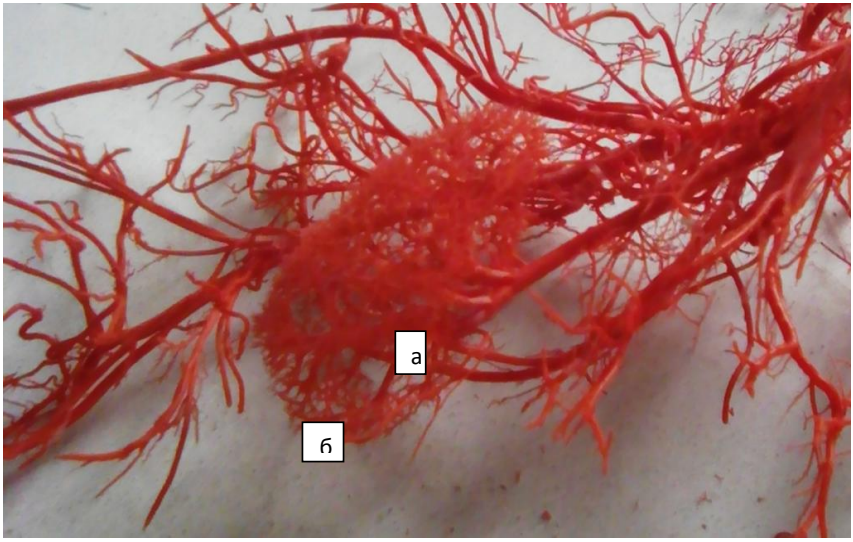

Fig. 2. *Left rabbit renal artery: a-interlobular arteries, b-arc arteries*

The vessels form in the nerve thickness vascular anastomoses of several orders of magnitude, depending on the diameter of the nerve (2,3). Moreover, the magnitude of the intervals depends on the diameter of the nerve fiber. The thinner the nerve, the smaller the intervals between the arteries supplying it. In large nerves, these intervals can vary from 3 to 6 cm. The main vessel can also be divided into branches of the first order, directed toward the peripheral or central part of the nerve trunk. Often the vessel passes in the transverse direction, gives a lot of branches, anastomizing among themselves. Most vessels enter the nerve thickness at acute or right angles. Vascular branches of different diameters can be located in one or three dimensions, forming spatial networks extended in the length of the nerve.

Thus, the renal artery trunk, d = 0.3 ± 0.1 mm, is divided dichotomously in the gate of the kidney. The lengths of the renal arteries are slightly different (4.6) and equal to 2.8 ± 0.3 mm. Vessels and nerves are closely intertwined in various forms and directions, forming plexuses, between the latter there are anastomoses, the size of the intervals between these formations depends on the size of the vessel and nerve.

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线性结构的沟渠
GULLIES OF LINEAR STRUCTURES

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注解。 20世纪末的特点是活跃的沟渠数量减少。 以前的农业活动是沟壑发展的主要原因。 然而，目前观察到越来越多的所谓技术性雨水沟（在城市地区，沿着不同类型的道路，管道，在露天采矿区域中形成）。 可以建议根据其起源 – 路边，工业径流和城市来区分三个主要的技术性雨水沟。

关键词：技术沟壑，沟壑，路边沟渠，工业径流沟壑，城市沟壑。

Annotation*. End of the 20th Century was characterized by decreasing number of active gullies. Previously agricultural activities were the main causes of gully development. However, at present the increasing number of so-called technogenic gullies (formed in urban areas, along different types of roads, pipelines, in areas of open mining) is observed. It can be proposed to distinguish the three main groups of technogenic gullies according to their origin – roadside, industrial-runoff and urban.*

Keywords: *Technogenic ravines, gully, roadside gullies, industrial-runoff gullies, urban gullies.*

Introduction

In the late XVII and early XVIII centuries in the European territory of Russia, arable land occupied only 8% of its total area, other land (meadows, pastures, kitchen gardens and manors) - 17%. 52.7% of the area was covered with forest, uncomfortable lands occupied 25% [Tsvetkov, 1957]. European Russia for nearly two centuries lost almost a third of its forests - in 1914. forest cover decreased to 35%. But this is an average figure. For individual provinces, this figure fluctuated sharply. For example, in 1914, the forest area was: in Tula province 7.8%, Samara - 7.5%, Voronezh - 7.4%, Kursk - 6.2%, Penza, Orel, Tambov provinces - 16%. The deforestation, along with the plowing of land, the systematic loosening of the soil, the destruction of natural vegetation, the creation of artificial drainage lines during land surveying, plow furrows created favorable conditions for the appear-

ance of a dense network of ravines. Such active development of ravines in the late XIX-early XX centuries allowed researchers to come to the conclusion about the purely anthropogenic origin of the ravines. A.A. Kozmenko [1963] believed that the modern erosion was caused solely by agricultural development, although V.V. Dokuchaev [1878] wrote about the natural origin of ravines and their role in the formation of the fluvial network. The appearance of natural ravines is caused by a number of natural processes: lateral erosion of rivers, landslides, karst, suffusion, catastrophic rainfall, etc.

Man-made ravines owe their appearance and development primarily to economic activities affecting the state of natural landscapes. The end of the 20th century in the Russian Federation was characterized by a decrease in acreage, a change in agriculture, which led to a decrease in the number of active ravines. If earlier the main cause of gullying was agricultural activity (expansion of arable land), then the share of technologically caused ravines is growing (in settlements, when laying roads, pipelines, mining). The role of man in gully erosion is reduced, to a large extent, to the creation of conditions of gullying.

In the Research Laboratory of Soil Erosion and Channel Processes named after N.I. Makkaveev, Faculty of Geography, Lomonosov Moscow State University, compiled a map "Realization of the potential of gully erosion of the territory of the Russian Federation" scale 1:2500000. On it, on a five-point scale, territories are shown with different probability of achieving the density of the gully network in conditions of agricultural development. On the most part (more than 50%) of the territory of European Russia, in conditions of unchanged natural watersheds, the probability of development of the gullying process is practically zero, and only 0.8% of the area is 100%. The main factor influencing this is the active construction, the laying of roads and all sorts of linear structures, the creation of quarries. They led to the formation of ravines connected with engineering structures. The results reflect the general trend of increasing the role of man-made ravines. This is also confirmed by field surveys in a number of cities in the center of the Russian Plain. It should be noted that, unlike agricultural ravines, man-made ravines are much less dependent on the natural and climatic conditions of the territories where they are located - the main factors for their formation are relief features, geological conditions, the degree and nature of anthropogenic load. According to the conditions of origin, three groups of technogenic ravines can be distinguished - “roadside”, “industrial stock” and “urbanogenic”.

Types of man-made ravines

Roadside ravines are attributed to man-made, since the construction of both highways and unpaved roads uses a large number of different techniques, as well as huge amounts of soil and building materials are moved. The consequence of this is a man-made change in topography and, consequently, catchments. There is

a redistribution of runoff in the newly formed drainage basins and the appearance of erosion forms. In addition, along the roadway, a drainage slide is created - a ditch designed to ensure the flow of water from the road surface. For the passage of surface water, at the intersection of depressions in the relief, in the body of the road embankment dyukers are laid perpendicular to the road.

Industrial-stock ravines are less common. This is due primarily to the more local distribution of objects with a flow of industrial water. For the formation of such ravines, it is necessary to violate the rules for the discharge of industrial wastewater from the territory of the facility and to ignore the relief of the surrounding area. As an example, we can cite areas for the extraction of oil and minerals (quarries), construction sites, places of pipeline breakthroughs, etc.

Urbanogenic, or ***urban,*** ravines [Kovalev, 2005] are allocated in a separate group, as they are the result of processes and phenomena inherent only in residential areas. Morphological and morphometric features of ravines and the intensity of their growth depend on the type of settlement [Kovalev, 2001] and the level of anthropogenic load.

Roadside ravines are the most widespread, and among them are the cuvette, located along the road and the ravines of the crossings, located at an angle to the road. Cuvette ravines are found everywhere at elevation differences along highways. The cuvettes themselves create conditions for erosion, concentrating the water flow. Sometimes a roadside ravine is formed on long slopes with a minimum catchment or in its absence, when the catchment area is the road bed. They occur when precipitation is large and 100% of the coefficient of runoff from the asphalt pavement. The problem of road ravines arose long ago.

Unsettled roadside spaces and the calculation of runoff volumes, based on 5–10% security, remain the main reason for the formation of cuvette ravines even now. For-the average growth rate of the cuvette ravine in the Ulyanovsk Volga region for 24 years - 26 m / year, in 1964-66 - up to 55 m / year. Its development was uneven, with peaks in 1984 (123 m), 1987 (42 m), 1991 (62 m) and 1994 (52 m). Since 2001, its active growth has ceased. This is due not so much to the natural conditions of the territory as to the uneven anthropogenic impact.

Another type of roadside ravines - ravines crossings through roads, are located perpendicular to the road (country, asphalt, railway embankments). They are a continuation of the ravine, hollow or hollows on the opposite side of the road, which is why the siphon was built. And anyway, the stream concentrates here. The formation of a ravine at the exit can occur both with the wrong calculation of its carrying capacity, and in the absence of dampers.

The next type of man-made ravines is ***industrial stock*** (Grigoriev, Rysin, 2008). There are frequent cases of intentional use of linear erosion forms as water outlets from territories occupied by residential or industrial buildings. An example

is the discharge of industrial and domestic water from the plant in Bryansk or, for example, the discharge of warm water from the territory of CHPP-1 in Vorkuta, which caused the formation of thermal erosion ravines [Lyubimov, 1970], and so far some of the wastewater to the tundra. This type of ravine is relatively rare, localized being tied to populated areas.

A special group is urban ravines. They can be divided into ***urbanogenic,*** or ***urban ravines*** [Kovalev, 2005]. The first - the ancient ravines on the territory of the village and ravines that entered into their territory during the expansion of the boundaries of the settlement. Most often, they have already completed their development and to some extent are integral parts of the territory of settlements, without causing significant damage, except for the complexity of their infrastructure.

Unlike urban ravines, urbanogenic ravines are generated by economic activity in the territory of urban settlements and pose a certain threat to it. The destruction of vegetation, soil and plant layer during construction, the redevelopment of the catchment area, the redistribution of flow, an increase in the flow coefficient leads to the emergence of new ravines and reanimation of old ones. Some of them may be filled up during the construction process, but this does not guarantee that the filled up ravine will not be revived and will begin to grow again.

