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**INVESTMENT POLICY IN THE POWER INDUSTRY OF THE RUSSIA:  
FACTORS OF FORMATION, PROBLEMS AND DIRECTIONS OF  
DEVELOPMENT**

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**Abstract.** *The article systematizes the factors that determine the features of the formation of investment policy in the electric power industry. The analysis of indicators characterizing investment activity in this industry is carried out. The problems and contradictions of the implemented investment processes are revealed. The directions for improving investment in the electric power industry have been determined.*

**Keywords:** *electricity, investments, politics, government, regulation, tariffs*

**Formulation of the problem**

The economic development of Russia is largely due to the success of the modernization processes in the production sector, the development of processing industries, the increase in the competitiveness of domestic industrial products, and the implementation of a real policy of import substitution. At the same time, the energy sector can make an important contribution to the sustainable innovative development of the Russian economy by ensuring the necessary development of the energy infrastructure, expanded reproduction of the total energy potential of Russia, and stimulating the innovative development of related industries. [1, p.13]

Thus, the development of the energy industry is a potential source of competitive advantages for the Russian economy, and the real risks of energy constraints on economic growth can be significantly reduced only with a qualitative change in the investment policy in the energy sector and an increase in capital investments in the industry.

The current state of the energy infrastructure is extremely controversial. On the one hand, the facilities built during the USSR period and used up to the present time require not only physical renovation, but also bring-

ing them in line with modern criteria of scientific and technological development, which requires even greater investments. On the other hand, in Russia, the potential of natural energy sources and agricultural products for energy supply has not been sufficiently used. Accordingly, not only the scale, but also the directions of investment will determine the further development of this most important sector of the economy.

It is expedient to consider the investment policy in the energy sector as a system of measures aimed at determining the main directions, volumes and terms of investments in order to renew fixed assets, applied technologies and increase the competitiveness of the industry. [2, p.115]

At the same time, a number of factors should be taken into account that affect the formation of investment policy in specific industries and areas of activity.

The functioning of energy systems, in addition to territorial distribution and technological complexity, has a number of features that largely determine the specifics of the formation and implementation of investment policy:

1) constant demand for products (services) of the industry, which guarantees the relative stability of revenue;

2) irreplaceability (or extremely difficult substitutability) and the impossibility of abandoning this product (service), which determine the regulated nature of activities in terms of setting prices (tariffs);

3) the invariability of the quality of products (services) of the industry, regardless of the manufacturer and production time, the continuity of functioning and the interconnection of modes of operation of the system elements, their technological unity, which determine the presence of signs of natural monopoly;

4) inextricable connection and simultaneity of the processes of production and consumption of energy (tight balance of production and consumption);

5) exposure to large-scale external influences (intentional and unintentional), the possibility of a cascade of accidents, which determines high investment risks.

Among the key factors that determine the goals, content and features of the implementation of investment policy, as a rule, the following are analyzed: production and technological, resource, institutional factors. Let's consider the influence of individual factors on the formation of investment policy in the energy sector.

Production and technological factors are associated, first of all, with the ability of energy enterprises at present and in the future to produce,

transmit and distribute electric and heat energy that meets the established requirements. The technological features of energy production determine the specifics of the time aspect of the implementation of energy investment projects. On the one hand, a relatively short period of construction of a power plant, during which it is brought to its rated power (productivity) by means of appropriate capital investments, by the end of this period, design solutions are implemented in terms of the type of technological scheme, nominal values of parameters, composition and design of equipment of the power facility. On the other hand, energy investment projects are characterized by a long period of operation, respectively, in the process of their implementation, there are mainly operating costs.

Characterizing the resource factors of the formation of investment policy, it should be noted such aspects as the provision of material, financial, labor resources, the presence of intellectual property objects (patents for inventions, know-how, etc.). The resource potential of energy enterprises is largely determined by the state of the institutional environment, i.e. conditions that allow, on the one hand, to ensure the full-fledged operational activity of energy systems (the level of tariffs, the degree of economic independence of business entities, etc.), on the other hand, to carry out long-term planning in the context of the implementation of investment projects (the possibility of temporary cooperation of co-executors to solve strategic problems ).

Due to the special importance of the energy sector for the country's economy, it is necessary to create institutional structures that could mobilize funds and invest financial resources in the creation and development of energy facilities. The solution to these issues is in the plane of decision-making on the implementation of the state energy strategy and investment policy.

Thus, the scale and long-term nature of the investment tasks being solved in the energy sector require a new approach to managing the development of the industry both at the state and corporate levels.

Currently, there is a functioning scheme for the electric power industry in Russia, in which the following main segments are represented:

- generation;
- transmission and distribution;
- electricity sales;
- direct consumption of electricity.

Electricity generation is carried out by thermal, nuclear, hydroelectric power plants, renewable energy sources. Generation companies supply the generated electricity to the grid or directly to large industrial enterpris-

es. Generation belongs to the competitive segment of the electric power industry and is represented by Russian state and private companies, as well as foreign private companies.

Electricity transmission and distribution is carried out by the grid companies belonging to the regulated segment. The main tasks of the organizations in this segment are the transmission of electricity and technological connection of new consumers. Grid companies are natural monopolies, and their activities are regulated by the state, which involves not only setting tariffs for electricity transmission, but also providing consumers with equal access to network services. Sales companies purchase electricity from grid companies and then sell it to end consumers, including the population.

One of the tools for achieving the goals of reforming the electric power industry in the Russian Federation was the attraction of private capital in competitive activities - the generation and sale of electricity. It should be noted here that a feature of investments in electricity assets is their long-term nature and rather long payback periods (from 20 years and more), which is much longer than the payback periods in other energy industries (gas and oil) with a much lower rate of return.

In general, over the period of implementation of reforms in the electric power industry, this mechanism was implemented: investors were attracted to both generation and energy sales business. The increase in investments began in 2006, i.e. since the launch of a new model of the wholesale electricity market and the beginning of structural reforms in the industry. If we analyze the total investment by period, then it is necessary to recognize the fact that for the period from 2008 to 2012, the total investment in the electric power industry increased almost 3 times compared to the period 2003-2007 and amounted to more than 4.0 trillion rubles. [3, p.160]

One of the principles of the reforms carried out in the electric power industry was the focus on attracting foreign investors, which, on the one hand, were supposed to reduce costs and increase the efficiency and profitability of privatized assets by optimizing management and technological solutions, new fixed assets. In the maximum scenario, the average annual foreign direct investment (FDI) in the Russian power industry in the period from 2000 to 2010 did not exceed 830 million dollars, with the exception of 2008 (more than 3.4 billion dollars). About 70% of foreign direct investment came from the sale of generating facilities. During the reform of the electric power industry from 2003 to 2010, more than \$ 10 billion of foreign direct investment was attracted. Large European energy companies have entered the Russian power industry. At the same time, the capacities that

have come under the control of investors are mainly located in energy-deficient regions of the European part of Russia.

The collapse of RAO UES of Russia, the systemic economic crisis of 2008, changes in the global economy and, as a consequence, transformations in the global electric power industry in the post-crisis period (2008-2013), have brought significant adjustments to the industry development strategy. The situation was further complicated by the political events of 2014-2016 - the introduction of economic sanctions against Russia by European countries and the United States, the decline in oil prices, the devaluation of the national currency, etc.

The destabilization of the economic situation in the Russian Federation resulted in significant difficulties in attracting investment resources to the power industry and subsequent changes in the industry's investment policy.

The internal reserves of the industry are not enough to improve the investment situation, as organizations have already used possible ways to optimize costs over the past decade. The result of the crisis in the electric power industry is that the adjusted investment programs of many organizations in the industry are currently aimed more at maintaining the reliability of the production infrastructure and fulfilling current obligations for technological connections.

The main problems of regulation and attraction of investments in the industry, including foreign ones, are the shortcomings of strategic and medium-term planning, which leads to the forced systematic intervention of the state in market mechanisms, reducing the investment attractiveness of the domestic electric power industry.

**Table 1 - Investments in fixed assets of foreign economic activity "Supply of electric energy, gas and steam; air conditioning" \***

Indicators	2016	2017	2018	Changes
Investments in fixed assets in total across the RF, billion rubles	14748,8	16027,3	17595,0	2846,2
Investments in fixed capital of foreign economic activity (in actual prices), billion rubles	866,0	943,7	1047,5	181,5
Share of foreign economic activity investments in the structure of the national economy,%	5,9	5,9	6,0	0,1
Fixed capital investments in% of the previous year,%	87,4	104,4	110,99	23,59
Balanced financial result (profit) of foreign economic activity, billion rubles	706,6	536,9	611,5	-95,1

\* Compiled using [4]

According to Rosstat, during 2016-2018, there is a significant increase in the volume of investments in fixed assets (by 19%) in the Russian economy as a whole, which characterizes its recovery. In 2016, the reduction in investments in fixed assets in Russia as a whole amounted to 11.6% compared to 2013. Therefore, the growth of investments in fixed assets of the industry over three years is a positive trend.

Analyzing the data in Table 1, it should be recognized that the volume of profits of organizations in this type of economic activity in 2016-2018 does not cover the total amount of investment, accordingly, borrowing is present, but own funds remain the priority sources of financing today.

When characterizing the sources of financing investments in the electric power industry, one should admit the lack of reliable statistical data on these indicators. According to the official website of the Ministry of Energy of the Russian Federation, the main sources of investment during 2017-2019 are the organizations' own funds, depreciation deductions, budget funds allocated to finance State programs for the development of the industry.

The problem of attracting credit resources to the power industry (with the exception of short-term loans to finance working capital) is due to two circumstances.

On the one hand, high interest rates on loans, typical for the Russian banking system, make borrowed sources unavailable for obtaining long-term investment loans. On the other hand, the existing system of tariff regulation is a limiter of profit growth, and, accordingly, a limiter for loans that are subject to return from the profit of organizations.

Characterizing the overall state of investment processes in the power industry, one should recognize the industry's unmet need for investments both for macroeconomic reasons (restrictions due to the regulated nature of activities, high cost of bank loans) and due to the imperfection of the investment policy itself existing in the industry.

The mission of the sectoral investment policy should be to form investment resources in the required volume at a price that is beneficial for both the investor and the industry's enterprises, and their cost-effective, transparent use in accordance with sectoral programs.

First of all, let us focus on understanding the purpose of the sectoral investment policy, which includes the following tasks:

- ensuring the national and sectoral investment climate conducive to effective investment activities;
- development and implementation of effective mechanisms to support direct investments, including foreign ones;

- formation and implementation of corporate mechanisms for the formation and use of investment resources;
- improving and expanding the regulatory framework for the operation of investment mechanisms in the industry;
- changes in the current pricing system in the industry.

Achievement of the set sub-goals will set the "rules of the game" for the investor and organizations.

Investors will gain an understanding of the principles of investing in the industry, will be able to determine the area of their interests and clarify their expectations from investing in the future. Enterprises will receive the necessary financial resources (which they cannot accumulate on their own due to the specifics of the industry tariff setting), including in long-term projects aimed at expanded reproduction, some stability in the future.

The policy of forming investment resources in the industry should be implemented on a legally developed system of prohibitive, restrictive and stimulating measures, rely on tools that ensure the systematic formation of investment resources. In turn, the policy of using investment resources should ensure their most efficient use, which should be confirmed by a system of statutory relevant economic indicators.

In addition, the potential of small and alternative energy enterprises (RES) is promising. They have a significant, but currently unclaimed reserve. Their unique feature is direct deliveries to backbone networks. However, to date, there are no real mechanisms to support investments in this segment, and therefore, in the Russian market, they have low economic efficiency in comparison with "big" energy.

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## LEGAL NORMS AS A SUBJECT OF ECONOMIC ANALYSIS

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**Abstract.** *This article attempts to look at the economic system through the prism of law, as well as to draw attention to the value of regulatory requirements in terms of their impact on the behavior of market entities. The author proceeds from the fact that in reality a free market economy is not an endless field of elements and arbitrariness, but a system of economic relations, the order in which is maintained not only by objective economic laws, but also by legal norms existing in society, which prescribe a certain type of behavior to all participants in these relations, "rules of the game". Knowledge of these rules is mandatory, first of all, for those whose labor activity is associated with economic practice. This knowledge is no less necessary for future economists and lawyers, as well as for those who master the basics of entrepreneurship in business schools, since understanding the relationship and interaction of law and economics, their influence on the behavior of economic agents is one of the most important requirements for their future professional activities. In this regard, the question of the difference between the methods of analysis and the ways of thinking of economists and lawyers is of no small interest, which is also discussed in the article.*

**Keywords:** *legislation, neoinstitutionalism, way of thinking, political economy, legal norms, "Ricardian sin", economics, economic theory, jurisprudence.*

Before we talk about the relationship between economics and law, as well as about the features of the assessment of the surrounding reality by economists and lawyers, it is worth turning to two important events in the history of economics as a science and as a social practice, partly explaining why a lawyer needs knowledge of economic theory, and an economist - knowledge of law. It is known that in the 1970s and 1980s, the ideology of economic liberalism, often referred to as "market fundamentalism", dominated the economic theory and state economic policy of Western coun-



tries. Supporters of this ideology severely criticized Keynesianism, which dominated the post-war period until the late 1960s, and opposed any influence on the market economy by the central government. Moreover, using the analytical toolkit of "methodological individualism", representatives of this trend began to increasingly actively invade the related fields of social sciences - sociology, political science, psychology, history, jurisprudence - considering any area of human activity as an analogue of the market ("implicit markets"). where rationally acting subjects compete, maximizing individual utility. This scientific expansion was called *economic imperialism* in the literature, the most prominent representative of which was the American economist, Nobel laureate G. Becker (1930-2014), who applied the economic approach to explaining human behavior in various spheres of social life. The result of this expansion was the birth of a number of new disciplines, such as, in particular, "family economics", "crime economics", "legal economics", "public choice theory", "new economic history". In addition, within the framework of this direction, the process of mathematization of economic research unfolded at an unprecedented pace and on an unprecedented scale, the language of which became super-complex algebraic equations, diagrams and graphs that turned economic theory into a kind of "social physics", which in fact did not give any real knowledge about the *current* economic system, since it took economic analysis into the jungle of mathematical scholasticism.

What was happening, in a sense, was a renaissance of the "Ricardian sin" - a phenomenon named by the Austrian economist J. Schumpeter after D. Ricardo, an outstanding representative of English classical political economy. Ricardo was a follower of the "great Scottish sage" A. Smith, but in his works, unlike his predecessor, who viewed the economy as an organic part of social life, showing, in particular, its connection with the legal system, he had a habit of using highly simplified abstractions. including mathematical ones, to solve, as it seemed to him, practical problems. After Ricardo, and up to the 1930s, economic science in its development began to plunge deeper and deeper into the study of problems that had little in common with social reality. This was the flip side of the objective process of differentiation of both natural and social sciences that unfolded back in the XIX century, which led not only to the emergence of borderline, "joint" sciences, but also to their delimitation. The flaw in such a demarcation in the social sciences is most clearly manifested in the division of *political economy* into two disciplines - *political theory* and *economics*, which negatively affected not only the development of economic science, but also the explanation of real social problems. It has become fashionable

to write more and more often about the "opposition" between private and public interests, to draw a divide between the zones of action of the market mechanism and the sphere of state policy, etc.

But especially disastrous consequences of the "great split" of the once united science, according to the Nobel Prize laureate in economics F. Hayek, affected "the two oldest disciplines - in economic theory and in jurisprudence." Hayek saw the root of the evil of this specialization in the fact that "the rules of fair conduct studied by the lawyer serve as the basis of a certain order, the characteristic properties of which remain unknown to the lawyer; and the study of this order is mainly concerned with the economist, who, in turn, knows little about the characteristic features of the rules of behavior on which the order studied by him rests" [6, p. 23].