By the 90th. of the twentieth century, most small settlements in Russia had at least one street or access road with hard surface. Almost everywhere asphalted or laid out with concrete plates of the site near the outbuildings. The result of this is the formation of new runoff lines and a change in the runoff coefficient. In addition, the seams between the plates themselves concentrate stock. Sometimes the development of the ravine begins under the plates. Developing ravines threaten the destruction of roads and buildings. In some cases, the violation of turf cover as a result of only survey and preparatory work (drilling, moving heavy equipment, leveling the ground) led to a sharp activation of two existing ravines and the emergence of new ones in the city of Bryansk. The ravines that already existed on the territory grew 1.5–2 m over the year. During the same year, three new, rapidly growing erosion forms were formed. Planting trees as an anti-erosion event not only did not slow down their development, but, on the contrary, by creating new streamlines between the rows, intensified the process. Such examples can be found in many localities of different ranks. But, probably, the most important reason for gullying in human settlements is not new construction, but un-planned planning of urban neighborhoods, the absence or incorrect construction of a drainage network.

An example of the development of urban ravine due to the planning and not thought out storm sewage system is Krylatskoye microdistrict in Moscow. In the 1970s the construction of Krylatsky and the construction of Olympic facilities began. In 1979, a cycle route was opened on Tatarovskysk and a storm sewage system was completed. By 2004, storm sewers in the estuaries were partially de-

stroyed, clogged with debris and no longer able to cope with the passage of water. On July 30, 2004, with a short-term rainfall, 78.6 mm of precipitation fell (data from the meteorological station of Lomonosov Moscow State University). In the upper reaches of the Verkhne-Tatarovsky ravine, in descending down Krylatsky Hills Street, the water flow from the adjacent territories was concentrated within the roadway bounded by a curbstone. The depth of the stream was about 0.5 m, with a curb of 25 cm in height. During the downpour, the head of the ravine blurred along its length by 3 m and its width up to 5 m, causing a threat to the destruction of the cycle route. But not only the flow of water from nearby neighborhoods threatens the integrity of the cycle route. When it was designed, a drainage system for surface water was planned with its drainage to the slopes of ravines. At the same time, no quenching and spraying devices were designed. As a result, at one of the openings in the ravine, Stone Infections washed out 4 m of the storm sewer pipe. In the same place, on another screwdriver, water flow through the siphon eroded the slope and formed a ravine 40 meters long, up to 8 meters wide and 6 meters deep.

Conclusion

The division of ravines into natural and anthropogenic [Zorin, 2003] and the division of the latter into agricultural and man-made - is the main one in gullying. In turn, man-made ravines can be divided into ravines: roadside, transitions, industrial stock, quarry, urban and residential. Urban ravines are subdivided into urban and urbanogenic.

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将领土划分为合理的规则
THE ZONING OF TERRITORIES TO JUSTIFY MELIORATIVE REGULATION

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抽象。 在该条款中，考虑了根据不同类型的填海土地的要求而设的土地。 提供了一种方法来确定不同自然区域需要什么类型的填海或其组合。注意土壤的水力，热量和营养因素。 所提供的方法允许估计具体类型的改进或其组合的必要性。 该方法可用于不同的自然区域和条件。

关键词：改良，改良影响的理由，划分区域，植物需求，植物环境因子，土壤水分因子，温度条件，土壤养分因子。

Abstract*. In the article, territories of land ranging in accordance to requirement of different types of reclaimed lands are considered. A method is offered to determinate what types of reclamations or their combinations are required for different natural zones.The attention is paid to hydro, thermal and nutritious factors of soils. The offered method allows estimating the necessity of a concrete type of melioration or their combinations. The method can be used for different natural zones and conditions.*

Key words*: melioration, justification of melioration influence, division into districts of the territory, requirement of plants, factors of environment of plants, hydro factor of soils, temperature condition, nutrient factor of soils.*

Quantitative methods of justification of need and efficiency of melioration were always the cornerstone of the differentiated management [1]. One of the effective methods to visualize the results and to substantiate the need for land reclamation is zoning. Depending on the task of an integrated amelioration measures, we can provide macro, meso and micro zonings. A methodology of macro zoning is discussed in this work. Zoning allows to increase the efficiency of land reclamation by dividing the territory depending on the desired type of reclamation for growing plants. The land reclamation involves a variety of types depending on controlled factors: hydro, temperature, contents of nutrients, contents of salts in the soil, etc. According to the above, some types of land melioration have been distinguished, for example:

- hydro melioration (regulation of soil moisture and depth of groundwater level by means of drainage and irrigation);
- thermal melioration (regulation of soil temperature and temperature of air);
- nutritious melioration (regulation of nutrients in plants and in the soil by applying fertilizers, biological means and others);
- agro melioration (measures to protect soil from erosion, accumulation of snow in the fields, snow melting controls)
- forest melioration (the direct change of natural systems to improve crop yields by planting trees and shrubs etc.);
- chemical melioration (regulation of salt content in the soil on a plant level) etc.

Some can be attributed to the activities to prepare land for growing plants (for example, cultural and technical melioration that allows cleaning lands from timber and grass vegetation, rocks etc.). Others allow creating favorable conditions to form of the high, guaranteed crop yields (for example, hydro, thermal and nutritious melioration).

The territory of Russia is located in the different natural zones significantly differing in hydro and thermal conditions, efficiency of lands and other factors. Therefore, the territory can be divided into natural and ameliorative zones and subzones within which, agricultural production becomes more efficient under specific type or combination of different types of amelioration.For example, in tundra zone and the forest-tundra one, the system of ameliorative measures includes: thermal melioration; selective drainage of floodplains, nutritious melioration (introduction of considerable doses of fertilizers).

In the conditions of Taiga zone the following measures are required: drainage, cultural and technical meliorations, chemical and nutritious meliorations (lime application into soils, introduction of mineral and organic fertilizers) and phyto - meliorative measures.

In the zone of the mixed forests the main types of melioration are: drainage (surface runoff collecting and groundwater level lowering), thermal (protect plants

from frost),cultural and technical ameliorations, chemical melioration (lime application) and nutritious meliorations, argo and forest reclamations.

Ameliorative zoning of territories is carried out taking into account factors of environment to plant cultivation. Major factors are:

- water (its content forms the needed amount of moisture and air in the soil, so-called water-air mode of soils that defines conditions of plant growth. Amount of water is managed by means of drainage and irrigating systems);
- temperature (the defining growth and development of plants), it is characterized by temperatures of the soil and air;
- soil fertility (characterized by the contents of nutrients available to plants in the soil).

The probability distribution of factors (for example, soil moisture contents, soil temperatures) are well described by the normal law of distribution.

The technique of justification of complex melioration has to meet the following requirements:

- accounting of climatic features of a zone;
- accounting of biological features of agricultural crops.

"The bioclimatic method of justification of melioration" takes into account all these requirements [2]. The method is based on the following, the requirements of crops are compared with the environmental factor. The changing of characteristics in space and time as well as the growing conditions of plants are characterized completely by their distribution functions. It allows probability defining of optimum conditions (Popt), probabilities of increasing value of a factor (Pthe need to increase the value of the factor (P↑) or its decrease (P↓).

Requirements of plants to the factors of environment

Requirements of plants to the factors of environment are understood as a quantitative expression of dependence of their crop yields from the considered factor [2]:

$$S_{\varphi} = \left(\frac{\varphi}{\varphi_{opt}}\right)^{\gamma \cdot \varphi_{opt}} \times \left(\frac{1-\varphi}{1-\varphi_{opt}}\right)^{\gamma \cdot (1-\varphi_{opt})} \quad (1)$$

where S_{φ} - relative productivity (efficiency) of agricultural plants representing the relation of the actual crop productivity to the greatest possible productivity in specific conditions; φ - relative value of the factor; φ_{opt} – optimum relative value of the factor; γ - a coefficient characterizing the self-regulation of plants.

The requirements of plants are used for the definition of lower (φ_1) and upper (φ_2) optimum limits of the considered factor corresponding to the given level (planned) relative of crop productivity (in the fig. 1 S_{plan}=0,8).

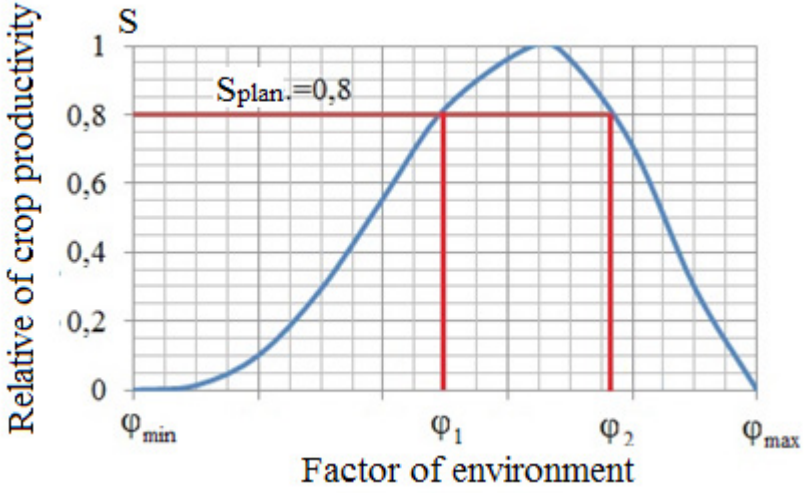

Fig. 1. *A view of the curve of plant requirements from an environment factor*

Characteristic of the environment conditions. Thecharacteristics of growth conditions of plants, that vary in space and time, to the factor is described by its distribution function f(φ) or its integral form (fig. 2). On the function the lower and upper values allow separating the areas corresponding probabilities:

- the need to increase the value of the factor P↑ (for example, in the case of a reclamation, it is the probability of need for irrigation);
- the probability of optimality conditions Popt ;
- the likelihood of the need to decrease the value of the factor P↓ (e.g., the probability of the need for drainage of soils).