However, the problem is not only in the delimitation of the *spheres of study* of economists and lawyers, it also lies in the difference in the *methods of analysis* used by economic theory and jurisprudence, as well as in the *ways of thinking* of representatives of these scientific disciplines. Economic theory models the world, relying mainly on the deductive method of analysis, which allows one to draw logical conclusions about the particular on the basis of the general. In jurisprudence, on the contrary, the inductive method predominates - a method of research in which from the observed concrete facts they move to the formulation of general principles and the establishment of laws. This is most clearly demonstrated by judicial practice, which concentrates its attention mainly on specific situations. As one of the most prominent legal thinkers of the USA R. Posner wrote, "judges often reason from the particular to the general, proceeding from specific court cases and arguments, than from the general to the particular, proceeding from the overarching principles" [2, p. 83].

There are also differences in the mindsets of economists and lawyers. An economist thinks in terms of a choice between alternatives and evaluates possible solutions taking into account lost profits, while a lawyer's thinking is captivated by adopted legislative decisions, which means that his "professional ethics" will induce him to conclude about the wisdom of these decisions. It follows from this that the actions of a lawyer will be useful or detrimental depending on the wisdom or stupidity of the decisions made by the legislature, and that the lawyer is equally likely to defend both the wisdom of the legislator and his mistakes [6, p. 87].

To prevent such tendencies in the development of law and to create a truly scientific legislative activity, legal scholars should not be guided only by political considerations, they need to look for criteria for the effective development of events that are outside the scope of jurisprudence. The

source of such influence, according to Hayek, should be "a good economic theory, and not a set of myths and fables about economic development, which today directs the thought of jurists" [6, p. 87]. Note: these words were uttered by Hayek exactly 50 years ago and were addressed mainly to Western intellectuals and politicians, but they remain relevant to the present, in particular, in relation to the authors of Russian legal acts. Our legislators have been passing laws for decades, ignoring not only the conclusions of economic science, but also the completely obvious needs of the country's economic development, guided exclusively by political (and often geopolitical) expediency.

Another, directly opposite, direction in the methodology of economic science developed in the 1990s. During this period, scientists come to understand that the economy is, first of all, people, and that it has a human dimension, and economic science is of a humanitarian, anthropological nature. As a result, the cultural and institutional paradigm of progressive economic development and social progress began to make its way in socio-economic research. Sociologists, cultural scientists, anthropologists, and economic historians began to argue convincingly that the functioning of markets and economic development in general are determined by socio-cultural values and non-market institutions (culture, ideology, politics, law). This area of economic analysis is called *neoinstitutionalism*, in which jurisprudence also took its rightful place. Many works have appeared in which the economy began to be viewed through the prism of legal institutions, in particular, in the context of property rights - the norms sanctioned by society that regulate access to rare resources. The hypothesis of rationality, as one of the basic prerequisites of economics, began to be supplemented by the postulate that "rational individuals coordinate their actions with the legal norms that they face" and that these legal norms exist "to a large extent in order to change behavior the people they influence" [4, p. 10].

Indeed, we are far from always aware of the fact that the economy of any country is closely connected with its political and legal system. After all, all people engaged in economic activities do not live in isolation, like the Robinsons, but in a community of people, where, by necessity, they have to enter into certain relationships with each other and somehow settle the problems that arise between them. "If there were only one person in the world," writes the well-known American expert in economics and law, D. Friedman, "he would have many problems, but none of them would be legal. Add a second inhabitant, and we get the possibility of conflict. We are both trying to pick the same apple from the same branch. I pursue a deer that I have wounded, but I find that you have already killed, butchered

and are about to cook and eat. The obvious solution is violence. This is not a very good solution; if we apply it, our small world can be reduced to one person, or even depopulated" [4, p. 9].

To prevent this from happening, people have found a better solution. They came to the understanding that the relationship between them should be directed not only by the "invisible hand" of selfish interest, but must be determined by a system of legal norms, explicit or implicit rules of behavior that determine who and what should do and what will happen if he does not. It is obvious to any adult that not a single company, not a single household entering into a sale-purchase relationship, not a single individual who decides to save their income or participate in investment activities is free from the legislation existing in a given society (labor, tax, commercial, patent, banking, criminal, etc.). It is no coincidence that economic science has long been called "political economy" - this term reflected the inextricable connection of the economy as a sphere of economic activity of people with the political and legal system of society. It is known, for example, that Smith was not only a brilliant economist and moral philosopher, but also a philosopher of law. While preaching the ideas of freedom and opposing excessive government interference in the economy, he, at the same time, left the state with the function of a "night watchman" - a defender of private property, a "factory of laws" and a controller over the observance of generally accepted rules of conduct by market participants. In his lectures at the University of Edinburgh, and then in the main book of his life - "A Study on the Nature and Causes of the Wealth of Nations" - he offered his innovative vision of the economy as a complex system, including from a legal and ethical point of view. Another great economist, J.M. Keynes, considered it expedient to retain the name "political economy" for economic science, realizing how important a political and legal context is in human economic activity. It is not surprising that today political economy is increasingly appearing in the lists of university disciplines, and economic research is focused on the development of related branches of social knowledge and uses their results in their models.

Thus, if we want economic theory to move away from mathematical formalism and become closer to reality, it will have to include in the subject field of its analysis the political and legal system connected with the economy by inextricable ties. The importance of adopting this approach has been discussed for a long time. Back in 1982, the Royal Swedish Academy, when awarding the Nobel Prize to the American economist J. Stigler, noted that "legislation is no longer an "exogenous" force that affects the economy from the outside, but an "endogenous" part of the eco-

conomic system itself" [4, p. 237] This means that economics, as a science of how to find the best solutions in the context of constraints, cannot ignore not only the fact of scarcity, but also the existing institutional and legal reality, which also forces market participants to seek reasonable compromises in this reality.

It is worth recalling that a similar - and very fruitful - alliance, which has been going on for more than 150 years, exists between economic theory and psychology. Back in the second half of the XIX century, representatives of the first Austrian and then the American school of political economy included psychology in the instrumental arsenal of research into the behavior of both consumers and producers. The scientific result of the influence of psychological factors - "preferences", "inclinations", "motives", "instincts" - on the decisions of market participants was not only a significant expansion of the subject field of economic theory, but also, which is especially important, the approximation of the results of its analysis to reality. V. Pareto, a prominent Italian economist and sociologist, wrote in 1906: "The basis of political economy, like any of the social sciences, is undoubtedly psychology. Maybe one day we will be able to deduce the laws of social science from the principles of psychology" [3, p. 9]. Time has only confirmed the correctness of these words. In recent years, representatives of the "new behavioral economic theory" agree that the functioning of the modern economic system is approximately 60-70% determined by psychological motives. And for the study of the influence of psychology on human behavior and economic decision-making, even Nobel Prizes are given today - this is how the scientific world appreciated the works of the American economist R. Thaler in 2017. The laureate quite accurately noted that the prize went to him "for understanding that economic agents are people and economic models must take this into account" [1, p. 2].

For economic theory, the union with jurisprudence is equally important. By studying the impact of the legal system on the functioning and results of a competitive market process, economics can successfully fill the existing gap between theory and business practice. The value of conventional rules from an economist's point of view is that they are normative requirements that dictate to economic agents what they can and cannot do. Unlike lawyers, for whom law is just a *set of rules and procedures* for resolving conflicts of interest, economists see it as an institution that can be used to *change the behavior of the people* it affects. The economist views the rule of law as a system of *incentives and transaction costs* that help people reduce damage and use resources more wisely in order to maximize results. This, in particular, is intended to serve as the *Kaldor-Hicks criterion*

developed by English economists, according to which changes in legislation increase the efficiency of the economic system if those who benefit from such changes are able to compensate for the losses of those whose situation has worsened.

In light of the foregoing, it will now be easier for us to understand the conclusion made by L. Friedman, professor at King's College London, an expert on the history of American law: "The basic idea of economic theory is that *the legal system is a gigantic price mechanism* ... When laws give someone rights or impose duties on someone, they make this or that behavior cheaper or more expensive" [5, p. 558]. In other words, **from the point of view of economic theory, legal norms are nothing more than prices** in the form of fines, community service, and imprisonment that have to be paid to those who violate the "rules of the game" established by law. Knowledge of the consequences of illegal activities in the form of specified prices plays a central role both in understanding the existing rules of law (in particular, property rights, contracts, loans, etc.) and in deciding in which direction the legislator should adjust these prices. in order to streamline the economic system and improve its efficiency.

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## RUSSIAN PHARMACY IN THE CONTEXT OF THE CORONAVIRUS PANDEMIC

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**Abstract.** *The article analyzes the current state, achievements and problems of Russian pharmacy against the background of trends in the global pharmaceutical market in the context of the coronavirus pandemic. The most common business models practiced in modern conditions by the leading players in the global pharmaceutical business and Russian leading companies are characterized. The achievements and successes of domestic pharmaceutical science in the development of effective drugs and vaccines against coronavirus are analyzed, as well as the complex problems of their mass industrial production. It is concluded that at present the optimal solution for Russia is the sale of licenses for the production of Russian vaccines in different countries and the satisfaction of the domestic demand for drugs through the production of a significant amount abroad. This will create conditions for the subsequent expansion of its own production of drugs against coronavirus and their export to other countries.*

**Keywords:** *Russian pharmacy, coronavirus pandemic, pharmaceutical company, business model, vaccine, pharmaceutical product.*

Currently, the pharmaceutical business is one of the most high-tech and rapidly developing sectors of the Russian economy. This was largely facilitated by the implementation of the "Pharma 2020" strategy aimed at increasing the competitiveness of the pharmaceutical industry in our country in the global market. In terms of the efficiency and effectiveness of the development of effective drugs and vaccines against coronavirus, domestic pharmacy has become one of the world leaders due to the high potential accumulated by Russian science in the field of biotechnology and genomics.

Russian pharmaceutical companies are developing in accordance with the trends of the global pharmaceutical market, the main among which are the following:

1) accelerating the pace of development of the pharmaceutical business against the backdrop of a sharp crisis drop in global production as a result of the pandemic;

2) increasing instability and uncertainty of world economic dynamics;

3) dominance of the largest international companies (Big Pharma);

4) a rapid change in the balance of power between the leading players in the world market;

5) confident leadership of China in terms of economic development, including in the field of pharmacy;

6) intensification of competition between large pharmaceutical companies for the creation of innovative pharmaceuticals, primarily drugs and vaccines against coronavirus [1].

In the global pharmaceutical business, there are several of the most common models, the basic characteristics of which have been analyzed in the studies of A. Osterwalder and I. Pignet. According to the approach of these scientists, the specifics of the business model are determined by such parameters as the type of the main product created by the company, target markets, key resources, partnerships, the company's position in the value chain, return on assets [2; 3]. Each business model is a specific combination of these parameters.

Both the leading players in the global pharmaceutical business and Russian leading companies, as a rule, use one of the following four models [4; 5; 6].

1) A model aimed at increasing the value of a business, which assumes diversification, growth in output and export of products. This model is distinguished by the following features:

- selection by the company of well-known products that are not associated with risks, for the production of which it has strong competencies in production and sales;

- strict cost management;

- formation of a global network of suppliers and consumers and highly efficient infrastructure.

Note that this is the most common model in the Russian pharmaceutical industry, which is practiced by Pharmasintez (the leader in growth rates), Ozone, Pharmstandard-Leksredstva, Akrikhin and Sotex. The last two firms are the largest contract manufacturers that produce many types of drugs from foreign companies.

2) Portfolio management business model. This model is the most complex, but the second most frequently used by Russian leading companies. It assumes a large portfolio of products, many divisions (business units),



a full production cycle, and its own distribution system (warehouses and pharmacy chains). The model is characterized by the following features:

- diversification of business units or products, including generics, brand name drugs and primary care products;
- high selling costs and high revenue;
- significant investments in brand management, in the promotion of many products in various markets.

In Russia this model is practiced by R-Pharm and Valenta. The latter is the largest pharmaceutical company in the country in terms of the number of employees.

3) Disruptive research business model. It differs in the following features:

- development and launch of new original drugs on the market;
- active research and development, the use of mergers and acquisitions to expand research competencies;
- a developed network of partnerships with domestic and foreign research organizations and clinics.

It is important to emphasize that it was this model that allowed Russian companies to achieve brilliant results in the development of drugs against coronavirus and were the first in the world to register two drugs with direct antiviral action against Covid-19 in July 2020. These are Avifavir from ChemRar (High Technology Center) and Areplivir from Promomed. The drugs have been conclusively investigated across the totality of clinically significant efficacy criteria. According to the results of clinical studies, the effectiveness of these drugs exceeds 90%. Another real breakthrough in global pharmacy was the original Russian drug ilsira (active ingredient - levilimab), registered in July 2020, from Biocad, which also uses a breakthrough research business model. Ilsira is a drug against the "cytokine storm" - a complication of Covid-19, when a person's immune system begins to work against the body, destroying healthy cells.

Ilsir developers and the head of the Biocad company have already been awarded the State Prize for this development. In addition to these companies, Generium and Materia Medica also practice the breakthrough research business model.

Until recently, it was believed that the breakthrough research model was less typical for the Russian pharmaceutical business than for the foreign one, but practice has shown its successful application in Russia. The window of opportunity for the development of new drugs and vaccines is associated with the comparative advantages of Russian science in the field of biotechnology and genomics.

4) The business model is a distributed integrator model. This is a new model for Russian pharmacy, which is recognized as the most effective in the digital economy. It is based on contract manufacturing and is based on the following principles:

- promotion not only of its own brands, but also of drugs, trademarks of which belong to third parties;
- significant advertising costs;
- strict quality control at all stages of drug development and promotion.

This business model is being implemented by the fast-growing Russian company OTC Pharm, which is not yet one of the leaders, but owns exclusive rights to more than 250 trademarks.

An important achievement of Russian pharmaceutical science was the quick solution of the most difficult task of creating vaccines against coronavirus. Russia has become one of the few countries that have been able to cope with this task independently. Three research institutes have developed their vaccines at once: in August 2020, the Ministry of Health registered the Sputnik V vector vaccine, created by the National Research Center for Epidemiology and Microbiology named after N.F. Gamaleya, and in October 2020 - the peptide drug "EpiVacCorona", developed by the Center for Virology and Biotechnology "Vector" of Rospotrebnadzor. The advantage of EpiVacCorona is simple storage and transportation conditions (at temperatures from 2 to 8°C). Federal Scientific Center for Research and Development of Immunological Drugs M.A. Chumakov Russian Academy of Sciences in December 2020 began clinical trials of the vaccine, the registration of which is scheduled for February 2021.

It is successfully working on a vaccine against Covid-19 and the Research Institute of Vaccines and Serums of the FMBA of Russia. In total, 47 different coronavirus vaccines are being confidently developed in our country. By the end of 2020, 72 vaccines against coronavirus infection were created in the world, among which the most famous vaccines are Pfizer and Moderna. However, they can be stored only at temperatures no higher than minus 70 degrees.

The Russian pharmaceutical industry is now faced with the difficult task of organizing the mass production of vaccines (almost 300 million doses are needed to vaccinate the country's population) and other drugs against coronavirus. The fact is that there is a great distance between laboratory and industrial production technologies. So far, only a few companies with sufficient competencies in the field of translational biotechnology can make the transition from one technology to another. At this stage, the domestic economy faced other serious problems. The main one is the lack of

technological facilities capable of producing the required number of vaccine doses. Vladimir Putin noted this obstacle back in October 2020. The Russian pharmaceutical industry now numbers about 500 enterprises, and for the production of vaccines from Covid-19, mainly foreign equipment is used. Its purchase is currently very difficult due to anti-Russian sanctions, logistical problems that worsened during the pandemic, as well as as a result of a sharp increase in demand for this equipment around the world. After all, all leading countries are now striving either to create their own drug against coronavirus, or to buy a license for the production of a foreign vaccine and quickly launch its production domestically. Due to the difficulties in acquiring imported equipment, the President of the country instructed to accelerate the development of domestic equipment for the production of vaccines.