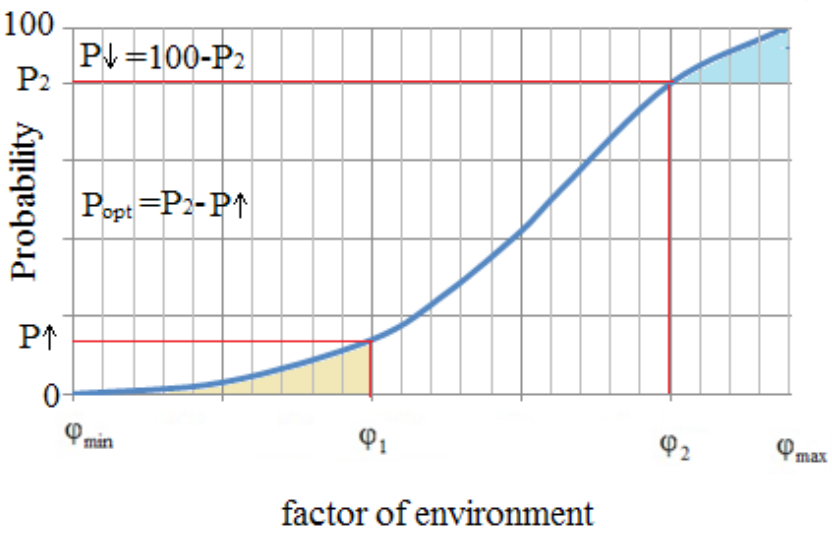

Fig. 2. *An view of the integral curve of a distribution density factor of the environment*

The rationale for specific type of melioration is carried out separately. Using this approach, probabilities of the need of regulation factors of crop life were carried out for different natural zones. The following factors were considered: soil moisture; temperature; the contents of the forms of potassium and phosphorus available to plants in soil (tab. 1).

Table 1

Likelihoods needing to hydro and thermal meliorations

Natural zone	Crop	Likelyhoods, %							
		Hydro melioration				Thermal melioration			
		P_{opt}	P↑	P↓	$P_м$	P_{opt}	P↑	P↓	$P_м$
Tundra	1	12	7	81	88	6	94	0	94
	2	19	10	71	81	15	85	0	85
	3	-	-	-	-	-	-	-	-
Northtaiga	1	12	4	84	88	8	92	0	92
	2	16	17	67	84	23	77	0	77
	3	13	1	86	87	-	-	-	-
Middletaiga	1	14	13	73	86	6	92	2	94
	2	18	15	67	82	17	83	0	83
	3	16	13	71	84	-	-	-	-
Southtaiga	1	18	9	73	82	13	86	1	87
	2	28	5	67	72	34	66	0	66
	3	33	17	50	67	-	-	-	-

Note: 1 – the winter wheat; 2 – the summer wheat; 3 – potatoes.

Results of researches. By results of calculations, it is possible to make the conclusion:

1. For the considered zones the probability of irrigation is small (up to 15% that corresponds to average degree of need). Decrease of crop yields without irrigation doesn't exceed 10%.

2. Rather high need for drainage is selected (it should be noted that in the calculations hydro-physical characteristics of the most common soils in natural areas were used. So the speech goes about the likelihoods of the need to drainage temporarily waterlogged mineral soils). Effect on crop yields corresponds to 30 ... 50%.

3. Concerning thermal melioration, it has a high probability of need to raise the temperature. The impact on reducing yields is up to 40 ... 77% due to the limitation of the thermal factor (tab. 2).

Table 2

*Decrease productivity of crops depending on the hydro-thermal factors**

Natural zone	Crop	Фактор		
		Hydro		Thermal
		$\Delta S_w\uparrow$	$\Delta S_w\downarrow$	ΔS_T
Tundra	1	0,04	0,57	0,75
	2	0,06	0,50	0,68
Northtaiga	1	0,02	0,59	0,74
	2	0,10	0,47	0,62
Middletaiga	1	0,08	0,51	0,75
	2	0,09	0,47	0,66
Southtaiga	1	0,05	0,51	0,70
	2	0,03	0,47	0,53

** The limitation is determined by the factor with the most value ΔS*

The need in the nutritious melioration is determined differently than for hydro and thermal ones. This is due to the large variety of oils with different fertility and a mechanical composition. Therefore, the calculations are carried out for different levels the soil fertility, which is determined, in this case, by the availability of nutrients in the soi: P_2O_5 and K_2O [3].

Depending on availability phosphorus and potassium in different soils, the probabilities of the need to increase their contents are changed approximately by 10 times. The need in nutritiousmelioration is rather high, because natural fertility of the soils, in the considered zones, is low (tab. 3, 4).

Table 3

Probabilities of P_2O_5 and K_2O regulation in podzolic and grey soils In The Nonchernozem zone in dependence to a nutrients' content, %

Content level nutrients	P_2O_5		K_2O	
	P_{opt}	$P_м$	P_{opt}	$P_м$
Very low	0	100	0	100
Low	0	100	0	100
Middle	18	82	14	86
Aboveaverage	46	54	54	46
High	79	21	79	21
Very high	90	10	85	15

Table 4

Probability of need in fertility melioration for the soils in theNonchernozem Zone, %

Natural zone	P_2O_5		K_2O	
	P_{opt}	$P_м$	P_{opt}	$P_м$
Tundra	0	100	0	100
Northtaiga	0	100	0	100
Middletaiga	18	82	16	84
Southtaiga	46	54	50	50

The efficiency of nutritious reclamation is determined (table. 5, 6) as the increasing in the crop yields by regulation phosphorus and potassium content in the soils. The plant productivity was evaluated in accordance with the Liebig law of the minimum.

$$S_{wTG} = min\{S_W, S_T, S_G\} \quad (2)$$

Table 5

Relative efficiency of grain crops in a taiga zonewithout ameliorative influence

Taiga zone	Winter wheat			Summer wheat
	S_w	Sp_2o_5	$Sк_2o$	S_w
North	0,26	0,25	0,15	0,40
Middle	0,38	0,30	0,18	0,50
South	0,87	0,45	0,25	0,92

Taking into account meliorative regulation the relative crop yields was accepted at the level of $S_{plan.}$ = 0,8. The efficiency of ameliorative regulation was determined by the formula:

$$\Delta S = S_{план} - S_{wTG} \quad (3)$$

Table 6

Efficiency of ameliorative regulation of factors of plant life (ΔS)

Taiga zone	Wheal	Potatoes
North	0,78	0,65
Middle	0,80	0,70
South	0,63	0,55

Conclusions

1. Despite all relativity of the given calculations, it shows that the given methodology can be used for justification of melioration for macroclimatic zones.

2. The choice of "nonagricultural" geographical zones (Tundra and Taiga) was made to show how the global climate changes could influence the likelihood of the need of a melioration type.

3. In the case of using the moisture content in the soil, like the parameter reflecting environmental conditions of more detailed elements of a landscape (the district, facies), the proposed method allows to carry out justification of needed type of melioration for the meso and microclimatic levels.

4. The calculated values can be used for estimating the probabilities of need different kind of meliorations with the help of an analogy method:

- interpolation - to estimate the need of reclamations for conditions within considered zones;
- extrapolation - to make an estimation for conditions other zones.

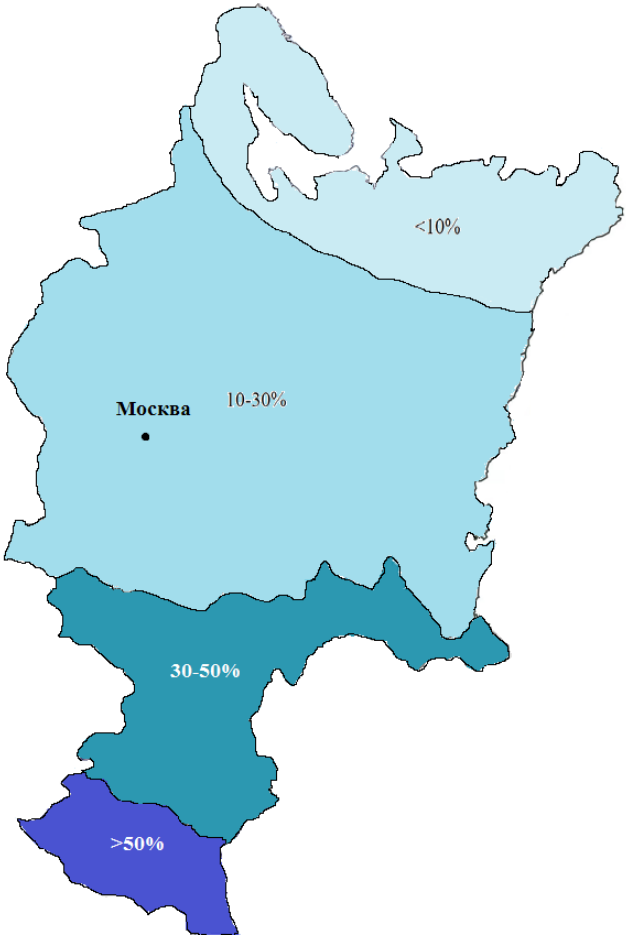

Fig. 3. *An estimation of probabilities of need hydro meliorations with the help of the analogy method for European territory of Russia (agricultural plant summer wheat)*

There is an estimation of probabilities of need hydro meliorations for European territory of Russia on the figure 3. The one was done with the help of an analogy method. To use the method was taken hydrothermal coefficient, which is the ratio of the potential amount of precipitation to the total evaporation from the land surface on the territory.

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俄罗斯计划中铆钉化合物的自动化设计
NANOCAD MECHANICS 9.0
AUTOMATED DESIGN OF RIVET COMPOUNDS IN THE RUSSIAN PROGRAM
NANOCAD MECHANICS 9.0

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注解。 结果表明，在俄罗斯程序nanoCAD Mechanic 9.0中，有用于铆接接头的计算机辅助设计的工具。 其中包括“机械”选项卡和其中包含的“铆接”工具，之后将打开“铆接”对话框。 在指定的窗口中，根据州标准预先安装铆钉列表，选择并编辑它们。 给出了设计的例子。

关键词：铆钉，nanoCAD力学9.0，选项卡，工具，工具，对话框，状态标准，铆接接头，选项，选择，编辑，AutoCAD，Autodesk Inventor。

俄罗斯计划nanoCAD Mechanics 9.0，build 35,2018用于评估计算机辅助设计的能力。

Annotation. *It is shown that in the Russian program nanoCAD Mechanic 9.0 there are tools for computer-aided design of riveted joints. These include the Mechanics tab and the Riveted Joint tool included in it, after which the Riveted Joint dialog box opens. In the specified window with a list of rivets pre-installed in accordance with State Standard, they are selected and edited. Examples of design are given.*

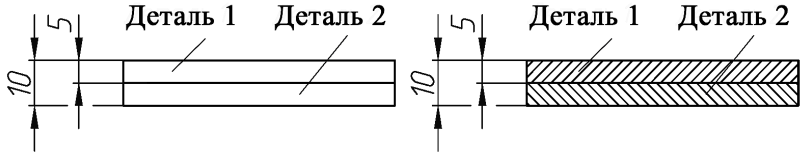
Keywords: *rivet, nanoCAD Mechanics 9.0, tabs, tools, tools, dialog boxes, State Standard, riveted joints, options, selection, editing, AutoCAD, Autodesk Inventor.*

The Russian program nanoCAD Mechanics 9.0, build 35, 2018 was used to assess the capabilities of computer-aided design.

I. Preliminary design of joints without taking into account the material of rivets and gaps in the holes for rivets.

Below, using the example of the Bracket compact instrument [1], a general approach to the design of rivet joints of parts is considered.

In the “Bracket” product, using rivets, they connect two parts “Bracket” (detail 1) and “Corner” (detail 2) to each other - fig. 1.



a b

Fig. 1. *Walls of the connected parts of the Bracket product: a - not shaded; b – shaded*

At the initial stage, using the Rivet Joint tool (LC* on the tab of the interface of the Mechanic from the Design group - Fig. 2) and the ORTO mode (F8 key), LC indicate the starting point, and moving the mouse cursor and LC fix the end point of the future riveted joints (Fig. 3) - the Riveted joints dialog box opens (Fig. 4)

***Note.** Here and below: LC - left click.

Fig. 2. *Tool Rivet joint from the group "Design"*

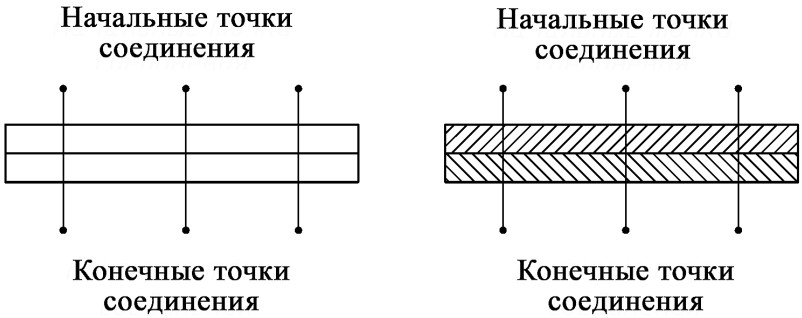


Fig. 3. *Specify the starting and ending points of the connection*

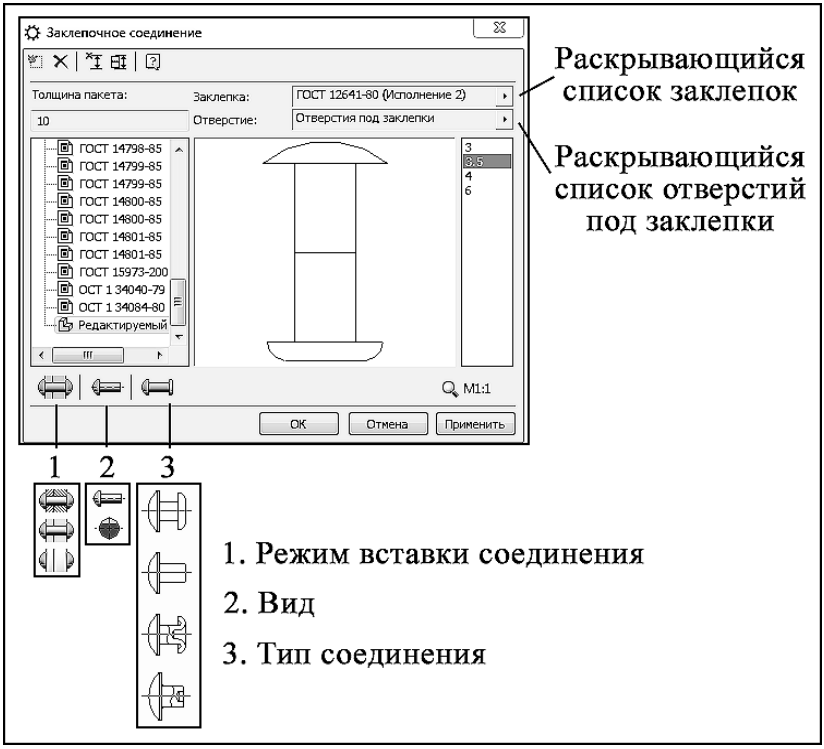


Fig. 4. *Rivet Dialog Box*

The possibilities of computer-aided design and analysis are considered using the example of connecting parts using three different rivets:

1) rivet No. 1 (left): LC in the Riveted joint dialog box (Fig. 4) on the line, for exam-ple, State Standard 12641–80 - LC on the selected rivet diameter, for example, 3.5 mm - LC on the Apply button - LC on the OK button - a riveted joint is formed for a pre-set package thickness of 10 mm (Fig. 5);

2) rivet No. 2 (in the center): LC in the Riveted joint dialog box (Fig. 4) on the line, for example, State Standard 12640–80 - LC on the selected value of the rivet diameter, for example, 3 mm - LC on the Apply button - LC on the OK button - a riveted joint is formed for a pre-set package thickness of 10 mm (Fig. 5);

3) rivet No. 3 (right): LC in the Riveted joint dialog box (Fig. 4) on the line, for ex-ample, State Standard 12640-80 - LC on the selected value of the rivet diameter, for ex-ample, 8 mm - LC on the Apply button - LC on the button OK - a riveted joint is formed for a pre-set package thickness of 10 mm (Fig. 5).

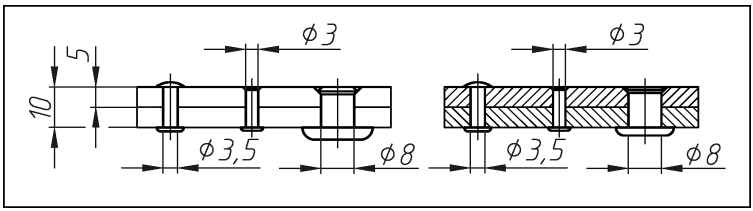


Fig. 5. *The result of the preliminary design rivet joints*

II. Editing of designed joints with regard to material of rivets and gaps in holes for rivets.

Based on the analysis of previously designed riveted joints (Fig. 4.7), conclusions are made, for example: 1) rivet No. 1 (left) is replaced with semi-hollow; 2) rivet number 2 is not suitable for structural reasons; 3) rivet No. 3 (right) is replaced with a hollow (for ex-ample, to pass inside its insulated current conductor) and reduce its outer diameter to 5 mm.

For rivet number 1:

1) double LC on the rivet head with a diameter of 3.5 mm (Fig. 5) - the State Stand-ard 12641–80 (Version 2) dialog box opens - fig. 6;

2) LC on the “Normal view” list (fig. 6) - LC on the opening list “View with a slit” (fig. 7) - LC on the OK button (fig. 7).

The result of the design is shown below in Fig. 12 (rivet - from steel, the gap in the hole for the rivet - 0 mm).

For rivet number 3:

1) double LC on the rivet axis with a diameter of 8 mm (Fig. 5) - a dialog box opens Riv-eting connection with the relevant standard for the selected rivet State Standard 12640–80 (Version 1) - fig. 8;

2) LC on the engine of the “Rivets” list (Fig. 8) - by moving the cursor while pressing the left mouse button, visually select the necessary rivet - LC on the State Standard 12638 list (Type 1) - the configuration of the selected rivet with a diameter of 5 appears mm (Fig. 9) for a pre-set package thickness of 10 mm (Fig. 5)

;

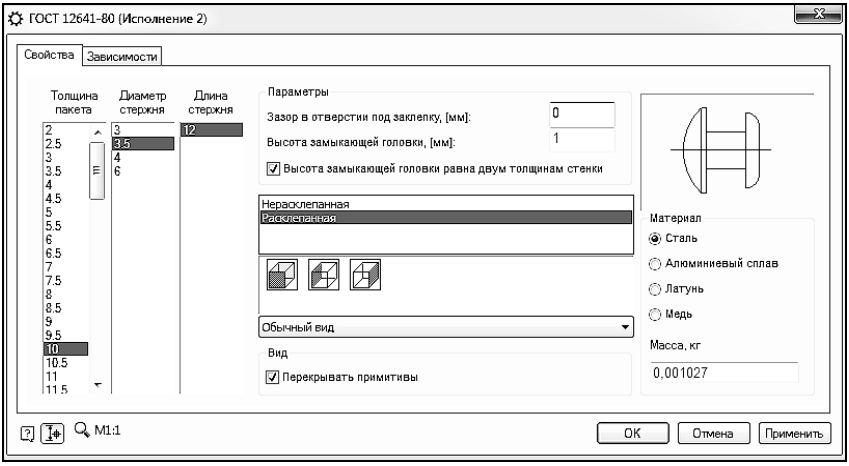


Fig. 6 *Dialog box of State Standard 12641–80 (Execution 2) with a list for the image of rivets "Normal view"*

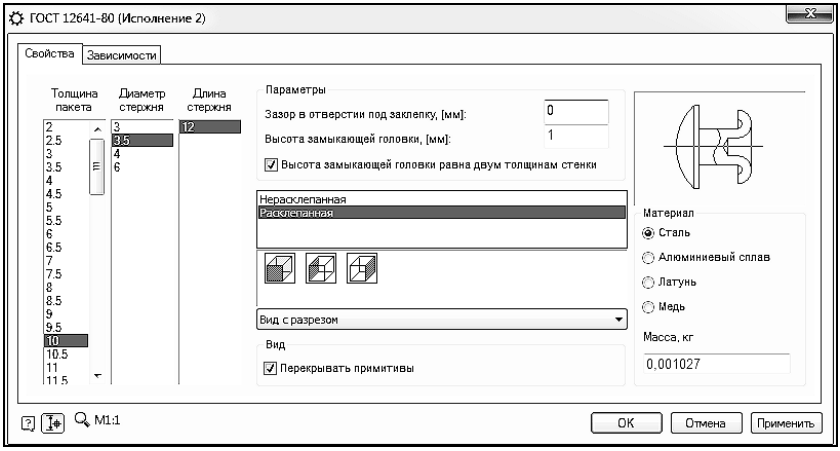


Fig. 7 *Dialog box State Standard 12641–80 (Execution 2) - "View with a cut" list*