However, the situation is aggravated by the fact that at present domestic pharmacy is not able to provide itself with its own raw materials, first of all, active pharmaceutical substances (APS). Russian companies provide only 6.8% of the domestic APS market. The main suppliers of active pharmaceutical substances to the world market are China and India. Until recently, China occupied almost 70% of the global APS market, but by 2020, amid the coronavirus pandemic, it reduced their supplies by 45% in physical terms. India also suspended the export of 26 substances. Switzerland and Italy hastened to take the vacated market share, but prices from European suppliers are noticeably higher. This sharply worsened the position of importers of substances, including the Russian companies Binnopharm, R-Pharm and Generium, which have already declared themselves as manufacturers of the "Sputnik V" vaccine [7].

In the current difficult circumstances, one cannot be mistaken with the choice of the optimal solution to the problem of vaccination of the population. It is not worth, for example, to focus on the creation of enterprises from scratch for the production of almost 300 million doses of vaccines, since in the context of a lack of own equipment and raw materials, this is an unjustifiably expensive and slow method. Re-equipment of the existing pharmaceutical industry facilities for the production of Covid-19 vaccines is hardly suitable, as this will damage the production of other important drugs. The most preferred option for Russia is the sale of licenses for the production of domestic vaccines in different countries and the satisfaction of the domestic demand for drugs through the production of a significant amount of them abroad. Russia already has agreements on the production of the Sputnik V vaccine with China, India, South Korea, and Brazil. The number of countries wishing to buy a license to produce a Russian vaccine

already exceeds 20 and is constantly increasing. According to experts from the Russian Direct Investment Fund, which participated in the development and promotion of the "Sputnik V" vaccine, a total of 500 million doses of this vaccine will be produced in Russia and abroad in 2021. This will not only solve the problem of vaccination of the country's population, but will also become an important stage in entering the international market, the capacity of which is estimated at 100 billion dollars in annual terms. The commercial price of the Russian vaccine against coronavirus (for two necessary vaccinations) is 1942 rubles (less than 26 dollars), while Pfizer costs 39 dollars for two doses, and 50-74 dollars for Moderna [8]. The lower price is a huge competitive advantage for the Russian vaccine for future export.

**Conclusion.** Practice shows that in the difficult conditions of a pandemic, Russian pharmacy demonstrates a high ability to mobilize and cope with emerging difficulties. Leading Russian pharmaceutical companies are successfully implementing one of the most innovative business models - the disruptive technology model. The speed, efficiency and effectiveness of the response of pharmaceutical science and industry to the pandemic-related challenges is largely due to the direct support of the state, which has provided accelerated procedures for testing and registration of drugs and vaccines, eliminating unnecessary bureaucratization of all mandatory procedures. Work has already begun on the "Pharma 2030" strategy, which will help overcome the current challenges. In accordance with this strategy, innovative development should become the main driver of pharmacy, and the business model of breakthrough research will be even more widely used in Russia. This will give an impetus to the development and production of modern high-tech drugs by Russian companies, protected by their own patents.

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## CRYPTOCURRENCY MARKET: CURRENT STATE AND DEVELOPMENT TRENDS

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**Abstract.** *The article contains an analysis of the current state and main trends in the development of the cryptocurrency market, based on the results of research by foreign and domestic experts in this area. The specificity of cryptocurrencies as a special financial asset is characterized, the features of pricing in the cryptocurrency market, the possibility and feasibility of forming a diversified investment portfolio with their participation are considered, the relationship of the cryptocurrency market with traditional financial markets, as well as the problems and prospects of cryptocurrency circulation are analyzed. It is noted that, despite the rapid development of the cryptocurrency market, central banks and the research community consider it impossible to use them as full-fledged substitutes for fiat money.*

**Keywords:** *cryptocurrency, bitcoin, blockchain, financial assets, cryptocurrency market, financial markets, investment portfolio.*

The history of the cryptocurrency market begins in 2009, when the blockchain protocol was first practically used, the first block in the chain was recorded and the first bitcoins were generated. To date, the total number of cryptocurrencies has exceeded 2,150, the capitalization of this market is about 180 billion dollars. Over the past few years, the cryptocurrency market has become an object of close attention of economists.

Cryptocurrencies represent a new class of assets that are characterized by very high volatility and extremely complex pricing patterns at the intersection of computer and financial technologies.

The largest number of studies is devoted to large currencies in terms of capitalization, the main of which is bitcoin (BTC), therefore, the patterns of functioning of the cryptocurrency market are analyzed primarily based

on the dynamics of bitcoin trading. According to many experts, this market does not meet the criterion of strong information efficiency, i.e. situations when all available (past, current public and insider) information is reflected in the asset price. At the same time, in 2016-2018, there was a gradual increase in the efficiency of the cryptocurrency market, although in this parameter it still lags behind the global gold market, the global stock market and the foreign exchange market. The largest contribution to reducing the gap is made by cryptocurrencies with a high level of liquidity, primarily bitcoin.

Let's dwell on the factors of cryptocurrency pricing. Among them are economic and non-economic. The former include the world's leading stock indices, the price of gold, commodities, interest rates of the central banks of the world's largest economies, and a number of others. Non-economic factors reflect the perception of bitcoin by interested economic agents in the world and include, for example, the number of mentions on Twitter, uncertainty in economic policy, global geo-economic and geopolitical risks, abnormal and unexpected negative events ("black swans"). It was found that non-economic factors influence the formation of the parameters of bitcoin trading much more actively than economic ones [1].

Experts of the Bank for International Settlements in Basel have developed a special index that measures the information background around the cryptocurrency market and takes into account statements by international financial organizations, central banks and other institutions with the authority to develop regulations for this market. It turned out that the most depressing effect on key cryptocurrencies is exerted by direct bans on their circulation emanating from the central banks of individual countries, as well as news about the possible use of these tools for laundering proceeds from crime and financing terrorism. On the contrary, information about the development of special legal regimes and initial offerings of tokens (TCO) has a positive effect on the profitability of cryptocurrencies [2]. We also obtained conclusions about the internal factors of bitcoin pricing, according to which the lower bound of its price is set by the marginal mining costs (computational efforts to identify a cryptographically suitable hash header for each block in the blockchain, which, if the correct hash header is found, provide a reward that is fixed in bitcoins). These findings contradict claims that Bitcoin has no fundamental value [3].

As the liquidity of the market for a particular financial asset grows, tools appear to manage the risks associated with fluctuations in the prices of these assets, i.e. futures. Bitcoin futures trading began only at the end of 2017 and remains poorly understood.

It has been established that so-called bubbles in price dynamics appear in the cryptocurrency market (first of all, bitcoin and ethereum). Their occurrence is associated with the overreaction of investors in the context of steadily rising or falling prices. Thus, high prices for cryptocurrency in previous trading days intensify further upward dynamics, and low prices, accordingly, downward dynamics. Such bubbles in the cryptocurrency market are caused by irrational expectations of investors due to high market uncertainty [4].

Trading parameters in various cryptocurrencies are largely determined by the largest currency in terms of capitalization - bitcoin. It is bitcoin that plays a priority role in the formation of prices for other cryptocurrencies, especially in the short term. Particularly strong pairwise relationships between Bitcoin and Ethereum have been identified. Players in the cryptocurrency market exhibit strong herd behavior and infection, which provokes high market volatility.

When analyzing the relationships between cryptocurrencies, the question arises about the advisability of forming an investment portfolio from them. The aforementioned effects of herd behavior and investor infection sharply limit the possibilities of portfolio optimization if the portfolio is going to be formed only from cryptocurrencies. Nevertheless, from the point of view of the risk-return ratio, the creation of portfolios is more preferable than non-diversified investments in a single cryptocurrency [5].

The question of the relationship between the cryptocurrency market and traditional financial markets is of interest. In general, the cryptocurrency market is characterized by significant autonomy from them. The marginal impact of traditional financial assets on bitcoin occurs mainly during the fall of its market, with the gold and commodity markets being the most influential. The lack of a close connection between the cryptocurrency market and other assets draws attention to bitcoin in terms of its inclusion in a diversified investment portfolio. However, Bitcoin is unreliable in this sense due to its very high volatility. Investments in bitcoin are profitable only during the period of growth of its quotes. In general, the effectiveness of using cryptocurrencies to diversify the portfolio depends on the target time interval and the choice of specific types of assets for the formation of the portfolio. In particular, it is better to use cryptocurrencies for diversification as short-term investments. It was also revealed that the largest cryptocurrencies in terms of capitalization can be used to hedge currency portfolios made up of leading fiat currencies (euro, pound sterling, Swiss franc, Canadian dollar, yen, yuan), which are traded against the dollar [6].

Thus, the inclusion of leading cryptocurrencies in the global diversified



portfolios of large investors is possible, but their share should be insignificant due to the relatively low liquidity. According to many researchers, cryptocurrencies, including bitcoin, should not be considered as teza-assets similar to gold. Although bitcoin, like gold prices, is characterized by an asymmetric correlation with traditional financial assets, it is strongly inferior to gold due to high transaction costs of buying and selling and low liquidity [7].

Cryptocurrencies are autonomous not only from traditional financial assets, but also from the monetary policy of central banks. Interesting is the research results on the impact of the monetary policy of the US Federal Reserve System (FRS) and the People's Bank of China on the price dynamics of the four leading cryptocurrencies (Bitcoin, Ethereum, Litecoin, Ripple). They say that only the tightening of monetary policy by the People's Bank of China is causing a positive effect on the cryptocurrency market. The mechanism of this influence is as follows: restrictive measures of monetary regulation lead to a correction in the Chinese stock market, which forces retail investors to look for alternative investment options. Since China is the world leader in the field of mining and plays a rather noticeable role in cryptocurrency trading, the temporarily freed up financial resources enter the cryptocurrency market, and this leads to an increase in their quotes. As for the Bank of England, Bank of Japan, ECB, changes in their monetary policy do not cause a noticeable reaction in the cryptocurrency market.

Currently, the cryptocurrency market, despite the very high volatility, does not significantly affect the stability of the global financial market. This is primarily due to its insignificant depth compared to traditional asset markets, as well as the lack of widespread use of leverage (only about 20% of cryptocurrency holders trade with leverage). Risks for the global financial market may increase if, in the future, shadow banking institutions (hedge funds, money market funds, etc.), which are characterized by close balance relationships with banks, gain official access to the cryptocurrency market. In the meantime, the cryptocurrency market itself is largely responding to shocks that undermine financial stability. So, during 2010-2017, the impact of the dynamics of the global financial stress index, which is calculated by Bank of America Merrill Lynch, on the price dynamics of bitcoin was observed [8].

A similar effect is being seen in the current coronavirus pandemic. The first reaction to the rapid spread of the virus followed in March 2020 from classic exchanges. The popular stock indices and futures fell by 5-6%. Traditional protected assets (gold, bonds and US dollars and even the Japanese yen) began to rise in price. Bitcoin did not live up to the expect-

tations of those investors who hoped to see it as a protective investment instrument, and experienced one of the largest ever drop in March 2020: its price dropped by 50% in a few days, to a local minimum of 3,800 dollars. Bitcoin began to rise in price and on January 8, 2021, it updated its historical maximum value: the asset's quotes rose from March 2020 by more than 900% to a level above 41 thousand dollars. The cryptocurrency market capitalization for the first time in history exceeded 1 trillion dollars [9]. Thus, the conclusion about the strong impact on the price dynamics of cryptocurrencies of non-economic factors, and among them - the "black swans", which was played by the coronavirus pandemic, was once again confirmed. The sharply increased volatility of bitcoin quotes is also associated with the irrational expectations of investors that have become aggravated in an atmosphere of extreme uncertainty.

The extremely unstable situation in the cryptocurrency market during the pandemic convinces us that they will not be able to perform the basic functions of fiat money. Thus, cryptocurrencies cannot serve as a full-fledged medium of exchange due to their strong speculative component, which generates ultra-high volatility, which is comparable to the volatility of weak Latin American currencies - the Venezuelan bolivar and the Argentine peso. High transaction costs of buying and selling and low liquidity prevent cryptocurrencies from becoming a means of accumulation (tezaratsii). While acknowledging the futility of attempts to replace fiat money with cryptocurrencies, some experts note that the latter discipline central banks and encourage them to innovate in the field of money circulation.

At the same time, the blockchain technologies that underlie bitcoin as a key cryptocurrency, in particular, the proof-of-work principle, are being questioned and even criticized. The point of view is expressed that this principle has objective limitations, as a result of which the remuneration of miners will steadily decrease. This will increase the waiting time for confirmation of writing information to the block, as well as the risk of reversibility of records in all previous blocks, in the event of possible actions of intruders to fabricate transactions. A possible way to solve this problem is to implement an add-on to the blockchain protocol, which will allow two-way transfers of funds in bitcoins without the need to write this information into the block every time. This approach increases the degree of decentralization of the blockchain and assumes that only the final balance of all bilateral transactions is recorded in the block. Currently, such an add-on to the blockchain (lightning network) is in test mode [10].

**Conclusion.** The cryptocurrency market continues to grow rapidly, although it is still far from its maturity phase. While maintaining its autonomy

from the markets of traditional financial assets, it is gradually moving closer to them in terms of efficiency, the availability of derivatives linked to it, and new financial instruments. Cryptocurrencies are already being used to diversify investment portfolios. Some central banks that have previously denied this instrument have announced their readiness to experiment with cryptocurrency. In general, the position of central banks and the research community regarding cryptocurrencies as full-fledged substitutes for fiat money remains negative due to their strong speculative component, high volatility, as well as high transaction costs of buying and selling and low liquidity. These characteristics of cryptocurrencies are clearly manifested during the coronavirus pandemic. At the same time, technologies on which digital currencies are based are used to develop wholesale payment systems and other innovations in the banking sector.

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## JAZZ FESTIVALS AS AN ELEMENT OF EVENT TOURISM

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**Abstract.** *The article defines the place of jazz festivals in the field of tourism, their features, key problems and offers perspective development of this type of tourism. By jazz tourism we mean a niche type of event tourism, a subtype of musical tourism associated with visiting jazz festivals, concerts, competitions, as well as historical places associated with jazz for the purpose of learning. Jazz festivals are an effective catalyst for financial processes in the region, they can stimulate large tourist flows to the region, contributing to its development and improvement of welfare, however, their organization is associated with a number of problems and requires painstaking consideration of many factors on which the quality of the event and financial effect on the region.*

**Keywords:** *event tourism, music festivals, leisure, jazz festivals, economic activity of the region, economic impact of a jazz festival, jazz tourism.*

### **Introduction**

For modern tourists, it has become a familiar reality to visit natural or man-made attractions. The need of people for unusual, unique leisure, contributes to the formation of such a phenomenon as event tourism in a separate industry. This industry is relatively new, but, nevertheless, it has its own specifics. An example of event tourism is music festivals, including jazz festivals, which annually attract millions of tourists to different regions. Music tourism, as one of the areas of event tourism, is constantly developing, therefore, the study and holding of jazz festivals is relevant, since in the future it can bring profit to regions that do not have unique natural and man-made tourist resources, and thus contribute to their economic development.

Music tourism is a type of event tourism aimed at attending events related to musical art, such as music festivals, concerts, music competitions [1].

Currently, jazz festivals have been studied rather poorly and are viewed from the standpoint of culture and ethics, rather than management and marketing. However, there are several fundamental works in the field of event and festival tourism: UNESCO Institute for Statistics, Festival statistics: Key concepts and current practices [1]; A.V. Babkin Special types of tourism [2]; Dolzhenko G.P., Shmytkova A. Event tourism in Western Europe and the possibilities of its development in Russia [3]. More specifically, jazz festivals of individual countries and regions are considered in the following works: Tony Whyton, Rhythm Changes: Jazz Cultures and European Identities [4]; Northern Ireland Tourist Board, Northern Ireland Exploring the Music Festival Tourism Market [5]; A.A. Golodenko The jazz music sector in the Russian concert services market by the beginning of the second decade of the XXI century [6]; Maklakov F. Organization of music festivals: budgeting and booking of artists [7]; Opanashchuk D. V. Specificity of promoting projects in the field of jazz music [8]. It is also worth mentioning the Internet portal of the "Jazz.ru" magazine, which has compiled a list of most of the jazz festivals in Russia [9].