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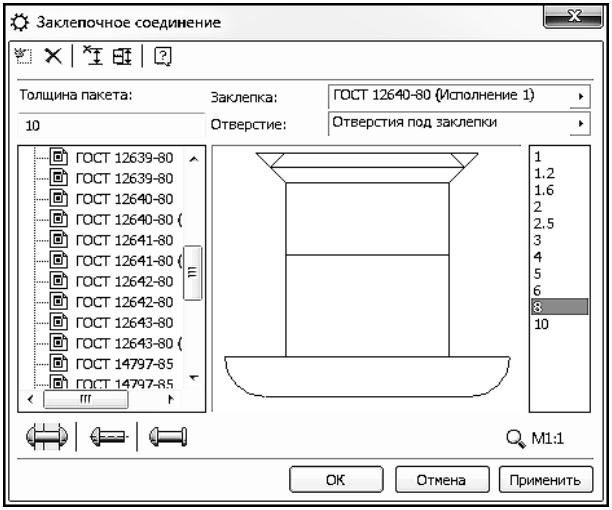

Fig. 8 *Dialog box Rivet with rivet selected (State Standard 12640–80 version 1)*

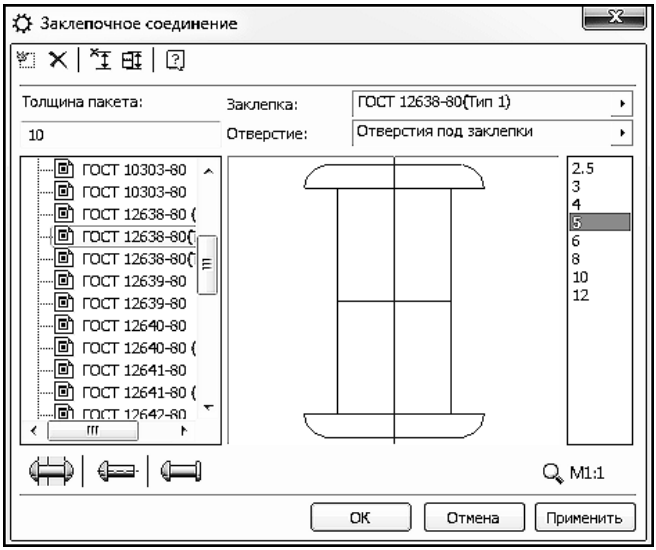

Fig. 9. *Dialog box Rivet with new rivet*

3) LC on the OK button (fig. 9) close the Riveted joint dialog box (fig. 9);

4) double LC on the head of a rivet with a diameter of 5 mm - the dialog box opens State Standard 12638–80 (Type 1) - fig. 10;

5) LC on the “Normal view” list - LC on the opening list “View with section” (Fig. 11) LC on the OK button (Fig. 11).

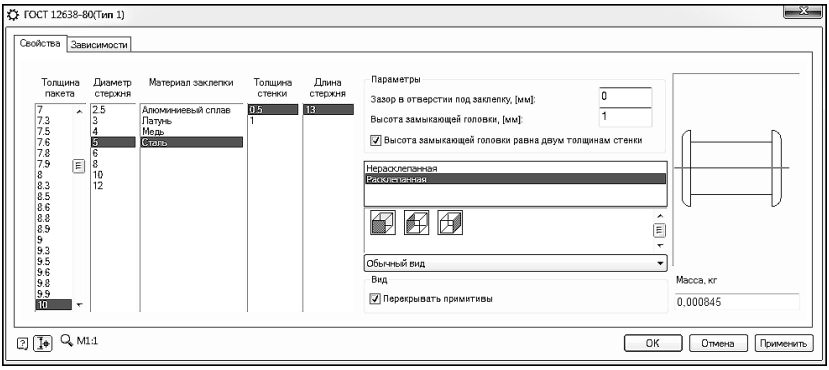

Fig. 10. *Dialog box State Standard 12638–80 (Type 1) - list “Normal view”*

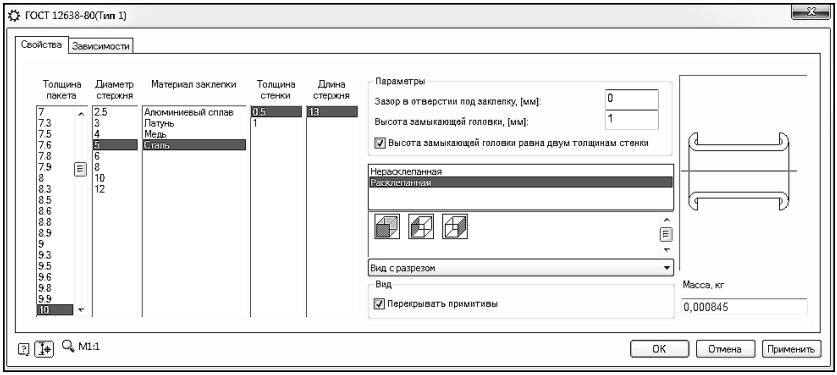

Fig. 11 *Dialog box of State Standard 12638–80 (Type 1)*

The result of the design is shown below in Fig. 12 (rivet - from steel, the gap in the hole for the rivet - 0 mm).

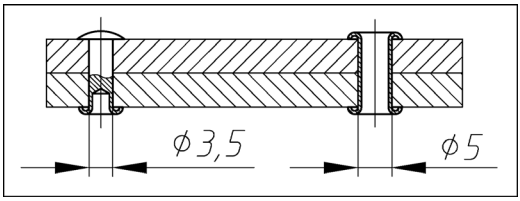

Fig. 12. *The result of the final design of the compounds:*
a - with semi-hollow rivets Ø 3.5 mm (State Standard 12641–80, version 2);
b - with hollow rivets Ø 5 mm (State Standard 12638–80, type 1).

In the absence of the required type of rivets in the Riveting joint (Fig. 4) dialog box, the joints are designed based on the use of the Base of the nanoCAD elements:

1) double LC on the axis of the pre-designed joint - the Riveted joint dialog box (Fig. 4) opens - LC on the drop-down list of rivets (Fig. 4) - the Part selection dialog box (Fig. 13) opens in the Base of nanoCAD elements;

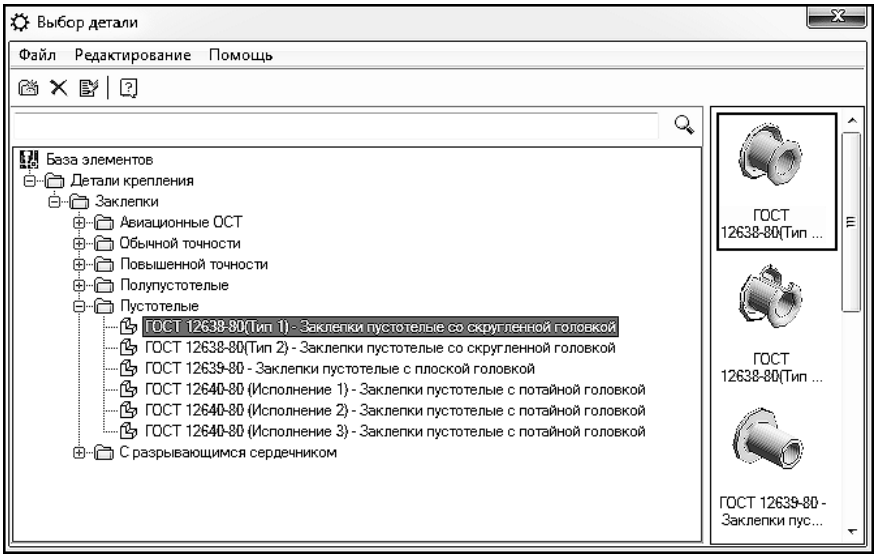

Fig. 13. *Tool selection dialog*

2) LC in the viewing window on the selected rivet State Standard 12638–80 (Fig. 13) - the dialog box Image selection closes automatically, and in the Rivets list of the Riveted Joint dialog box, the selected rivet option appears corresponding to State Standard 12638–80.

If the preliminary results of the design of the joints are not satisfactory (Fig. 12), then use the appropriate dialog boxes (Fig. 6 and Fig. 10), in which by choosing it is possible to take into account the interrelation of several parameters: 1) the package thickness and the diameter of the rivet rod; 2) the gap in the hole for the rivet; 3) you are the cell of the clos-ing head of the rivet; 4) rivet material (steel, aluminum alloy, brass or copper).

In addition to instrument-making products [1], riveted joints are widely used in vari-ous building structures (Fig. 14) and in machine-building product assemblies (Fig. 15). Automated design of riveted joints in these structures and products is carried out accord-ing to the above method, with rivets can connect packages of several parts of arbitrary thickness, and the diameters of rivets that are unacceptable for a given thickness of a package of parts are automatically eliminated.

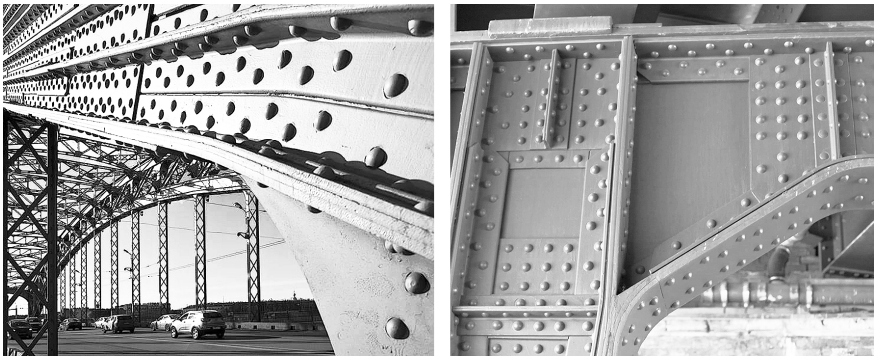

Fig. 14 *Examples of riveted joints in building structures.*

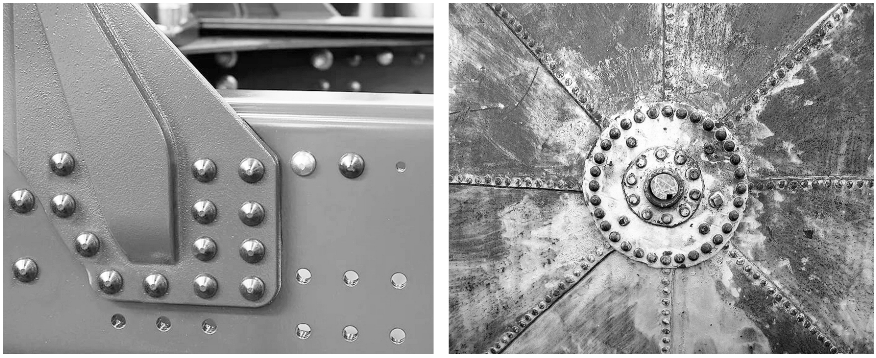

Fig. 15 *Examples of riveted joints in mechanical engineering units*

Findings:

1) the design functionality implemented in the nanoCAD Mechanics program is currently one of the most rational. The database allows to take into account the requirements of a large number of ESKD standards, and due to parametric dependencies of rivet sizes and thicknesses of connected parts, the design of connections takes much less time;

2) given the increasing relevance of replacing foreign CAD platforms with Russian and wide possibilities for automating connection design, the use of the nanoCAD editor Me-chanics [2] of the Russian company Nanosoft (www.nanocad.ru) is more than justified and allows you to refuse to work in foreign editors of AutoCAD [3], Autodesk Inventor and their applications (www.autodesk.com and www.autodesk.ru).

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基于危险生产情况控制的生产风险管理理念
THE CONCEPT OF PRODUCTION RISK MANAGEMENT BASED ON THE CONTROL OF HAZARDOUS PRODUCTION SITUATIONS

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注解。 阐述了煤矿企业生产风险管理概念的基本原则。 俄罗斯煤炭工业企业使用的安全保障模型正式化和特征化。 在对这些模型进行分析的基础上，发现只有投资模型符合提出的概念，现代企业运作的要求和条件。 建立了基于危险生产情况控制的生产风险管理逻辑模型。 生产风险管理主要阶段的实施结果证明了所提出概念的有效性。

关键词：竞争力，效率，安全，安全模型，风险管理，生产风险，危险生产情况。

Annotation. *The basic principles of the concept of production risk management at the coal mining enterprise are stated. The models of safety assurance using by Russian enterprises of the coal industry are formalized and characterized. Based on the analysis of these models were found that only the investment model meets the proposed concept, modern requirements and conditions of enterprises operation. A logical model of production risk management based on the control of hazardous production situations is developed. The results of the implementation of the main stages of production risk management proved the effectiveness of the proposed concept.*

Keywords: *competitiveness, efficiency, safety, safety model, risk management, production risk, hazardous production situation.*

The rapid development of coal mining enterprises, due to high competition in the coal industry, requires an appropriate rate of increase in safety. The main controlled parameters of competitiveness today are efficiency and safety of production. The world practice of coal mining enterprises shows that a high level of production safety is a significant competitive advantage, since it ensures the reliability of the operation of an enterprise when it reaches the required level of its economic efficiency. And the importance of safety, as one of the main competitive advantages of a coal-mining enterprise, is constantly growing, as mines around the world are comparable both in terms of production conditions and in the methods used to ensure production safety.

In conditions when both the main technical and technological means of production and means (methods) of safety are standardized, distributed and mastered at coal enterprises all over the world, competitive advantages are gained through the use of effective methods of actions and methods in the field of safety. For example, the concept of “zero injuries” (Vision Zero) has become widespread, for which enterprises use various methods to reduce injuries, in particular, risk management.

Risk management today is one of the main methods of ensuring production safety [11-13]. Since the risk level is a derivative of conceptual approaches implemented in the production safety system, the development and implementation of an adaptive concept that takes into account all the factors of a complex technosphere will significantly reduce production risk in a coal mining enterprise. Thus, the coal-mining enterprise will achieve the required level of safety and production efficiency and provide competitive advantages.

In connection with the above, the development of a risk management concept is of great importance for solving problems of ensuring efficiency and safety of production. Such a concept should, first of all, prevent a conflict between these tasks (production conflict), therefore it is advisable to build a management concept based on the concept of “production risk”.

By production risk is understood the risk associated with the characteristics of a particular production, taking into account the technology used, the management system, and working conditions. The concept of "production" includes all the factors that affect workers in various professions in the course of their work activities, and is related to production (type of activity, enterprise or industry as a whole).

Thus, production risk is associated with property damage for an organization as a result of harm to the life and / or health of workers and other persons exposed to production factors. It includes, at a minimum, the risk of the employer (corporate production risk), employee risk (personal occupational risk), state risk (social and economic risk) [15-18].

Thus, the production risk at a coal-mining enterprise is a consequence of the

choice of a solution aimed at achieving the target result of economic activity with the likelihood of receiving economic or any other damage due to the uncertainty of the conditions for implementing this decision. At present, it is advisable to manage production risk by controlling, that is, preventing or eliminating hazardous industrial situations, as evidenced by the work of recent years [1-8, 9-10, 14].

For the formation of the concept of production risk management, it was necessary to analyze the existing safety models implemented in coal mines. The results of the analysis suggest that in recent years, there have been (at some enterprises and in the past) three main models for ensuring production safety at domestic coal-mining enterprises (Fig. 1).

The main object of control of the subsidy model, characteristic of the Soviet period, that is, the period of a planned economy, is compliance with safety rules. During its existence, the concept of absolute security was adopted as fundamental. The main causes of injury in the operation of this model are as follows:

- imperfection of technology;
- design defects of the equipment;
- low labor and technological discipline.

The cost of ensuring safe working conditions corresponded to the costs necessary to increase production. Production efficiency and labor productivity are low.

The crisis model (1990s) is characterized by a partial rejection of the cost of safety and redistribution to the needs of the survival of the enterprise. The main risk factor is an uncontrollable realized production conflict (repeated violations of safety rules, not caused by discipline and qualifications of personnel). The main causes of injury:

- limiting (critical) wear of equipment;
- insufficient organizational and technological development of the newly introduced high-performance equipment, as well as its unformed service;
- low level of work organization;
- low labor and technological discipline;
- insufficiently effective production control.

The object of control is compliance with the basic safety rules, the violation of which leads to a direct threat to the life and health of people.

The investment model, which has received in recent years the spread of advanced Russian enterprises, such as JSC SUEK, is characterized by stable and sufficient investment in ensuring the level of safety that is necessary to achieve a high level of production efficiency. Production efficiency and productivity are high. The main risk factor is controlled (eliminated) production conflict. Causes of injury:

- low safety culture of labor, not corresponding to the level of development of production;

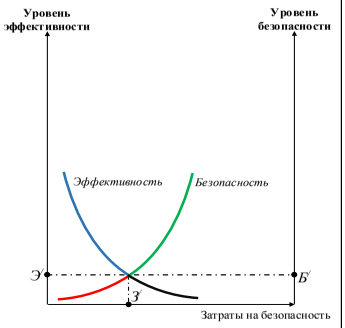
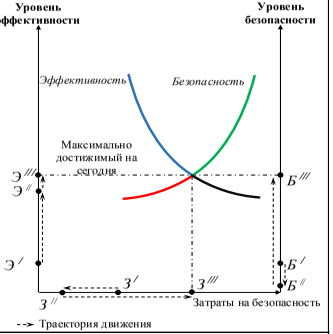
Parameter	Subsidized	Crisis	Investment
Target installation	The cost of ensuring safe working conditions required to increase production	Partial rejection of the cost of security necessary for the "survival" of the enterprise	Investing in security required to ensure production efficiency
Graphic presentation			
The main causes of injury	• Imperfection of technology; • Constructive defects of the equipment; • Low labor and technological discipline	• Limit (critical) wear of equipment; • Insufficient organizational and technological development of the newly introduced high-performance equipment, as well as its undeveloped service; • Low level of work organization; • Low labor and technological discipline; • Poor production control	• Safety culture, not corresponding to the level of development of production; • Labor organization that does not correspond to the level of production development; • Inadequate hazardous actions of workers (insufficient qualification in controlling risks)
Major risk factor	**Potential production conflict:** ***productivity ↔ safety***	**Uncontrolled realized industrial conflict (repeated violations of safety rules, not caused by the discipline and qualifications of staff):** ***efficiency ↔ safety***	**Controlled (eliminated) production conflict:** ***efficiency ↔ safety***
Object of control	Compliance with safety regulations	Compliance with the basic safety rules, the violation of which leads to a direct threat to the life and health of people	• Recurring security breaches; • Hazardous production situations; • Compliance with safety regulations

Fig. 1. *Models of production safety and the results of their application*

- labor organization, not corresponding to the level of development of production;

- inadequate hazardous actions of workers (lack of qualifications in controlling risks).

Object of control are:

- compliance with safety regulations;

- recurring security breaches;

hazardous production situations.

The mechanism for solving problems in the investment model, that is, the means of its implementation, is the control of hazardous industrial situations. It is this mechanism that determined the advantage of the investment security model in the framework of the developed risk management concept. This required the development of a logical model of production risk management based on the control of hazardous production situations (Fig. 2).

The use of such tools as the identification, elimination and localization of hazardous industrial situations began at the company's enterprises in 2014.

A dangerous production situation (DPS) is a combination of circumstances that occurs when personnel perform production tasks, which leads to an increase in production risk to critical values and a natural occurrence of injuries and accidents. The main purpose of the control DPS is to prevent its development in a negative event, that is, an accident or injury. Therefore, when an DPS is detected, the production risk is assessed and a decision is made about controlling the DPS or eliminating it. Taking into account the existing DPS, production activities are also planned (Fig. 3).