Thus, researchers have already undertaken attempts to study jazz festivals in certain regions. However, information about the specifics of jazz festivals, problems and ways to solve them have not yet been systematized, and statistical material is still being collected by research centers in some countries. In addition, there are no developed models for organizing jazz festivals and financial calculations of their activities in the public domain.

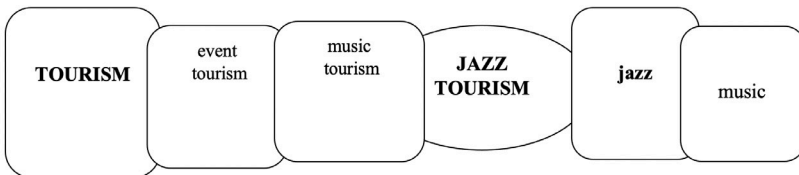
There is no single complete classification and typification of event tourism and events in this area in the world.

However, based on the WTO tourism classifications [9], the following types of activities in jazz tourism can be distinguished:

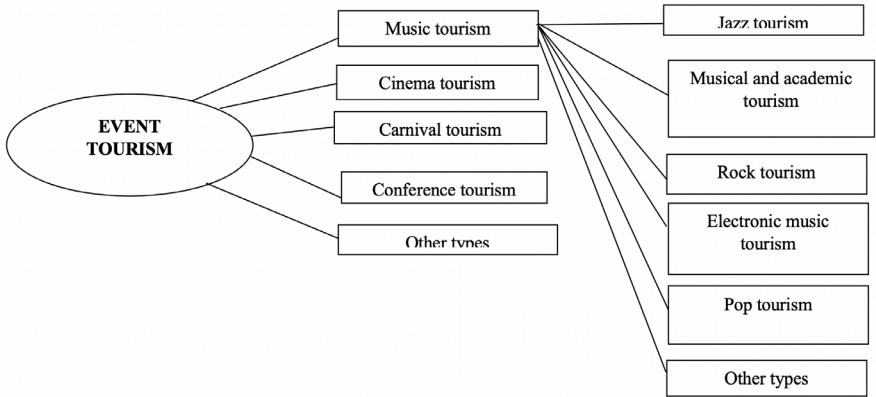
- 1) By the nature of the events:
  - a) concert;
  - b) festival;
  - c) festival-competition.
- 2) By the frequency of events:
  - a) one-time jazz events;
  - b) recurring jazz events.
- 3) By duration:
  - a) one-day jazz events;
  - b) multi-day jazz events.

- 4) By the format of the events:
  - a) indoor jazz events (concert halls, halls, etc.);
  - b) jazz events in the open-air format (in the open air).
- 5) In relation to seasonality:
  - a) seasonal jazz events;
  - b) non-seasonal jazz events.
- 6) By scale:
  - a) international jazz events;
  - b) national jazz events;
  - c) regional jazz events;
  - d) local jazz events.
- 7) By funding sources:
  - a) commercial jazz events;
  - b) non-commercial jazz events.
- 8) By age category of the target audience:
  - a) children's and youth jazz events;
  - b) jazz events for middle-aged and third-aged people;
  - c) jazz events for all age groups.

Currently, jazz tourism is one of the established niches of musical event tourism and has its definite place in the structure of event tourism (fig. 1, 2).



**Figure 1. The place of jazz tourism in the field of event tourism.**



**Figure 2. The structure of event tourism.**

For a more detailed study of the jazz tourism niche, we carried out a geographic study of jazz festivals.

Before organizing a jazz festival, choosing a venue for it, organizers need to conduct a marketing research, assessing the level of demand and competition in the region. Moreover, the organizers, as a rule, consider jazz festivals only at the micro level. We believe that for a better perception and understanding of the field of jazz tourism, it is also important to consider the macroregions of the world, thus finding out in which regions this type of festivals is in great demand, as well as what requirements are imposed on the quality of organizing jazz festivals.

In regions with a small number of jazz festivals, there may not be a high demand for the planned event, but much will depend on significant investments in promoting this event and on the quality of its holding.

Difficulties arise in the geographical analysis of jazz festivals, namely:

1) the concepts of jazz festival, international festival, jazz tourism, music tourism are in the stage of formation;

2) event tourism is an extremely dynamic sphere of tourism, this also applies to jazz festivals. Every year, many jazz festivals are held around the world, while this system is constantly changing: new festivals appear and old festivals cease to exist (in this regard, keeping track of them, and even more quickly collecting statistics, becomes an extremely difficult task, and the results are rapidly losing their relevance );

3) on a global scale, accounting for all jazz festivals is extremely laborious, since small, local festivals do not have information support.

Nevertheless, attempts are being made to create event calendars for

jazz festivals, however, only at the level of individual countries, therefore, information on jazz festivals in the world is still insufficiently systematized. The number of international jazz festivals by country is shown in table 1.

**Table 1. The number of international jazz festivals by countries of the world [10; 11; 12; 13; 14, 15]**

	Number of international jazz festivals	Share in the macroregion, %	Share in the world, %
Europe	775	100	73,85
Asia	57	100	5,46
North and Central America	172	100	16,40
Latin America	32	100	3,07
Australia and Oceania	7	100	0,68
Africa	7	100	0,68

We made an attempt to generalize the famous jazz festivals in the world (see tab. 1) and came to the conclusion that the largest number of jazz festivals are in North America and European countries.

Jazz festivals are less popular in Asia, and the least number of jazz festivals are concentrated in the African region, due to the high costs of organizing such festivals.

Note that more detailed research and collection of statistical material on festivals of even one genre is extremely difficult and has a predominantly regional rather than global character. Separate attempts to systematize data on jazz festivals are being made in the USA and Great Britain, which are considered the birthplace of jazz festivals. The key obstacle in the detailed study of jazz festivals and the collection of statistical data is the high dynamism of the event tourism sphere, as well as the information problem, expressed in the extremely insufficient information of small, small-town jazz festivals, since not all organizers of jazz festivals publish detailed information about their festivals. As a rule, only the approximate number of visitors is known about festivals, the approximate proceeds from ticket sales (if any), which gives only superficial possibilities in their comparison and analysis.

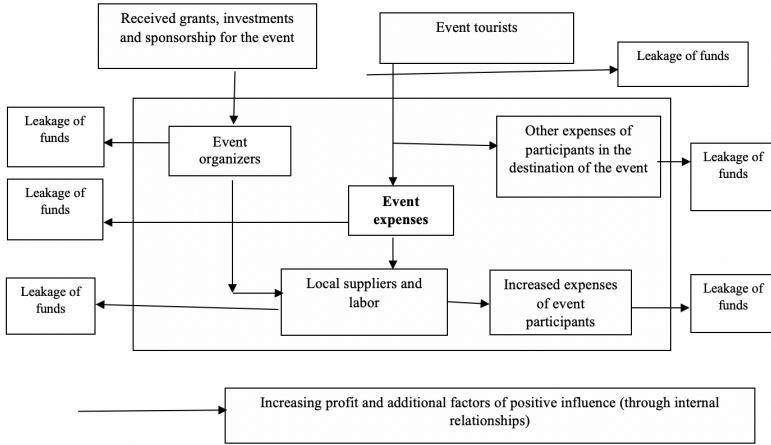
Holding jazz festivals will have an impact on the development of the regions.

How is it shown? In increasing the revenues of the region's budget, from visiting jazz festivals by tourists, it will also contribute to employment of the population and the creation of new jobs.

Jazz festivals in a region are more efficient for the economy if more



local performers, service providers and technology are used. The mechanism of action of a tourist animator in the context of an event event is shown in fig. 3.



**Figure 3. The mechanism of action of the tourist multiplier on the event.**

The organization of jazz festivals, like any other event, is a complex process and is associated with a number of problems that arise when planning and, directly, holding events.

The first problem is related to booking tickets for concerts and music festivals, as well as hotel rooms, parking spaces, etc. Large and even small festivals can cause an excessive load on the hotel fund of the region, on the transport network, and on the infrastructure of the event venue as a whole.

The second and one of the most important is the issue of safety at music events.

The third problem is informational. It is connected with the fact that tour operators are more interested in selling and promoting tours to major festivals, which are guaranteed to be in great demand. It is also hindered by the fact that a lot of events are happening in the world, they are not constant, dynamic. Therefore, it is quite difficult for small jazz festivals to gain popularity, world fame.

At the moment, the most effective solution to this problem is the popularization of jazz festivals in all popular social networks and bright brand-

ing.

Prospects for the development of jazz festivals:

a) improving the quality of jazz festivals, the formation of festivals as holidays or shows, with a large number of various entertainment elements;

b) analysis of prospects, as well as factors that negatively affect the image of the festival;

c) the formation of "event packages" including, in addition to visiting the festival, all the tourist services of the local infrastructure

d) reduction of organizational costs for the festival, on mutually beneficial terms with partners.

### **Conclusion.**

Jazz festivals are musical events that have a definite place in the field of event tourism, serving as a key object of jazz tourism as part of music tourism. The sphere of music tourism is currently poorly researched and systematized and definitely needs research. The study of festivals, the peculiarities of their organization, taking into account the many factors affecting their holding, is designed to provide a better understanding of this industry and to accelerate the development of the field of music tourism - jazz tourism.

Jazz tourism is at the intersection of tourism and music, and in fact is a genre type of music tourism. Jazz events can be divided into groups: by nature, frequency, duration, format, in relation to seasonality, scale, funding sources and age category of the target audience. Jazz festivals have specific features and lie in the fact that the target audience of jazz festivals is quite extensive - they are adults from 25 to 60 years old (the organization of such festivals requires taking into account the needs of different age categories), the contingent of jazz festivals is tourists interested in jazz music and high income.

With a steady pace of regional infrastructure development, as well as the existing strategy for promoting jazz tourism, a tourist product based on jazz festivals is able to occupy its niche of domestic tourism.

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## FEATURES OF EQUITY CAPITAL AS AN OBJECT OF ACCOUNTING AND INTERNAL CONTROL OF COMMERCIAL ORGANIZATIONS

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**Annotation.** *The article reveals eight key features of equity in the context of accounting, economic and legal approaches. The main ones include customer focus, capital circulation, social orientation, the use of a wide range of equity capital assessments and methodological approaches within various types of accounting, etc., which make it possible to expand the understanding of equity capital as an object of accounting and control.*

**Keywords:** *equity capital, multiple types of equity capital, peculiarities of equity capital, net asset value.*

The most important indicator of the activity of a commercial organization is its own capital. It gives an understanding of how the company is financially stable, what is its safety margin and how competently the company is managed. In addition, equity is a key category that reflects the relationship of an organization with its owners.

The analysis of scientific works allows us to state that at present there is no common understanding of the category of "equity capital". In our opinion, this definition should be viewed from two positions.

From the standpoint of traditional accounting, "equity capital is the total value of its assets minus liabilities, formed as a result of the use of fixed and working capital, while the sources of equity capital are the authorized capital, reserve capital, additional capital and retained earnings (uncovered loss)"<sup>1</sup>.

On the other hand, equity capital is the aggregate of the organization's funds that are in its ownership. In our opinion, a set of funds means various types of capital - financial, production, intellectual, human, social and reputation, natural, etc. It should be noted that each organization may

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<sup>1</sup> Evstafieva, E.M. Methodology for the formation of accounting and analytical support for equity capital management of a commercial organization // Management accounting. 2011. № 1

not have all types of capital, but only those that are necessary for doing business.

As part of the study, we identified the key features of equity as an object of accounting and control:

- Customer focus;
- Circulation of capital;
- Self-increasing cost;
- Social orientation;
- Using a wide range of estimates of equity capital and methodological approaches in the framework of various types of accounting;
- Includes the results of revaluation of non-current assets;
- Features of equity capital, due to the organizational and legal form of an economic entity;
- A plurality of types of equity capital: financial, production, intellectual, human, natural, social and reputation capital.

Let us consider in more detail the main features of capital that affect the organization of accounting and internal control in commercial organizations.

As the first feature, one should single out such a property of capital as customer focus, without which its growth is impossible. Customer focus is a long-term strategy of an organization aimed at identifying and meeting customer needs, providing high-quality service, without which long-term value added growth is impossible. The key components of customer focus are products, people, service and processes, rules and standards, and customer relationships. With the competent implementation of a customer-oriented policy, the organization increases the consumer loyalty index, increases the market share and sales volumes, increases the company's reputation, decreases staff turnover, which in the short term contributes to an increase in the organization's profits, and in the long term leads to an increase in the cost of capital. This feature requires, within the framework of accounting, to take into account external factors, as well as the organization of assessment and control of the level of customer focus of a commercial organization in combination with the process of creating value.

As the second feature, the circulation of capital should be considered. At all stages of its movement, there is a change in the forms of capital. At the first stage, financial capital is transformed into productive capital with the involvement of human, natural and intellectual capital and other types of capital; as a result of entrepreneurial activity, the redistribution of resources within each type of capital is shifted. At the second stage, the production capital goes into a commodity form, and at the third stage, there is a return to financial capital. This ensures the continuity of the production

process, and, consequently, consumption, in other words, there is a constant circulation of capital, which requires the organization of analytical accounting in the context of the main stages of circulation, directions of formation and use, as well as the organization of control in these areas.

The third feature is one of the most important features of equity capital, which is understood as the totality of the organization's assets owned (assets of the organization), lies in its property, which consists in self-growth of value, which is formed only with the continuous movement of capital.

The fourth feature of capital is its social orientation, without which its self-growth is impossible. The effectiveness of an organization's work implies the most complete use of the set of resources that is in the management of the organization, and, first of all, human, since a well-selected and functioning personnel directly affects the financial results of the organization. In this connection, the fundamental mission of any commercial organization should be its social orientation, which implies the creation of favorable conditions for work and rest of employees. Successful implementation of this mission implies an increase in the welfare of employees, provision of social guarantees, a system of labor motivation, working conditions, etc. Organizations that understand the value of human potential as a strategic factor of success achieve better results than their competitors.

The fifth key feature of equity capital is a wide range of valuations used, which directly depend on many factors, including its purpose, the concept used, valuation methods, etc. Currently, there are two approaches to valuing equity capital - accounting and economic. The accounting approach is based on determining the value of net assets in accordance with applicable law. Equity valuation obtained using the balance sheet method is retrospective in nature and does not contain the information necessary for making management decisions. The economic approach involves the determination of the value of equity capital as a set of future economic benefits, based on the use of three approaches - income, comparative and cost, and taking into account the influence of external factors on the activities of an economic entity.

The sixth feature is that equity capital includes the results of revaluation of non-current assets. Additional capital is one of the components of equity capital, the increase of which occurs due to the increase in the value of non-current assets (fixed assets and intangible assets) based on the results of their revaluation, as well as differences arising between the selling and par value of shares (interests), positive exchange rate differences associated with settlements with founders on deposits, etc. From an economic point

of view, additional capital is a certain monetary value formed in a company, which does not entail any obligations of the company to its counterparties. It creates a "financial safety cushion", because at the expense of such capital, the company is able to smooth out the consequences of some negative phenomena in business. In the balance sheet, additional capital in terms of revaluation of non-current assets is accounted for under the item "Revaluation of non-current assets", and in the rest - under the line "additional capital" (without revaluation) in the section "Capital and reserves". The additional capital directly affects the net assets of the organization and, consequently, its overall welfare, the value of such a business. At the same time, it should be noted that equity capital is not subject to revaluation.

The seventh group of features should include the type of organizational and legal form of an economic entity and its impact on the formation of equity capital. Commercial organizations do not have the right to start entrepreneurial activity without registering the authorized capital, the features of the formation and the size of which depend on the organizational and legal form of the economic entity. Limited liability companies, joint-stock companies (public and non-public) have a charter capital, unitary enterprises (state and municipal) have a charter capital, partnerships (full, limited) form a joint capital. The amount of the authorized capital is determined by legislation and the constituent documents of an economic entity. The assets of the balance sheet reflect the contributions transferred in the form of property or other rights in cash equivalent, and their assessment is agreed with the founders and approved by the decision of the meeting. The liability indicates the amount registered in the constituent documents. Thus, the organizational and legal form of a commercial organization affects the organization of analytical accounting, control of the formation and use of authorized capital, reserve capital, additional capital, retained earnings (uncovered) loss.