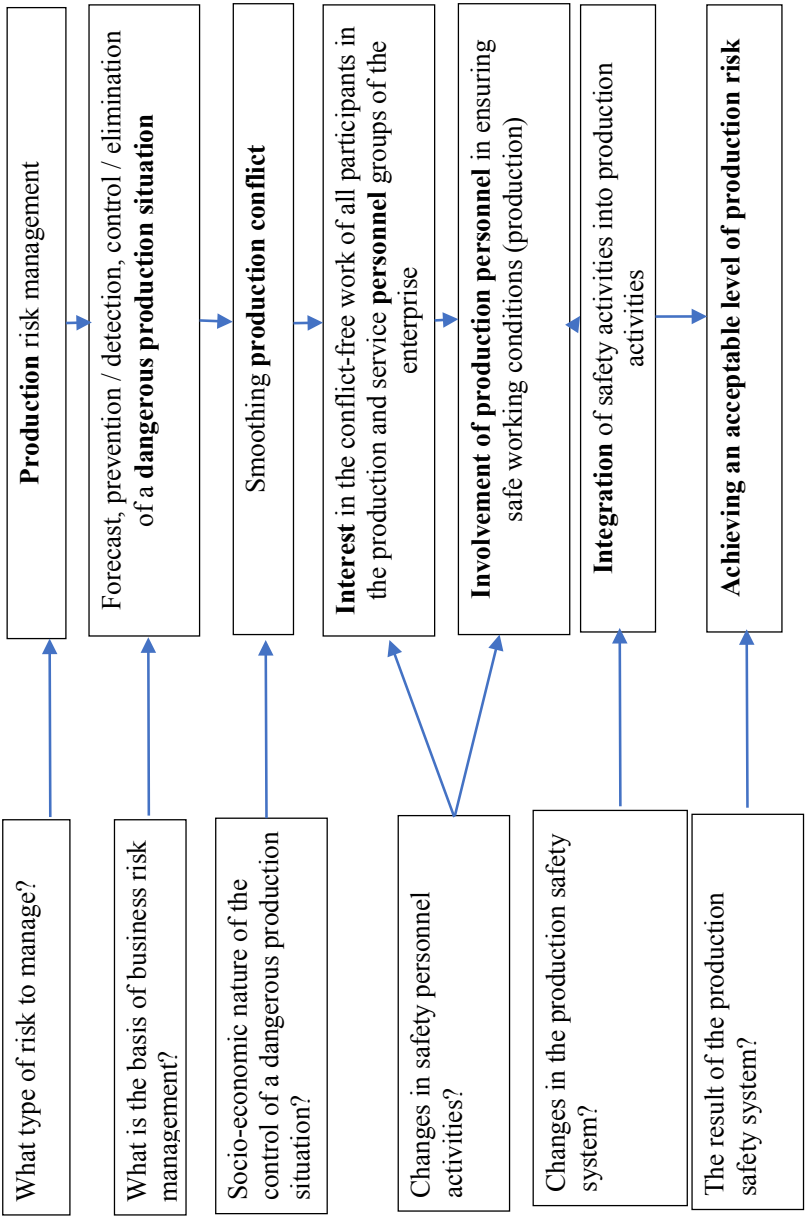


Fig. 2. Logical model of production risk management

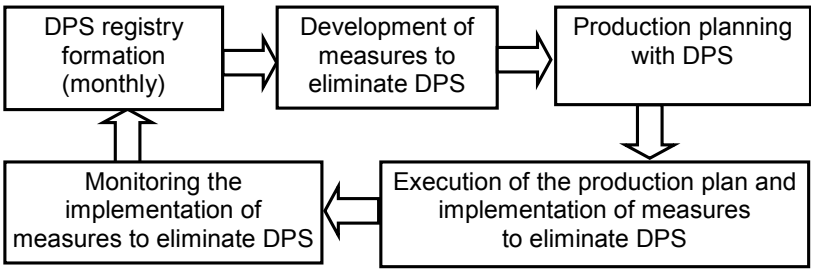


Fig. 3. *The main stages of the mechanism of control of hazardous industrial situations*

Approbation of this mechanism in the regional production associations of the company SUEK showed that DPS control turned out to be quite an effective method for the operational management of production risk. The following positive effects have been identified in the implementation of monitoring and elimination of DPS:

1. The costs of preventing (eliminating) DPS by eliminating them at earlier stages of development are minimized.

2. A point, targeted (more rational) distribution of material, labor and other types of resources is carried out, since the key factors and circumstances of the DPS are eliminated.

3. With the inclusion of actions to eliminate DPS in production planning, more substantial material resources and intangible assets are attracted to production safety, including through the mass involvement of workers in production areas and managers at the level of director, chief engineer, and site manager.

4. The level of organization (organization) of the production process is increasing.

With this approach to risk management, the safety system becomes an integral and valuable element of the production activity and is integrated into the management system of the mining enterprise.

Thus, the conducted studies allow us to conclude that within the framework of the developed risk management concept, the use of an innovative type safety management model based on the control of hazardous production situations reduces the level of production risk, and first of all, the risk of injuries and accidents in coal mining the enterprise.

The implementation of the concept of industrial risk management in the foreseeable future will allow the system to ensure the safety of production and production as a whole to achieve the following qualities:

- reliability (reliable operation);
- efficiency (social and economic profitability, profitability).

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制动过程中车轮的瞬态温度模式
TRANSIENT TEMPERATURE PATTERNS OF WHEEL DURING BRAKING

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注解。 本文采用有限元方法研究了填料的影响，空气分配器的模式等因素对制动过程中车轮加热程度和特性的影响。 给出了不同制动方式下车轮加热的模式，以及具有不同IR光学方向变化的信号。

关键词：热控系统，数学建模，有限元法，铁路制动器，车轮加热，复合制动块，铸铁制动块，车轮加热模式。

Annotation. *In the paper the influence of filler material, the mode of the air distributor and other factors on the degree and character of the heating of the wheels during braking were studied using finite element method. The patterns of wheel heating during different braking regimes, as well as signals with different variants of the IR optics orientation are given.*

Keywords: *thermal control systems, math modeling, finite element method, railway brakes, wheel heating, composite brake block, cast iron brake block, wheel heating pattern.*

In the 1960s light-weight and effective composite brake blocks became widely used on railways. The main prerequisites for the replacement of cast iron blocks with composite ones are their low mass, stable friction coefficient over the entire speed range and high wear resistance. In domestic practice of USSR and Russian Federation, in future, 6KV-10 became the first material for the manufacturing of composite brake blocks, which was replaced by 8-1-66 composite. 8-1-66 composite then became the prototype of the modern TIIR-300 composition [1]. In connection with the transition to composite brake blocks, the operating conditions

for wheel sets have changed significantly mainly due to increased maximum speed of trains (up to 140…160 km/h), which led to more than double of braking power that needs to be dissipated, and significantly less than the cast iron blocks thermal conductivity.

It is necessary to take into account the fact that when using cast iron blocks about 70% of braking power is expended for wheel heating. This parameter is 95...98% when using composite blocks [2, 3]. As a result, the increased thermal load on the wheels led to a significant increase for surface damages. These damages primarily have a thermo-mechanical nature. According to the KASANT system, just in 2017 about 40% of all failures were related to brake equipment on Russian Railways. Some of these failures were caused by thermo-mechanical damage to the wheels, in particular, by shelled treads. This defect is essential since the largest percentage of defects leading to the machining of the wheels is attributed to shelled treads [4].

Shelled treads arise as a result of heat and mechanical loads on the wheel. They represent local destruction in the form of shelling out. Mechanical influences on the wheel cause the occurrence and accumulation of plastic deformations in the facial layer of the rolling surface. Thermal effects primarily related to braking, lead to the complex unsteady heat transfer processes and contribute to the accumulation of plastic deformations.

The foregoing necessitates the improvement of existing and the development of new systems for monitoring and diagnosing the braking equipment of railway rolling stock, as well as improving data processing algorithms. These systems are thermal control systems (TCS). They allow for the diagnosis and evaluation of the effectiveness of brake equipment for heating the wheels. One of the tasks in the design and adjusting of TCS is to determine a reliable pattern of the wheel heating under different braking modes (heating patterns), as well as to determine the signal patterns that the designed system would receive when performing control.

Thus, the purpose of this article is to simulate the transient temperature field of the wheel during block braking in order to determine heating patterns and signals as the basis for the subsequent development of information support for the TCS. Study of thermal processes in frictional contact between the brake block and the wheel is based on the mathematical modeling method, implemented by the finite element method. The influence of the block filler material, the mode of the air distributor and other factors on the degree and nature of wheels heating under different braking modes was studied. A preliminary assessment of the patterns of signals obtained during the operation of the system was carried out.

Finite-element models of a solid-rolled wheel (wheel), a composite brake block, a cast iron brake block based on their solid models. The developed models take into account such material properties as density, Young's modulus, Poisson's

ratio, specific heat capacity, heat transfer coefficient, linear expansion coefficient, viscosity. The total number of nodes and elements in the model is 108 512 and 93 962 respectively (fig. 1).

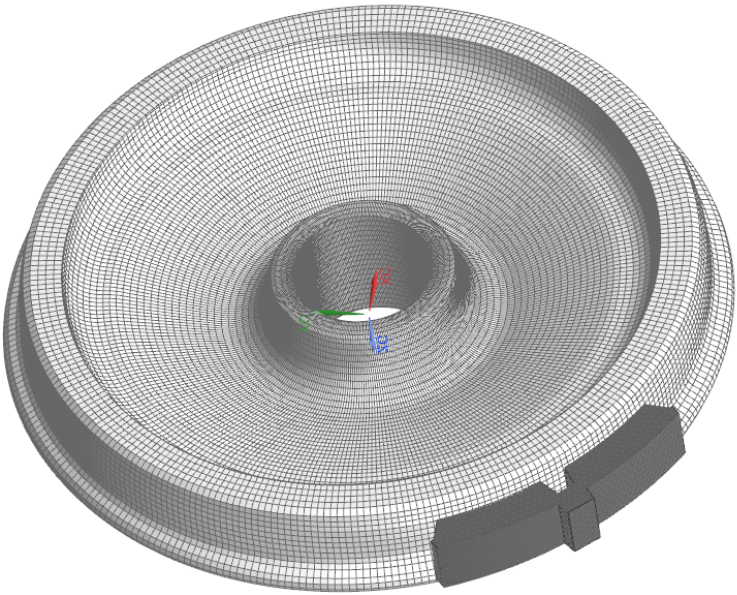


Fig. 1 *FE-models of solid-rolled wheel and composite brake block*

When the block is pressed against the rotating wheel the bodies are mutually heated as a result of friction. This mutual heating caused by the resulting heat flux. For its mathematical description we use the method of calculating the temperature regime of a wheel rolling surface during braking described in [5]. Heat flux is non-linear due to the gradual increase of pressure in the brake cylinders. After increasing the pressure in a brake cylinder to the maximum a train speed and a heat dissipation decrease to zero. The heat flux arising between the wheel and the block in the developed model is described by the following relationship:

$$q(t) = \frac{b(t)\vartheta(t)q_o}{A},$$

where $b(t)$ is specific braking force at the moment of time t, $\vartheta(t)$ is train speed at the moment of time t, q_0 is axial load of car, A is friction area of brake block (0,29 m^2 for composite brake block and 0,305 m^2 for cast iron brake block).