The eighth feature of capital when considering it as a set of funds of an organization owned or controlled by it is the multiplicity of types of equity capital. Commercial organizations are guided by a broader understanding of all possible sources of value creation. This approach is based on the concept of multiple capital, according to which different types of capital are distinguished - financial, production, intellectual, human, natural and social and reputation capital. At the same time, the "set of capital" in each organization is individual and can vary depending on the economic situation. The source of information on the various types of capital used by the organization within the framework of the accounting approach

is financial statements, in the framework of the economic approach - integrated reporting.

Thus, we have disclosed such features of equity in the context of accounting, economic and legal approaches. The main ones include customer focus, capital circulation, social orientation, the use of a wide range of equity capital assessments and methodological approaches within various types of accounting, etc., which make it possible to expand the understanding of equity capital as an object of accounting and control.



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**VIOLATION BY EUROPEAN BANKS OF THE RIGHTS OF  
CONSUMERS OF FINANCIAL SERVICES OF COMPANIES  
REGISTERED IN THE EUROPEAN UNION WITH RUSSIAN  
SHAREHOLDERS**

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**Abstract.** *The article examines violations of the rights of Russian shareholders, companies registered in the EU countries, to use banking services in European banks from the standpoint of international law. The epicenter of financial scandals were branches of Scandinavian banks in Latvia and Estonia, investigations in which led to a chain reaction of lawsuits against banks in Finland, Sweden and Denmark. In compliance with the requirements of the Financial Action Task Force on Money Laundering (FATF), banks have tightened the procedure for "proof of the legality of the origin of capital" for clients with the closure of accounts without much investigation for companies with foreign owners, including residents. As a consequence, resident taxpayers, employers, consumers of goods and services, and foreign companies move their assets to other countries.*

*On 13.1.2020, the Helsinki Court of First Instance dismissed Boris Rotenberg's claim against Svenska Handelsbanken AB, Nordea Bank Abp, Danske Bank and OP Yrityspankki Oyj. The court recognized the financial risks of the Scandinavian banks of the Finnish citizen under US sanctions above international law and guarantees of a fair trial. Based on this judicial precedent, now European courts can also recognize the risks of secondary US sanctions against any banks, not only to Russians from the SDN sanctions list, but also on any suspicion of money laundering by bank employees.*

*European banks strictly comply with the terms of the sanctions imposed by the US Treasury's Office of Foreign Assets Control and terminate client relationships with sanctioned parties and Russian residents. By complying with US demands, banks in Finland have undermined confidence in the banking system and the soundness of European financial institutions. And already in November 2020, the Directorate General for External Policies*

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*of the Union report notes that US extraterritorial sanctions that threaten to block companies around the world from accessing the American financial system are characterized as a serious challenge for the EU countries.*

*COVID-19 has transformed the banking market and accelerated the development of digital services and the transformation of banks into super-powerful ecosystems. The banking sector includes new technologies that will be able to squeeze the classic banks in this market and increase confidence in European banks and respect for the rights of consumers of financial services.*

**Keywords:** *conflict between international and national law, the right to banking services, US sanctions.*

On the basis of the Law on Combating Legalization (Laundering) of Proceeds from Crime and the Financing of Terrorism<sup>1</sup> adopted in European countries, European banks are discontinuing banking services to legal entities and individuals. The European Commission has revised the "black list" of countries in which EU banks should be especially careful when conducting financial transactions.

In September 2020, the European Banking Authority (EBA) urged EU member states to start developing unified and binding regulation to strengthen financial supervision and combat money laundering, with a concrete implementation plan to be presented in early 2021.

But according to experts from the International Monetary Fund, the fight against money laundering and tax crimes in the Baltic States and Northern Europe has shown the inability of European banks to effectively prevent money laundering received abroad.

In compliance with the requirements of the Financial Action Task Force on Money Laundering (FATF), banks have tightened the procedure for "proof of the legality of the origin of capital" for clients with the closure of accounts without special investigations for companies with foreign owners, including residents. As a consequence, resident taxpayers, employers, consumers of goods and services, and foreign companies move their assets to other countries.

For example, Latvian banks liquidate accounts of individuals and legal entities without explaining the reasons and do not give customers the opportunity to open an account in another Latvian bank. In 2019 alone, the share of foreign capital in Latvian banks was halved, and ten billion euros

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<sup>1</sup> In Finland the Law was passed later, 18.7.2008. Laki rahanpesun ja terrorismin rahoittamisen estämisestä ja selvittämisestä 503/2008.

URL: <https://www.finlex.fi/fi/laki/alkup/2008/20080503>. (appeal date:12.02.2020)

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left the Latvian financial sector in three years<sup>2</sup>.

In early 2019, the Scandinavian banks Nordea Bank and SEB AB received a request from the New York State Department of Financial Services (NYDFS) regarding the money laundering investigation at Danske Bank, as well as the connection of these banks with Mossack Fonseca. Particular attention was paid to bank accounts with Russian capital. Some branches of Scandinavian banks in Latvia and Estonia also became the epicenter of financial scandals, investigations in which led to a chain reaction of claims against banks in Finland, Sweden and Denmark.

According to the report of the international law firm Clifford Chance, in 2014-2019, clients of the Swedish bank Swedbank made bank transfers in the Baltic countries in the amount of over 37 billion euros<sup>3</sup>.

BuzzFeed News has published a report of banks to the Financial Conduct Authority of the United States Financial Crimes Enforcement Network on suspicious credit transfers worth about 1,800 billion euros between 2000-2017, including more than 150 million euros of suspicious money passed through Nordea Bank accounts alone<sup>4</sup>.

At the same time, US extraterritorial sanctions against European corporations (Airbus and Total) and Russian citizens and companies, as well as companies registered in Finland with Russian shareholders, influenced the work of European banks due to the prospect of losing access to the American financial system and are already characterized by as a serious challenge for the EU countries.

So, in 2017-2018, Scandinavian banks in Finland, including Nordea Bank, stopped servicing private payments of a citizen of Finland and Russia Boris Rotenberg. The Helsinki Court of First Instance, by its decision dated 13.01.2020 dismissed Boris Rotenberg's claim against Svenska Handelsbanken AB, Nordea Bank Abp, Danske Bank and OP Yrityspankki Oyj. The court recognized the financial risks of the Scandinavian banks of a citizen of Russia and Finland under US sanctions from the Specially Designated Nationals And Blocked Persons List (SDN). For the duration of the investigation, banks have the right to terminate the service and payment of the customer's bank charges pending the investigation. The law does not define the length of the period for the consideration of the case,

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2 [https://lv.baltnews.com/ekonomika\\_online\\_novosti/20200308/1023737104/Vash-schet-zakryt-cto-proiskhodit-s-latviyskimi-bankami-i-cto-delat.html](https://lv.baltnews.com/ekonomika_online_novosti/20200308/1023737104/Vash-schet-zakryt-cto-proiskhodit-s-latviyskimi-bankami-i-cto-delat.html). 8.3.2020.

3 Swedbank epäonnistui rahanpesun torjunnassa – epäilyttävää rahaa kulki pankin tilien kautta vähintään 37 miljardia euroa. YLE. 23.3.2020. URL: <https://yle.fi/uutiset/3-11271107>. (appeal date:15.12.2020)

4 Ainutlaatuinen tietovuoto paljastaa, miten liikainen raha liikkui pankkijärjestelmän läpi. YLE. 20.9.2020. <https://yle.fi/uutiset/3-11554451>. (appeal date:15.12.2020)

only the definition of "acceptable time frame for the investigation" is given.

For example, more than 9.5 million euros arrested by the decision of the court of first instance in Helsinki in August 2014 have not been released to date, although the court issued an acquittal on suspicion of laundering 135 million euros between 03.24.2014 - 08.07.2014<sup>5</sup>. The appeal hearing is scheduled for June 2021.

In the case of Boris Rotenberg, the court recognized the legal basis for Danish, Swedish and Finnish banks not to service the accounts of a client - a Finnish citizen from the sanctions list of the Office of Foreign Assets Control (OFAC). The Helsinki County Court referred to the US sanctions imposed on a Finnish citizen on the SDN list as the basis for its decision.

The bank argued that with the entry into force of the Countering America's Adversaries Through Sanctions Act<sup>6</sup> (CAATSA), Handelsbanken's risk is even higher than before.

The court, like the plaintiff, referred to the "Law on Credit Institutions"<sup>7</sup>, in particular for chapter 15, section 6, which entered into force on 9.12.2016. That is, Handelsbanken closed the accounts of Boris Rotenberg on 10.4.2014, even before the entry into force of this chapter and the law itself, which came into force on 15.08.2014.

The court also noted that after the closure of Boris Rotenberg's account in 2014, the Banking Council for Insurance and Financial Disputes in its decision dated 22.8.2017 indicated that the closure of Boris Rotenberg's accounts was permissible only for good reasons that the bank did not provide, and recommended to the bank cancel the closure of the account that the bank opened again on 4.10.2017.

That is, more than three and a half years ago, when Boris Rotenberg has been on the list of the Office of Foreign Assets Control (OFAC) Specially Designated Nationals And Blocked Persons List (SDN) since 20.03.2014, there was no risk of secondary sanctions for the bank, or excessive risks that threaten the financial position to continue its activities.

According to the Law on Payment of transactions, "The Bank (Service Provider) may refuse to execute a payment order only if the conditions for the execution of the payment order agreed in the agreement are not met or

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5 Decision of the Helsinki County Court dated 8.10.2019, R 18/6573. The author took part in the defense of the main suspect, and is also preparing a defense in the Helsinki Court of Appeal in May 2021.

6 Countering America's Adversaries Through Sanctions Act. Public Law 115-44. August 2, 2017. URL: <https://www.treasury.gov/resource-center/sanctions/Programs/Pages/caatsa.aspx> (appeal date: 8.12.2020)

7 Laki luottolaitostoininnasta 8.8.2014/610. URL: <https://www.finlex.fi/fi/laki/ajantasa/2014/20140610>. (appeal date: 8.12.2020)

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are not otherwise provided for by law"<sup>8</sup>.

The defendant bank Handelsbanken stated that Section 9 of Chapter 9 of the Law on Credit Institutions provides, inter alia, that a credit institution should not conduct its activities in a manner that would entail a significant risk to the credit institution's solvency or liquidity. Also, Section 4 of Chapter 18 of the Law on Credit Institutions states that a foreign credit institution should not be exposed to such a risk when carrying out its activities in Finland that it jeopardizes the interests of the branch depositors.

The County Court also referred to the Credit Institutions Act, which prohibits local banks from assuming excessive risks that threaten their financial situation. According to the court, the possible disconnection of the bank from the US financial system and the dollar market as punishment for Boris Rotenberg's transactions is such a risk.

In assessing the evidence, the court noted: "It is highly likely that OFCA will not designate these payment transactions in this case as significant, since the payments may be considered relatively small, and some of them may be characterized as ordinary payments for recurring expenses. At the same time, the court noted that the problem is that it is not possible to predict with any certainty how the OFCA will interpret these factors, since they were formed with the aim of giving OFCA the greatest margin of appreciation in establishing secondary sanctions."

Such formulations in the decision of the county court "*very likely*" and "*it is not possible to predict with any certainty*" remind of the sanctions imposed by the United States and European states, based on statements "*with a high degree of probability*" about Russia's involvement in the incident in Salisbury for which no evidence has yet been provided.

Chapter 16 of the Law on Credit Institutions, which entered into force on 9.12.2016 contains provisions on the client's right to basic banking services. The bank may refuse to open a payment account with basic functions only for reasons arising from the Law on the Prevention of Money Laundering and the Financing of Terrorism (444/2017) or the Law on the Implementation of Certain Obligations of Finland as a Member of the United Nations and the European Union (659/1967)".

According to the 1967 Law on the fulfillment of certain obligations of Finland as a member of the UN (section 1), in order to fulfill the obligations arising from Finland's membership in the UN and based on binding decisions of the Security Council, the necessary measures of an economic nature can be determined within the framework of the regulations.

According to the Act on the Fulfilment of Certain Obligations of Finland

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<sup>8</sup> Maksupalvelulaki, 30.4.2010/290. §41.

as a Member of the United Nations and of the European Union, no obligations or interim injunctions made in violation of this Act or any provision based on or circumventing it shall be enforceable<sup>9</sup>.

International law contains sufficient grounds for declaring unlawful unilateral measures. And Finland, as a UN Member State, must comply with and support only those sanctions that are provided for by a decision of the UN Security Council in accordance with Chapter VII of the UN Charter<sup>10</sup>.

The court also referred to former US President Barack Obama's Decree № 13661, which authorized the imposition of sanctions against any person who "provided substantial assistance/support" to the Russian persons on the SDN sanctions list. According to the testimony of the invited expert John Smith (the former head of the OFAC sanctions regulator), Nordea could theoretically be included in the same sanctions list if OFAC wanted to qualify transfers in the interests of Boris Rotenberg as "substantial assistance".

As a reminder, according to Article 235 of the U.S. H.R. 3364<sup>11</sup> The President of the United States may recommend against and prohibit all credit or payment transfers between financial institutions if the transfers are under US jurisdiction and involve a sanctioned person.

That is, in violation of the UN Charter, the President of a UN Member State can recommend, as well as cancel the application of sanctions to a person if this is included in the zone of the most important national security interests of the United States without adopting a Security Council Decision in accordance with Chapter VII of the UN Charter<sup>12</sup>. The freezing of the gold and foreign exchange reserves of a rogue country can become a destructive effect, while the content of this definition is also determined by

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9 Laki eräiden Suomelle Yhdistyneiden Kansakuntien jäsenenä kuuluvien velvoitusten täyttämisestä. 659/1967. URL: <https://www.finlex.fi/fi/laki/alkup/1967/19670659>. (appeal date: 14.12.2020)

10 UN Charter. Article 39 Chapter VII.

URL: <https://www.un.org/ru/sections/un-charter/chapter-vii/index.html>. (appeal date: 4.12.2020)

11 Law on Countering Russian Influence in Europe and Eurasia 2017 "(US Sanctions Law H.R. 3364) H.R.3364 - Countering America's Adversaries Through Sanctions Act. 115th Congress (2017-2018). URL: <https://www.congress.gov/bill/115th-congress/house-bill/3364/text>. (appeal date: 11.12.2020)

12 UN Charter. Article 39 Chapter VII. The Security Council determines the existence of any threat to peace, any breach of the peace or act of aggression and makes recommendations or decides what measures should be taken, in accordance with Articles 41 and 42, to maintain or restore international peace and security. URL: <https://www.un.org/ru/sections/un-charter/chapter-vii/index.html>. (appeal date: 12.12.2020)

the United States<sup>13</sup>.

The court found that the Office of Foreign Assets Control of the US Treasury determines, in rare cases officially, the liability of a person under secondary sanctions. Especially non-US banks tend to comply with punctual minor US sanctions, as the consequences for violating them are very serious, for example, completely depriving the services of correspondent banks of the United States with payment in US dollars in the United States market, which can cause the collapse of all banks subject to these sanctions.

The court concluded that it follows from John Smith's conclusion that well-known world banks, as a rule, strictly comply with the terms of the US Treasury's FDA sanctions and terminate client relations with the sanctioned parties, as otherwise there may be a risk among the objects of sanctions, which, in turn, may pose a threat to the continuation of the bank's activities. The consequences can be serious if the bank admits a violation of secondary sanctions. For example, for international financial institutions that require the ability to use the services of US banks and US dollars, the deprivation of the services of US correspondent banks in the United States market and transactions in US dollars would be a serious threat to their continuation.

The court did not take into account that the payments made by Boris Rotenberg fell within the scope of Council Decision № 2014/145/CFSP and were intended for: (a) necessary to meet the basic needs of the persons listed in the Appendix, as well as their dependent family members, including for paying ... taxes, insurance premiums and utilities; (b) solely to pay reasonable professional fees or to recover costs incurred in connection with the provision of legal services"<sup>14</sup>.