During braking part of a heat flux $q_1(t)$ is directed into the brake block, and its other part $q_2(t)$ is directed into the wheel. This model also takes into account the heat dissipation to the surrounding air in the form of a heat flow $q_3(t)$:

$$q_1(t) = \alpha \cdot q(t)$$
$$q_2(t) = (1-\alpha) \cdot q(t)$$

$$q_3(t) = -h(t) \times (T - T_c) - \varepsilon\sigma(T^4 - T_c^4),$$

where α is a part of the heat flow directed into the brake block, for the composite brake block $\alpha_c = 0{,}05$ and for the cast iron brake block $\alpha_{ci} = 0{,}30$; $h(t)$ is a convective film coefficient, W/m^3·C^o; $T_2(0,t)$ is a temperature of the wheel rolling surface at the moment of time t, °C; T_c is a temperature of the surrounding air, °C.

Convective film coefficient $h(t)$ is presented as a function depending on the speed of the car and the physical properties of the air [6]:

$$h(t) = \frac{0{,}037 k_a}{2r}\left(\frac{2\rho_a r \times \vartheta(t)}{\mu_{va}}\right)^{0,8}\left(\frac{C_{pa}\,\mu_{va}}{k_a}\right)^{0,3},$$

where k_a, ρ_a, μ_{va} and C_{pa} are the coefficient of thermal conductivity, density, viscosity and specific heat capacity of air at a temperature of 20°C, respectively, r is the radius of the wheel.

Changing of the friction coefficient in the contact between the wheel and the brake block due to speed changing is taken into account and applied in the developed model according to the known empirical relationships. The pressure of the brake block is taken in accordance with the regulation of speed-time-distance calculations [7] for empty, medium and loaded modes of the air distributor.

According to the simulation results, typical patterns of wheel heating were determined for different braking modes. At the same time short-term (60 s) and long-term (1200 s) braking modes are of the greatest interest in accordance with the norms for calculating brakes [8]. Wheel heating patterns according to these modes are shown in fig. 2.

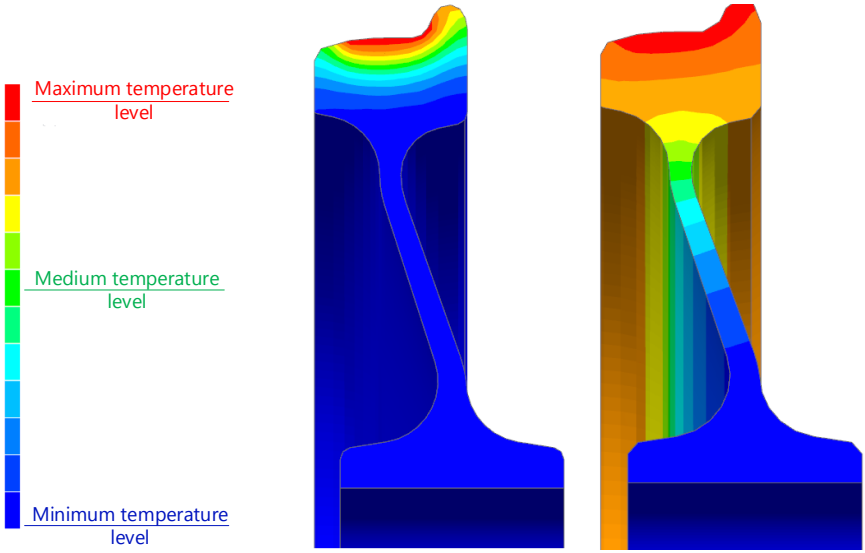
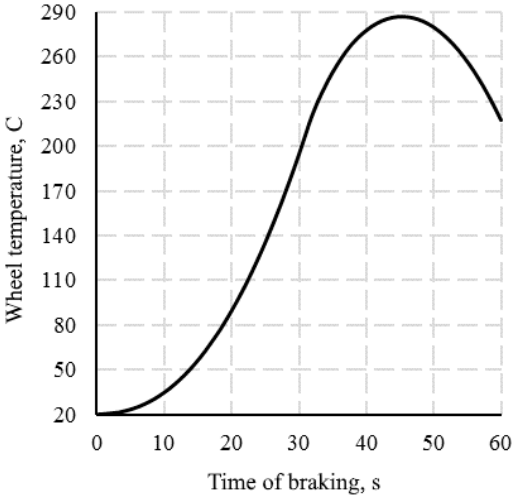
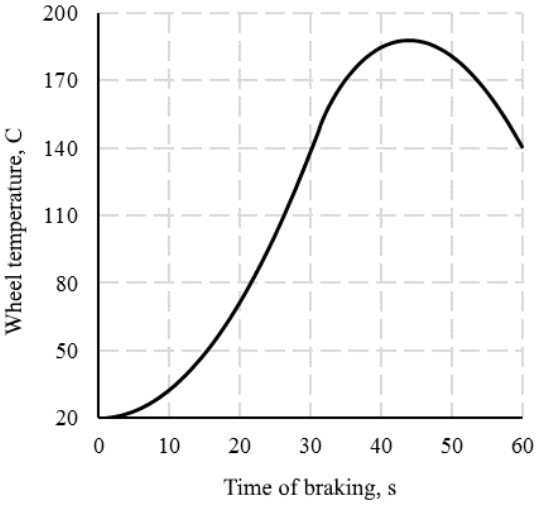


Fig. 2 *Wheel heating patterns:*
a) – short-term mode, b) – long-term mode

The numerical values of the maximum temperatures depend mainly on the mode of the air distributor (empty, medium, loaded). It should also be noted that peak temperatures are observed not at the end of braking, but closer to the middle when the pressure in the brake cylinders reaches a maximum. The dependence of the maximum wheel temperature on the duration of braking is shown in fig. 3



a) composite brake block



b) cast iron brake block

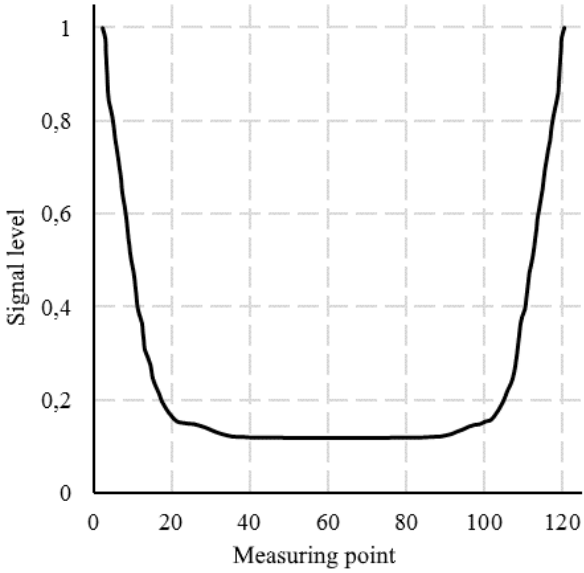
***Fig. 3** Maximum temperature of the wheel during braking*

In a previous paper by the authors [9] an analysis of informative zones on the wheel for thermal control was carried out. Since under operating conditions monitoring the tread surface as the most informative zone is technically difficult to implement, it is proposed to consider two options for orientation of IR optics:

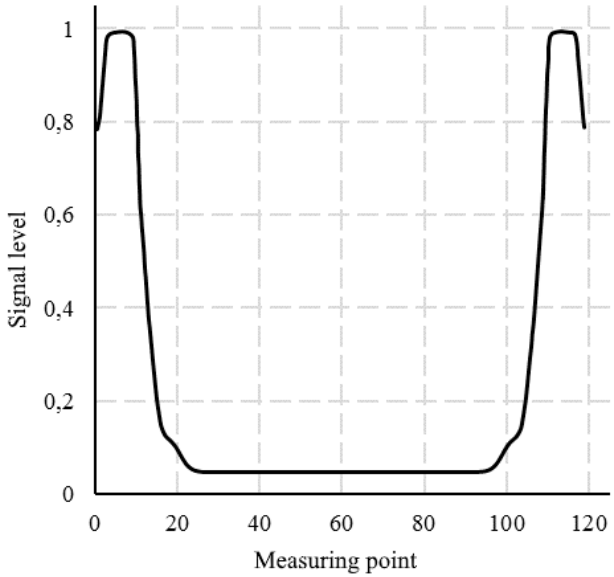
a) along the chord of the wheel at a height of 150 mm above the rail head level;

b) along the wheel chord in the wheel seat area (about 350 mm above the rail head level).

The signal patterns obtained in the simulation for the corresponding variants of the orientation of IR optics are shown in fig. 4.



a) 150 mm above rail head level



b) 350 mm above rail head level

Fig. 4 *Signal patterns*
(composite brake block, short-term mode)

In this paper, the process of heating the wheel interacting with the brake block is considered using the mathematical modeling methods. The results indicate that more significant wheel heating is observed when using composite brake blocks. The difference in the maximum temperature of the wheel when using composite and cast iron blocks can be 2...2,5 times according to various studies. During short-term braking the temperature of the hub part of the wheel remains almost unchanged and heating occurs mainly in the wheel rim. The maximum temperature of the wheel rim during short-term braking when using composite brake blocks can be about 290...300°C, and 180...190°C when using cast iron brake blocks.

If we consider the long-term braking, there is a more uniform heating of the wheel throughout the cross section, but the temperature of the hub part, as in the case of short-term braking, varies slightly. The maximum temperature of the wheel during long-term braking with composite brake blocks can reach 500°C, and 470°C with cast iron brake blocks.

The results obtained are in good agreement with the well-known experimental and theoretical studies of this issue [4, 10, 11]. The next stage of work on creating information support for the TCS is to validate and refine the developed mathematical model by comparing the results obtained with the operating data.

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