It is important to emphasize that the new version of the Finnish Constitution, which entered into force in 2000, secured the priority of the basic law in the article "Rule of the Constitution" as a guarantee of the unconditional sovereignty of the state and its people. "The requirements of international legislation and treaties can operate only to the extent that they do not contradict the Constitution, and if, when the court is considering the case, the application of the prescription of the law would be in clear contradiction

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13 The National Security Strategy of the United States of America. September 2002.  
URL: <https://2009-2017.state.gov/documents/organization/63562.pdf>. (appeal date:11.12.2020)

14 Council Decision 2014/145/CFSP of 17 March 2014. Concerning restrictive measures in respect of actions undermining or threatening the territorial integrity, sovereignty and independence of Ukraine. Official Journal of the European Union. L 78/16, 17.3.2014. Article 2.3, a), b).

with the Constitution, the court must give priority to the Constitution."<sup>15</sup>.

When considering claims for the cancellation of earlier decisions of national courts on the basis of the European Court of Human Rights' finding of a violation by Finland of the articles of the European Convention, the Supreme Court of Finland referred to the supremacy of the Constitution and was guided by Chapter 31 § 2 paragraph 3 of the Finnish Justice Act, upholding the decisions of the national courts.

We also note that the legislation of Finland, Sweden and Denmark does not give national banks the right to unilaterally close client accounts or refuse to conduct transactions due to the requirements of American law. But while transactions in dollars pass through the US banking system, the Ministry of Finance will control, block transactions and oblige banks to pay fines. European banks are not under US sanctions, but each year they agree and pay billions in fines.

As in Finland, in the United States, a conflict between the Constitution and an international treaty is resolved in favor of the Constitution. At the same time, the strategic interests of the United States are placed above international law; back in 1919, the 28th President of the United States, Woodrow Wilson, considered "part of the political tradition" to refuse to comply with international obligations after their signing. And 100 years later, former US national security adviser John Bolton called the decision of the International Criminal Court "illegal" and promised that the United States would do everything to "protect its citizens", and the United States threatened with sanctions against the International Criminal Court if it continued to prosecute Americans.

In making its decision, the Helsinki County Court referred to the § 226 (imposition of sanctions against Russian and other foreign financial institutions) and § 228 (mandatory imposition of sanctions regarding transactions with foreign sanctions violators and serious violations of human rights in the Russian Federation) of the Law on Countering Russian Influence in Europe and Eurasia 2017.

The Finnish court further refers to US law and states that § 228 of the US Sanctions Act H.R. 3364 obliges the President to impose freezing sanctions - the same as for Boris Rotenberg - on any person who is not a US citizen. In accordance with federal law (pursuant to § 311 CFR, § 561.308), "foreign financial institution" means any foreign legal entity engaged in receiving deposits, providing loans or buying/selling foreign exchange, securities. Nordea is a "foreign" (non-US) organization that receives deposits.

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<sup>15</sup> Finnish Constitution, art. 107. 11.6.1999/731.

URL: <https://www.finlex.fi/fi/laki/ajantasa/1999/19990731>. (appeal date:10.12.2020)



And then the court concludes: "Thus, OFAC will almost certainly consider Nordea a foreign financial institution within the meaning of the Law."

This ruling by the Helsinki County Court became the first legal precedent for most banks in European countries, in which the real estate and accounts of foreigners who do not live in the EEA countries, regardless of their citizenship or residence permit, are located.

As a result of this decision, Scandinavian banks began closing accounts of Russian resident companies registered in Finland, represented on the board of directors. Note that the shareholders or executives of these companies were not subject to US or European sanctions, just as the companies' activities were legal and financial reporting was transparent.

Russian tax residents of Finland doing business or owning real estate in Finland are increasingly facing infringement of their rights to basic banking services. Based on the judicial precedent in the Boris Rotenberg case, now European courts have already recognized the risks of secondary US sanctions against any European banks not only to Russians from the sanctions list, but also to those living outside the European Economic Area.

In a series of many similar cases of violations of the rights to banking services in Finland, the closure of accounts of a company from the capital region with Russian shareholders, residents of the EU country - Finland, deserves special attention. In November 2020, the Finnish bank OP Yrityspankki Oyj ceased banking services to a Finnish-registered company registered in 1996, which is a distributor of Boart Longyear, an international firm headquartered in Salt Lake City, importing mining equipment mainly from the United States and Canada to Finland with further sale to other countries. The annual turnover of the company was over 10 million euros per year with a constant high and sustainable profit. The shareholders and management of the company have dual Finnish and Russian citizenship. The owners and management of the company are not on the Office of Foreign Assets Control sanctions list (OFAC) and are not subject to EU or US sanctions, and all business partners are screened in the US by Boart Longyear.

Bank OP Yrityspankki Oyj did not indicate the reasons for termination of the agreement with reference to clause 1.10 of article 19 of the standard agreement with the bank "Duration and termination of the agreement". This condition gives the bank the right to terminate the agreement with one month's notice under any circumstances without giving reasons and without taking into account the situation and interests of the bank's client.

At the same time, OP Yrityspankki Oyj closed the right to use the account for a subsidiary in central Finland, through whose accounts only the

sales of Boart Longyear products within Finland were carried out. The closure of the accounts of the parent and subsidiary company led to the layoff of all employees, made it impossible for further activities and the payment of the last repayment of the loan of 2 million euros received in 2016.

In response to a lawyer's inquiry to the Finnish Government and the Financial Supervision, a response was received that the company was aware of the national and European banking regulations and related issues that, according to correspondence with the government, will be available in early 2021 of the year.

We also note that the Finnish Constitution guarantees the right to work and to support oneself on the income from ones chosen work<sup>16</sup>.

The bank's actions to terminate the signed agreements for the use of accounts violate the Regulation of contract terms between traders (Laki elinkeinonharjoittajien välisten sopimusehtojen sääntelystä 3.12.1993/1062). The rights of the recipient of the bank's services were also violated in accordance with the Contracts Act (Laki varallisuusoikeudellisista oikeustoimista, § 36 OikTL) and the provisions of the Consumer Protection Act (kuluttajansuojalaki 38/1978).

And then, on 23.9.2020 the US Treasury Department imposed sanctions against a Finnish citizen and Finnish-registered companies Acex OY, GCH Finland OY, Optima Freight OY and Unicum Trade OY, which also made it impossible for companies to continue to operate in Finland.

By fulfilling the requirements of the United States, banks in Finland are breaking confidence in the banking system and the stability of European financial institutions, as well as being deprived of the inflow of foreign capital and large clients that find other financial structures.

And already in November 2020, the Directorate General for External Policies of the Union report notes that the extraterritorial US sanctions that threaten to block companies around the world from accessing the American financial system are characterized as a serious challenge for the EU countries. Extraterritorial sanctions also raise critical questions as to their legality under general international law, WTO law and other specific international rules<sup>17</sup>.

While the US dollar is one of the main currencies in settlements be-

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<sup>16</sup> The Constitution of Finland. 11 June 1999. Chapter 2. Section 18. Everyone has the right, as provided by an Act, to earn his or her livelihood by the employment, occupation or commercial activity of his or her choice.

<sup>17</sup> Policy Department for External Relations. Directorate General for External Policies of the Union. November 2020-PE 653.618.

URL: [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/653618/EXPO\\_STU\(2020\)653618\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/653618/EXPO_STU(2020)653618_EN.pdf)

tween states, the US Treasury with an external debt of more than 27 trillion US dollars will control not only dollar transactions, but also the very principle of the functioning of the world banking system. To counter the influence of the United States from American institutions and reduce their dominance in the EU financial system, it is necessary to create a European Monetary Fund, a SWIFT system with an increase in the share of the euro in international settlements as an alternative world currency.

At the same time, Europe cannot free itself from American dependence. Created in the summer of 2020, an analogue of the BLINC SWIFT system to support cryptocurrency transactions is tied to ClearBank, a partner bank of the American cryptocurrency exchange Coinbase. During an interview with CNBC's Squawk Box, Mike Pompeo stressed that digital asset transactions must be strictly controlled and governed by stricter rules along with SWIFT transactions and other electronic payment systems. And other digital currencies, including cryptocurrencies zcash, centrally-issued tokens, may also be subject to the regulatory framework. Pompeo supported Mnuchin's position that cryptocurrencies and anonymous transactions will not become the norm, as this will "reduce the security of the world"<sup>18</sup>. Mnuchin was one of several US government officials who have raised concerns about the potential of cryptocurrency as a terrorist financing tool.

Also note that Facebook in early 2021 will have its own Libra cryptocurrency pegged to the US dollar. At the same time, in October 2020, Libra announced its exit to the international payment system PayPal, and then Visa, MasterCard, eBay and Stripe refused to participate in Mark Zuckerberg's project. Despite the exit from the payment system, Facebook plans to integrate the digital wallet into the company's WhatsApp and Messenger services to pay for goods and services using a single currency.

Already in the United States itself, the special commissioner of the US Securities and Exchange Commission (SEC) Hester Pirs adheres to the position that the SEC will not be able to include digital assets in the regulatory framework. In an online interview with John Whelan, Managing Director of Santander Bank, Pierce said the SEC could learn from other approaches to cryptocurrency regulation, such as in Wyoming<sup>19</sup>.

In September 2020, the Wyoming Banking Council granted the Kraken

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<sup>18</sup> US Secretary of State Wants to Regulate BTC Like Other E-Transactions. August 20, 2019.

URL: <https://cointelegraph.com/news/us-secretary-of-state-wants-to-regulate-btc-like-other-e-transactions>. (appeal date: 26.12.2020.)

<sup>19</sup> New rules' for SEC could follow example set by Wyoming, says Hester Peirce. December 03, 2020. URL: <https://cointelegraph.com/news/new-rules-for-sec-could-follow-example-set-by-wyoming-says-hester-peirce>. (appeal date: 28.12.2020.)

bitcoin exchange and cryptocurrency startup Avanti the status of a special purpose depository institution (SPDI) with the functions of a traditional financial institution, for example, in the state of Wyoming.

With the aim of increasing investment and ensuring consumer and investor protection, the European Commission adopted on 24 September 2020 a comprehensive package of legislative proposals to create a regulatory framework by 2024 to facilitate the implementation of blockchain and digital assets in the financial sector, creating a legal framework for the provision of cross-border digital public services in the EU using blockchain technology. The European Commission also adopted new legislative rules for regulating cryptoasset markets in the EU and a pilot regime for market infrastructures based on DLT distributed ledger technology.

For other crypto assets that do not qualify as "financial instruments", such as utility tokens or payment tokens, the Commission has proposed a new structure that will replace other EU and national laws that currently regulate the issuance, trade and storage of crypto assets. This Markets in Crypto-Assets Regulation (MiCA) will support innovation while protecting consumer rights and the integrity of cryptocurrency exchanges.

And already in November 2020, the Directorate General for External Policies of the Union report notes that the extraterritorial US sanctions that threaten to block companies around the world from accessing the American financial system are characterized as a serious challenge for the EU countries. Extraterritorial sanctions also raise critical questions as to their legality under general international law, WTO law and other specific international rules<sup>20</sup>.

It should also be recognized that COVID-19 has already changed the banking market, accelerated the development of digital services, online services and the transformation of banks into super-powerful ecosystems. The banking sector includes new advanced technologies that will be able to squeeze the classic banks in this market and increase confidence in European banks and ensure the observance of the rights of consumers of financial services.

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20 Policy Department for External Relations. Directorate General for External Policies of the Union. November 2020-PE 653.618.

URL: [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/653618/EXPO\\_STU\(2020\)653618\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/653618/EXPO_STU(2020)653618_EN.pdf)

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## CRIMINALISTICS IN ANCIENT CHINA

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**Abstract.** *Orientation on overcoming the dualism between knowledge and practical skills, practical orientation led to the interest of ancient Chinese culture and science in the human person and human activity in all its manifestations. Traditional Chinese thought saw the goal of its development to identify the main worldview, moral, psychological and social attributes of a person, and to implement the achieved results into real human activities, including forensic sciences.*

**Keywords:** *criminalistics, Ancient China, crime, philosophy, criminal procedure, judicial activity, ancient Chinese treatises, state, law.*

The famous Austrian forensic scientist Hans Gustav Adolf Gross<sup>1</sup> in the introduction to his classic work "Leitfaden für Ermittler als forensisches System" (English translation - "Guide for forensic investigators as a system of forensic science") wrote: "Forensic science, by its very nature, begins only where criminal law, also by its nature, ceases to work: material law has as its subject the study of a criminal act and punishment, formal criminal law (process) contains the rules for the application of material criminal law. But in what way are crimes committed? How to investigate these methods and reveal them, what were the motives in committing such, what were the goals in mind - neither criminal law nor the process tell us about

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<sup>1</sup> Hans Gustav Adolf Gross (Germ. Hans Gustav Adolf Groß; (26.12.1847 — 09.12.1915) — Austrian lawyer and forensic scientist, one of the main founders of the science of criminalistics (Note from authors).

all this. This is the subject of forensic science".<sup>2</sup>

In modern science, forensic science is explained as "the reality of criminal law", emphasizing the inextricable connection of these sciences<sup>3</sup>. Indeed, the science of criminal law is a defining link in the system of legal sciences aimed at combating crime, it lays down the boundaries and directions of development, providing forensic science with the subject of proof, but establishing a connection with the driving force behind the development of institutions for combating crime, called the criminal policy of the state.

It is generally accepted that the need for forensic science arose at the beginning of the XIX century in connection with the spread of organized crime. At the same time, researchers often refer to the classic work of J. Thorvald "The Age of Criminalistics", dedicated to the history of the development of European criminalistics from the moment of the creation of the criminal police by François Vidocq until the beginning of the XX century. However, retrospective analysis shows that organized crime belongs to historically stable types of crime, therefore it cannot be considered a phenomenon that arose only in the XIX century, and therefore it is erroneous to associate the emergence of European forensic science with it.

Therefore, we propose to turn again to the statement of G. Gross. A well-known criminologist, speaking of forensic science, mentions criminal and criminal-procedure law, the normative basis of any investigation process. It would not be wrong to assume that the emergence of criminalistics - and its sister - the applied science of criminology, is caused by the appeal of state interests to the issue of internal security, is associated with the emergence of state policy, separated from the personality of the head of state and derived from the emergence of society as an equal actor in state-legal relations. able to demand protection of their interests from persons who do not comply with the law.

In other words, Hans Gross was undoubtedly right in believing that the formation of forensic science as a science requires the existence of criminal law, which the state and society recognize as a universal regulator of relations between absolute prohibition and protection. To perform the function of protection, the state needs special tools, which are, first of all, the system of criminal justice and the system of execution of sentences, as well as a mechanism that contributes to the actual achievement of the set goal - to combat crime and punish real criminals. Forensic science is

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2 Gross G. Manual for forensic investigators as a system of criminalistics. M.: LexEst, 2002.

3 Uvarova I. A. Historical aspects of the development of criminology as a science / / Young scientist. 2016. №14. P. 478.

such a mechanism.

That is why we see a gap of hundreds or even thousands of years between the emergence of criminal law and the emergence of criminalistics in a number of states. The rudiments of legal proceedings, the foundations of investigative actions, analysis and proof, which we talked about in the previous chapter of this textbook, were not systematic due to the fact that those states and societies did not need a permanent anti-criminal mechanism. The reasons for the absence of such a need may be different, and their analysis and classification will require a separate study. However, this connection between a certain level of development of state and legal institutions and the emergence of a need for applied police sciences does not require proof, since the first forensic science originated much earlier than the XIX century, in a completely different cultural space, which took a different path of building statehood.

Researchers of Ancient China note that this is a country of "intense culture that has not left a single phenomenon of life in its original form"<sup>4</sup>. Ancient China was distinguished by a developed management system, which can be safely classified as bureaucratic. The systematization and bureaucracy of ancient China was formed several centuries before the new era, expressed not only in the state structure, but in philosophy and even religion. It is not for nothing that scholars of the history of China note its originality in the fact that he does not know philosophy according to the European model - philosophy as a science and discipline, which had developed by that time in Ancient Europe. The philosophy of China "developed in close unity with other pro-scientific ... disciplines that had applied significance and contributed to the achievement of any real ... practical results - the theory of public administration, social psychology and ethics, medicine"<sup>5</sup>.

Traditional Chinese thought saw the goal of its development to identify the main worldview, moral, psychological and social attributes of a person, and to implement the achieved results into real human activities. It was China that was the first to separate a person as a physical subject and a person as an individual, creating the rudiments of a classification that in the modern period is so significant, for example, for the science of criminology in the study of the interaction of crime with a person - a criminal and a victim.

China is one of the centers of the so-called "axial time" - a concept introduced by the German philosopher Karl Jaspers to designate the peri-

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4 Alekseev V.M. Chinese folk painting. M., 1966. P. 102.

5 Abaev N. V. Chan-Buddhism and the culture of psychological activity in medieval China. Novosibirsk: Science, 1983. P. 9.

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od of human development, when the mythological worldview was replaced by the philosophical one, which formed the type of person that we know and study now<sup>6</sup>. The axial time of Jaspers falls on the period 700-200 BC, when the first schools and the first movements appeared in ancient China, which formed, among other things, the system of criminal justice and police activity. In China at that time, this resulted in the creation of a whole list of philosophical schools focused on explaining the place of man in relation to the state and state power. World famous Kun Tzu (Confucius) - the ancient Chinese philosopher, who created his famous doctrine of a noble man and his role in managing people, "the theory for future governors"<sup>7</sup>. However, few people know that Confucianism is one of the first practical psychological and pedagogical sciences, which sought not so much to create the concept of an ideal person as to educate him in socially approved behavior, to teach him to achieve socially valuable results. It acted not only as a philosophical basis for the formation of an ideological concept of a moral standard, but was used to characterize the personality. In the court records of Ancient China, in the period before the establishment of a single ruling Qin dynasty (until the III century BC), researchers find references to Confucian norms of behavior when assessing the personality of a criminal and when assigning him punishment<sup>8</sup>.

Oppositional opinion about a person, his role in the state and about the methods of influencing him and his behavior (including criminal) was expressed by the opponent of Confucius, the founder of the School of Legalists Shang Yang in his treatise "The Book of the Governor of the Shang Region"<sup>9</sup>. It was on the basis of the merger of both worldviews that the later legislation of China was built, including criminal, starting with the accession of the Han dynasty (206 BC).

The establishment of an ideology and bureaucratic structure contributed to the formation of a whole system in which the aspiration of a person became service to the state. Ancient China was the first country to put into practice the system of education and training of officials, established a system of class ranks and a career ladder that promoted advancement. Of course, the ramified and complex system of public services could not do without the part that is responsible for the fight against crime and the administration of justice. An extensive number of systematized works of a procedural and scientific nature has come down to us, whose analysis

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6 Jaspers K. The meaning and purpose of history. M.: Republic, 1991. P. 32-50.

7 Alekseev V.M. Chinese literature. M., 1978. P. 402.

8 See: protocol 20, Official Theft of Grain and Confucian Principles. Zouyanshu (Collection of Judicial Requests): Paleographic Documents of Ancient China. M., 2013. P. 87-89.

9 Shang Yang. The book of the Shan region ruler. M.: Ripol. 2018.

allows us to conclude that there is not only rudiments in China, but a well-oiled and almost flawlessly operating system for solving and investigating crimes, which is in no way inferior in complexity to modern police systems. Already in the III century BC, on the territory of Ancient China, there was a "Qin Guide to Investigating Crimes" dedicated to the method of establishing the nature of the crime committed, recreating its situation by examining the scene, interrogating witnesses and relatives of the victim, examining material evidence, searching and establishing evidence, documenting it, checking versions, etc<sup>10</sup>.

In the list of early recommendations, mention should be made of the famous ancient Chinese treatise "The Art of War", written by Sun Tzu<sup>11</sup> more than 2500 years ago, which sets out the issues of tactics and methods of establishing various circumstances of past events, as well as the basics of operational-search activities, which are still relevant today and are actively studied by government officials not only in modern China, but also in other countries of the Asia-Pacific region.

Thanks to early bureaucratization and a unique way of building a state, based on Confucianism, and therefore not characteristic of European civilization, China has become the cradle of forensics in the sense in which Russian scientists understand it - that is, forensic techniques, tactics and methods.

The famous monument on the history of legislation and judicial activity Zouyanshu (Collection of Court Requests) contains interesting information about how the procedure for the investigation of crimes was carried out until the IX century A.D. Through this ancient work, we know that in China during the Warring States period (from the V century BC until the unification of China by Emperor Qin Shi Huang in 22 BC), there were already officials performing police functions on a permanent basis. These officials were divided into several types, in particular, civil servants who did not participate in the detention of bandits and robbers; on civil servants involved in detentions; and for military personnel performing a law enforcement function. At the same time, the principle of personal responsibility of an official for failure to fulfill their tasks in the field of law enforcement and for abuses committed in the investigation of crimes arose in China, which was enshrined in specially developed legislative acts, for example, in the "Statute on the Application of Punishments" from Zhanjiasan. There was

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10 See: Reader on the history of the Ancient East / Ed. M. A. Korostovtsev, I. S. Katsnelson, V. I. Kuzishchina. Part. 2. M., 1980.

11 Sun Tzu is a military leader, strategist and thinker who lived in the 6th century BC, the period of the Qi kingdom, the author of the famous treatise "The Art of War" (Note from authors).

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a concept of false denunciation, divided into several types, falsification of evidence, abuse, the concept of false testimony and knowingly false translations when giving evidence in court, etc.

In addition, already at such an early period of time, the police officials of ancient China carried out investigative and search actions in accordance with the tactics and methods of their conduct. So, in the process of studying Protocol 22 from the "Collection of Court Inquiries",<sup>12</sup> which describes the methodology for investigating a robbery in 241 BC, we see that the officials who carried it out act in the same way as is recommended for modern law enforcement officers.

It was recommended to start the investigation with the interrogation of the victim, during which the details of the incident are clarified, and also, by means of clarifying questions, doubts about the possibility of knowingly false denunciation are eliminated. Further, the instrument of the crime is examined, and its signs are described in detail in the investigation protocol, and the scene of the incident is examined, where other material evidence is collected. After that, the employees appointed to carry out the investigation proceed to search activities: a search and interview of possible eyewitnesses, a door-to-door visit are carried out, and when these measures do not give a result, a general search is announced. The protocol mentions the purpose of all these activities - to establish the circle of persons who had the reasons and opportunities to commit a crime. During interviews and interrogations, employees try to establish the fact of criminal awareness. And after a suspect has been identified, his identification is carried out during the identification procedure with a description of individual characteristics based on appearance, as well as by collecting testimony about the ownership of the crime instrument found at the scene of the attack. All actions during the investigation are carefully recorded in the protocol.

From the texts of the Collection it is known that police officials of that period used methods of induction and deduction, possessed the skills of logical thinking, and had an idea of the procedure for conducting investigative actions with maximum efficiency.

The protocols show signs of the use of technical knowledge, although at that time they were not yet of a special expert nature (for example, protocol 19<sup>13</sup>), the search actions are carried out in a sequence from smaller to larger (from particular to general), with an increase in coverage.

So, in protocol 22, the investigation begins with interviewing witnesses who lived near the scene, then proceed to interview those who were aware

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<sup>12</sup> Soanish (Collection of judicial requests): paleographic documents of ancient China. M., 2013. P. 94.

<sup>13</sup> Ibid. P. 84.

of the victim's money, and only after that a general search is announced.

Obviously, the police of that period have an idea of criminal awareness, they check the testimony of victims and witnesses through interrogation of other persons and cross-examination in order to establish their reliability, as well as through confrontation (minutes 16, 17, etc.<sup>14</sup>).

The study of the monuments of the history of criminal law and judicial procedure in China allows us to draw a conclusion about the undoubted relationship of the processes of state and legal development taking place there with the formation and development of the forensic science and other applied police sciences. We believe that such a significant (almost a thousand-year) advance in time of the creation of the criminal police and criminal sciences in Confucian Southeast Asia, in comparison with states in Europe, is caused precisely by the early formation of the idea of bureaucratic functions and competence, as well as the emergence of the training system, certification and professional graduation of civil servants.

The significantly higher literacy of the population of Southeast Asia, in comparison with ancient and medieval Europe, also played a role: most Sinologists around the world note the fundamental role of the written Chinese language in the development of the bureaucratic apparatus of China and methodological support for the functioning of the state<sup>15</sup>.

It has been proven that already in ancient China, fingerprints were used to certify documents and prevent their further counterfeiting, methods and possibilities of fingerprint research were developed.

Fingerprints of officials from the Qin Dynasty (3rd century BC) were found on documents and government seals<sup>16</sup>, and evidence from foreign traders in Tang China (851) shows that the thumbs of the parties were necessarily affixed to loan contracts<sup>17</sup>. This was due to the exact knowledge of the uniqueness of papillary patterns. This tradition in countries with hieroglyphic writing is still preserved for another important reason - insufficient handwriting originality and its identification capabilities and characteristics.

In addition to fingerprints, China's police services have since ancient times used systems to describe the criminal by external signs, including for search. The census and registration system also included a verbal portrait. In the administration of the Han dynasty (206 BC - 220), the officials

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14 Ibid. P. 65-83.

15 Spiritual culture of China: encyclopedia: in 5 V. V. 3. Literature. Language and writing / ed. M. L. Titarenko et al. 2008. P. 93-109.

16 Cummins H. Ancient finger prints in clay //Journal of Criminal Law and Criminology (1931-1951). 1941. V. 32. №. 4. P. 468-481.

17 Cole S. A. Suspect identities: A history of fingerprinting and criminal identification. Harvard University Press, 2009.

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who were responsible for the annual population census compiled registers, where they took into account "the number of men and women in each court, their name, age, place of birth, dignity (social status), description of appearance, financial situation, etc."<sup>18</sup>. These registers were also used to identify persons in case of a doubt about their identity.

China is distinguished by a large number of recommendatory (methodological) monuments, which were used in the investigation of crimes. In the literature on the study of the history of forensic science, the activities and works of the official Song Tzu, an outstanding scientist and specialist in forensic medicine during the Song Dynasty, are most often mentioned<sup>19</sup>. Since 1239, Song Tzu has exercised judicial functions: first as a judicial quartermaster in the county, later as the head of the judicial branch in the province. Combining his official duties with a great personal interest in the investigation process, in 1247 he wrote *Xiyuanjilu* (Collection of Reports on the Clearing of Unjust Accusations)<sup>20</sup> – the world's first work on forensic medicine, especially on the autopsy and the establishment of fifty three causes of death. The treatise contains methods of external examination of the body (due to the non-prevalence of the practice of autopsy), signs that make it possible to determine the cause of death and their differences, the basics of toxicology and techniques that can be attributed to the first tips when conducting toxicological examinations. Song Tzu's recommendations were three hundred and fifty-five years ahead of the earliest (1602) European work on forensic medicine, by the Italian Gortunato Fedeli.

Through the work of Song Tzu, we know that guidelines for the investigation of homicide and personal injury existed in China before him. When writing his work, he relied on previous works, for example, on the earliest known text on forensic medicine by an anonymous author of the X century. "Neishulu" ("Compassionate Records") and on the "Collection of Outstanding Cases" compiled in 951 by He Ning and He Men. However, it was Song Tzu's Collection of Reports that was published by the Hunan Provincial Judiciary in accordance with the imperial order, and remained the first mandatory practice guide for judicial officials until the XX century. On the basis of Song Tzu's treatise, numerous works on forensic medicine were written, as well as commentaries and interpretations on the text of

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18 Perelomov L. S. The Qin Empire – the first centralized state in China (221-202 BC). M.: East. lit., 1962. P. 45.

19 Asen D. Song Ci (1186–1249) Father of World Legal Medicine: History, Science, and Forensic Culture in Contemporary China //East Asian Science, Technology and Society: an International Journal. 2017. V. 11. №. 2. P. 185-207.

20 Song C. The washing away of wrongs: forensic medicine in thirteenth-century China. Michigan: University of Michigan Press, 1981. №. 1.

"Xiyuanjilu" itself: in 1308, Wang Yu's "Records of Judicial Infallibility"; a number of works of the XVII century, such as "Commentaries and Interpretations on the "Reports on the Withdrawal of Unjust Accusations" by Wang Kentang, "Compendium of Materials on the Withdrawal of Unjust Accusations" by Zeng Shenzhai, "Amended" Reports on the Withdrawal of Unjust Accusations" by the Head of Department in the Department of Punishment Wang Mingde; in 1694, the "Reports on the Clearing of Unjust Accusations" by the Official Committee of Laws was published in 1796, Wang Yuhu's "Confirmation of Reports on the Clearing of Unjust Accusations"; in 1827, "Amendments to "Qiu Zhongrong's Records of Clearing Unjust Accusations" and Shen Jiaben's "Supplements to the Manual of Forensic Medicine". The manual has been translated into Korean and Japanese, which means it has gained international relevance.

From these examples, we see that the drawing up of practical recommendations for the investigation of crimes in China was systematic, there was a research methodology and its continuity. This testifies to the existence of forensic science before the period of industrialization, and also allows us to draw a conclusion about the dependence of forensic science on the recognition of the need for scientific and methodological support of one or another function of the state. The latter is true not only for the criminal industry, since similar recommendations have been drawn up in China throughout its history and in other industries: from agriculture to court ceremonial procedures.

Of course, the systems of law enforcement and its forensic support that existed in those periods bore the imprint of the time when they were created, which must be taken into account. In particular, a later analysis of the works of Song Tzu and his followers by European experts contains definitions such as "absurd" and "curious"<sup>21</sup>. However, it must be remembered that the foundations of the recommendations were laid in a period when the system of sciences was not as harmonious as even at the beginning of the XX century, and the methods of scientific research consisted mainly of observation and experiment. The reality of those times did not separate the rational and the mythologized, therefore, along with the recommendations on forensic medicine and criminal procedure, astrology and alchemy were used in the investigation of crimes, and together with legal departments, departments of forensic fortunetellers were included in state

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<sup>21</sup> In particular, this opinion was expressed by G. Giles in 1901, when he called the Collection "a curious book on medical jurisprudence" with "an abundance of absurdities." See: Dai N. Ancient China's technology and science, compiled by the Institute of the History of Natural Sciences, Chinese Academy of Sciences. 1983.

bodies<sup>22</sup>. However, this does not at all diminish the quality of the works described by us, which largely meet the requirements of modern forensic science, not only by the subject matter, but also by the methodology of the research, the presentation of the results obtained and the quality of their systematization.

When examining the historical development of forensic science, it is very important not to exaggerate its dependence on the development of criminal law and process. As a retrospective analysis and study of the evolutionary interdependence of these spheres shows, even significant changes in criminal or criminal-procedure norms rarely lead to similar changes in forensic science. We see that the recommendations made by domestic criminologists in the middle of the XX century can be used with similar success by the subjects of disclosure and investigation even now, despite the adoption of the current Criminal Code of the Russian Federation of 1996. The more general methodological these recommendations are, the less they depend on the current legal norm and all its changes. Comparing the first forensic recommendations with modern ones, we see that forensic science tends to inherit the scientific paradigm of the time of its origin, and also directly reflects the science intensity and development of the natural-technical fields of knowledge of a particular country, its specific interests in a certain time period.

In addition, it is always worth remembering that forensic science is an applied science, which means that its changes are caused, first of all, by the presence of one or another practical problem in the activity of the investigator, that is, an incident. This incident, in turn, is directly derived from the evolution of criminality and crime, therefore between criminology and forensics, in our opinion, there is much more in common than between criminology and criminal law. Due to this casual applied nature, forensic science cannot be a purely theoretical science, because its development is determined by practical needs: situations that arise during the investigation; specific deeds, the truth about the commission of which must be established. This connection is inseparable and obvious, especially in the examples of the evolution of European and Russian forensic science, with which we will get acquainted with the scientific community later, in our other scientific publications.

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<sup>22</sup> Cook, C.A., Major J. *Defining Chu: Image and Reality in Ancient China*. Honolulu, 1999.

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## TRAINING OF EDUCATIONAL PERSONNEL IN THE BORDER AREA: THE SOUTH OF RUSSIA

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**Abstract.** *The urgency of the problem of cross-border cooperation in education is due to the strengthening of the role of border regions in the context of globalization, the growing flows of interregional, border, international migration of the population. This presupposes the purposeful training of management and teaching staff in order to develop cooperation between educational systems in the border area. A set of methods was used to study the problem: theoretical analysis of domestic and foreign pedagogical literature; historical, relative - comparative research methods, etc. In the process of scientific analysis, theoretical research and practical experience in the implementation of master's programs at the Southern Federal University for training education personnel, relevant for educational in the border area of the South of Russia, in the consortium of universities "Frontiers of Russia" are systematized.*

**Keywords:** *border and cross-border space; federal university; preparation of masters of education.*

### **Introduction**

The education system is one of the most important spheres of life of the modern society, responsible for the reproduction of its intellectual resources. For the system of lifelong education in this situation, it is relevant to constantly analyze the main factors of educational integration in the modern interconnected and interdependent world, developing in conditions of economic and socio-cultural interaction, including the insufficiently studied

dimension - border cooperation in the field of education and science.

### **Problem and purpose**

Using the results of theoretical analysis of numerous scientific and rational discourses on globalization, regionalization, frontiers, substantiate the productivity of designing master's programs at a federal university in order to develop cooperation in the border space. The main directions of state policy in the field of education and science in the border area include: internationalization, regionalization and globalization; equity, availability and quality; educational process, research.

**Research methodology** are: theories and models for the design and implementation of master's programs for training leaders in the field of education, relevant for the formation of cooperation with universities in the border and cross-border space.

### **Research methods**

A set of methods was used: theoretical analysis of domestic and foreign pedagogical, psychological, managerial literature; historical, relative-comparative research methods; terminological analysis. A set of methods was used: theoretical analysis of domestic and foreign pedagogical, psychological, management literature; historical, relative-comparative research methods; terminological analysis.

### **Results**

As a result of the geopolitical consequences of the collapse of the USSR, 24 constituent entities of the Russian Federation found themselves in the position of border area for the first time, the number of which is 45 million people. Along with the longest border, the Russian Federation also has the world's largest border space. More than half of 89 constituent entities of the Russian Federation are border regions. They occupy over 75% of the entire territory. They are home to about 70 million people of the population of Russia. Cross-border cooperation of the constituent entities of the Russian Federation with territorial communities and authorities of foreign and neighboring states is becoming an urgent task in the context of globalization in the development of cooperation in the border, economic, humanitarian, educational and other fields.

Cross-border cooperation in the Russian Federation is a complex, multi-level phenomenon that contributes to the sustainable development of border areas. The development and formation of a common educational and scientific space of the CIS, SCO, BRICS is of paramount importance in border cooperation.

An up-to-date strategic document defining the prospects for the development of cross-border relations of the constituent entities of the Russian

Federation, the education system is associated with the processes of globalization, regionalization and federalization.

These guidelines and complex tasks are presented in the Concept of cross-border cooperation in the Russian Federation, approved by the order of the Government of the Russian Federation of October 7, 2020, 2577-r [1]. The practical value of this Concept lies in the fact that it clarifies and supplements the list of participants in cross-border cooperation: federal executive bodies, executive bodies of the constituent entities of the Russian Federation and local self-government bodies, legal entities and individuals, gives a clear delineation of the powers of these bodies, gives a definition of border territories, systematized in detail and described the types and directions of cross-border cooperation.

For the Russian Federation, the border space is especially relevant and significant at the present time, since it has become an important feature of modern international and interregional relations of Russia, since the interests of states, including humanitarian contacts, intersect and form on the state border. The development of humanitarian cooperation between border areas of neighboring states, on the one hand, helps to improve the livelihoods of the population of border areas and the maintenance of historically established ties and contacts in social, cultural, informational and other spheres, on the other hand, it influences the formation of the much-needed "belt of good neighborliness" along the perimeter of Russian borders.

In this project, the authors rely on an interdisciplinary approach, which assumes that the potential for interaction and the real level of cooperation of the border region with the adjacent territory, along with the internal conditions of the border region itself, is also determined by the functional role of the state border. L. B. Vardomsky and N.S. Mironenko distinguish three basic functions of the border: contact (connecting), filtering (for example, at the customs border) and barrier (obstructing communication) [2, p. 40].

From various points of view (economic, geopolitical, civil law, socio-cultural, etc.), it is possible to substantiate the reasons for the emphasis by states of the role of education in promoting their values abroad, through the development of educational programs. These reasons include the following: geopolitical expediency and national security interests, economic development and development of professional skills, border and cross-border space and the capabilities of the federal university in the development of education in the border and cross-border space. As indicated in the analytical studies of the Association of European Border Regions (AEBR), it is Russia that has great transboundary potential for mutually

beneficial cooperation in terms of economic integration and the development of horizontal networks in the intercountry space [3].

The institutionalization of cross-border cooperation and, in general, cross-border interactions makes it possible to implement a new programmatic approach to cooperation for the purpose of cross-border and border cooperation, including in education. Education is gradually acquiring an important role in regional integration processes, in particular on the European and Eurasian continents. The modern intensification of the processes of cross-border cooperation and the increasing attention to universities as to innovative "points of growth" require special approaches from researchers when studying the processes that affect the border region.

Educational programs are key instruments of soft power policy for the respective countries, regions, macroregions. The most important components of the potential of the border region include its scientific and educational potential of university networks, basic organizations, universities of the CIS, SCO, BRICS: CIS basic educational organizations, consortia of border universities (for example, "Borders of Russia", etc.); implementation of bilingual educational programs for additional education of children from families of migrants and residents of border regions, etc. These forms of cooperation show that universities should become the main actors and catalysts for integration processes in the development of education and science in the border area of the CIS, southern Russia.

South of Russia is an intensively developing macro-region, which is part of the dynamic development of a globally integrated economy, as well as a specific geographic space that embodies a diverse cultural heritage, confessional diversity with an intensively developing system of lifelong education. The fundamental task of the development of the South of Russia is the effective development of cross-border cooperation in education, its strategies, tasks, models in spatial development. This is due to the fact that the process of globalization in the modern world sets the goal of uniting states for mutually beneficial relations.

Border cooperation in education is a strategic landmark of the Southern Federal University, which will create a "belt of good neighborliness" along the perimeter of the southern Russian borders. Border and cross-border cooperation of SFU is an important factor in the development and intensification of the integration processes of Russia with the CIS countries, interstate cooperation with the CIS countries in general. In the activities of SFU in recent years, the direction of development of cooperation in the field of education, science and educational activities on the basis of a cross-border approach and the development of border space with neighboring

states has begun to form: the university consortium "Frontiers of Russia", centers, projects of the Caucasian and Black Sea cooperation in the field of education and science, etc.

The team of developers of SFU master's programs in management of educational development in the direction 44.04.01 Pedagogical education (L.M.Sukhorukova, V.N. Gurba, T.N. Shestakova, N.I. Fokin) has developed a scientific and educational project "Professional development of managerial personnel (managers) in the field of education, science, border and cross-border cooperation in education ", the purpose of which is cooperation in the field of training leaders of educational organizations, science with adjacent educational systems, extracts from which are presented in table 1.

**Table 1.**  
**Southern Federal University Program for the Development of Cross-Border Cooperation and Integration in Education**

№	Content
1.	Goal. Borders are one of the biggest challenges of the 21st century. The goal of the SFU program for the development of cross-border cooperation in education is to study the problems of the development of education in the context of global mobility, migration, cultural diversity of border areas, and transnational cooperation.
2.	Scientific and educational project "Pedagogical support of children in cross-border migration processes." Scientific and educational collaboration "Scientific school of Evgeniya Vasilievna Bondarevskaya. Migrant Pedagogy: Migration Management in Education in Modern Conditions".
3	Draft master's program in the direction 44.04.01 Pedagogical education "Border Regions in Transition: Teacher education and Leadership in education".
4.	Project for the development of cross-border and intercultural cooperation in the training of educational leaders.
5.	Project for cross-border regional and territorial education planning.
6.	The project of preventing interethnic conflicts by means of education in the border space of the CIS, SCO.
7.	A project to study the impact of globalization and political changes on the education sector of neighboring states.
8.	Development of a draft conversion master's program. Frontex Dissemination - European Joint Master's in Strategic Border Management.
9.	Designing an interdisciplinary and international master's program "The Master in Border Studies: migration and education."
10.	Scientific communications, organizational and managerial communications: International Association of Heads of Educational, Scientific Organizations and Cross-Border Cooperation in Education (network project). A network of educational and scientific organizations of the border area.

In developing the project, the authors are based on the provisions of the theories of "participatory management" in the development of education management. The federal university should also provide professional training and professional development of public administration personnel in the field of education. This is necessary to achieve the most important goal in the training of leaders in the field of education, the formation of their complex of managerial, information and communication, analytical, social and entrepreneurial and competencies for the implementation of sustainable development of educational organizations and educational systems [4]. SFU, as a multidisciplinary federal university, develops its own educational strategy, which involves the formulation of the main trends in the development of the education sector, innovative educational programs of multilevel education, research work on the problems of education management, including master's education in the direction 44.04.01 Pedagogical education. Therefore, SFU implements educational activities in a relevant educational profile for the purpose of vocational training and additional vocational education of managers, their deputy leaders, and the managerial personnel reserve of educational organizations in the border area.

At SFU, the design of master's programs in the direction of Pedagogical Education has been carried out since 1992 on the basis of Decree № 13 "On the introduction of a multi-level structure of higher education in the Russian Federation." This Resolution determined the content of training, the structure of the master's curriculum, according to which the master's program involved preparation for research activities. In 1993, the State Committee of the Russian Federation for Higher Education adopted the Regulation on Master's Degree in the system of multilevel higher education in the Russian Federation. This document regulated the order and sequence of implementation of the decree "On the introduction of a multi-level structure of higher education in the Russian Federation." This regulation was developed in accordance with paragraph 5 of Art. 9 of the Law of the Russian Federation 3266-1 of 10.07.1992 "On Education", which included programs of multilevel higher professional education: bachelor's, specialist's and master's degrees. This document clarified that the training of masters is focused on research and scientific pedagogical activities.

During this time, the priorities for the development of SFU were formed in the design of master's educational programs in the direction 44.04.01 Pedagogical education: training of pedagogical and managerial personnel in the "Education" branch; SFU as the center of an effective educational environment in the South of Russia macro-region; use of global educational, scientific, educational resources; interregional and border coopera-

tion, including with UNESCO centers; Foresight strategy "Integration of the Southern Federal University into the state and public management of education development in the post-crisis process of the South of Russia", etc.

The purpose and objectives of the complex of master's programs in the management of education development in the border and cross-border space being designed at SFU is the creation and implementation of innovative master's programs for training leaders in the field of education for training a state manager in the field of education, educational systems. Competence of the head in the field of education, generalized labor functions, labor actions should be formed by the profile disciplines of the educational program, provided with educational and methodological complexes in accordance with the requirements and recommendations of the FSES HE 3 ++ and professional standards [5.].

In the modern educational situation, management personnel in the education sector need knowledge and professional competencies on the problems of intercultural management, management of the development of the education sector in a multicultural and borderline, cross-border space. The implementation of this approach is possible subject to the use of the achievements of scientific schools of the South of Russia E.V. Bondarevskaya, V.S. Ilyin, scientific and pedagogical schools of V.I. Mareeva, S.V. Kulnevich, V.T. Fomenko, S.A. Safontseva and others.

Since 2018, the FSES 3 ++ has been operating in the pedagogical education system, which implies the combination of professional and educational standards. Decree of the President of the Russian Federation "On measures for the implementation of state social policy" dated May 7, 2012 № 599 formulated the development of at least eight hundred professional standards. Including, in the field of science and education: teacher (pedagogical activity in preschool, primary general, basic general, secondary general education, educator, teacher); teacher (pedagogical activity in vocational education, additional vocational education, additional education); specialist in the field of educational psychology (activities on psychological and pedagogical support of students); a specialist in the field of education (activities on social and pedagogical support of students); head of the educational organization of secondary general and vocational education; head of the organization of higher and additional professional education; head of a scientific organization; scientific worker (research activity).

The implementation of the goal and related tasks will be possible if SFU positions itself as a global-regional university, implementing a cluster of innovative programs for multi-level professional education, in cooperation with the scientific and educational communities of the CIS, SCO, BRICS.

In developing the content of this project and its components, the authors consider educational systems and scientific activities as an integral part of the border space of the CIS, SCO, as participants in the active transformation of the surrounding reality, due to the cultural and historical community of the peoples of the CIS, SCO, and the South of Russia.

Thus, border and cross-border cooperation in the field of education is a strategic task of border and cross-border relations of the Russian Federation. This cooperation and interaction in the field of education is aimed at establishing and developing a constructive dialogue between the Southern Federal University and university networks, educational authorities of neighboring states. For further study, scientific and educational projects of multilingual, ethnological training of managerial and pedagogical personnel of the border area of the South of Russia are relevant.

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## USING THE EUROPEAN EXPERIENCE OF SCIENTIFIC ACTIVITY IN RUSSIAN UNIVERSITIES

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**Annotation.** *In this article the author considers the using European experience of students' research activities in Russian universities. In this context, the theoretical achievements of European scientists on the methodology of student research activities accumulated in new historical conditions are very important for our research.*

**Keywords:** *higher education system, university, european experience, scientific research activity*

At present, in Europe, there is a need to update the prognostic plans for the development of students' research activities and to develop general provisions for the integration of higher education systems in Western European countries. The openness of the European Higher Education Area has many positive consequences. Overcoming national restrictions, it is possible to start a structure of research activity that would facilitate mobility and close cooperation, on the one hand, and preserve national diversity, on the other. To implement this provision, it is necessary to use the growing support of the European Union, pursue a policy of encouraging students and teachers of research activities or teaching outside their native countries throughout Europe [1].

In Russia, the system of research activities of students in the framework of vocational training is carried out on the basis of research institutes, centers, problem and creative laboratories, student research associations, associations, and circles. The higher education system of Russia faces a very important question: are modern higher education institutions capable of preparing a young specialist not only as a subject teacher, but also as an independent researcher-experimenter, capable of solving scientifically the problems of improving the scientific and pedagogical process?

In the domestic sphere of higher education, new trends in research have been outlined: the training of highly qualified specialists in accordance

with the requirements of the labor market; strengthening of innovation processes in the field of specialist training; the idea of continuous professional development in the context of research activities; there is a tendency to develop and improve such extracurricular collective forms of students' research activities as scientific schools, teams of young researchers, student rationalization and design bureaus, production and economic bureaus, production and economic bureaus, the management of scientific circles of students in the vocational education system, etc. And, without a doubt, one of the promising areas that will prepare students for experimental research is participation in the work of search groups that provide students with the opportunity to develop their intelligence and creative abilities in the process of participating in experimental activities. It is participation in research activities that gives students a creative impetus, they have a desire to spread their personal intellectual horizons, the joy of learning.

In the context of European integration in Russia, it is necessary to modernize research activities in order to increase the competitiveness of scientific achievements at the global educational level. However, in order to achieve an increase in the number of Russian universities and to achieve their recognition in the world ranking of higher education, it is necessary, first of all, to pay great attention to the quality of scientific research. All this is possible by integrating Russian and foreign experience, creating favorable conditions for the research activities of future specialists: to achieve increase in the number of higher education institutions that are among the 200 leading world universities, according to the world university rating (Quacquarelli Symonds World University Ranking), given that when determining the place in the ranking according to QS World Universities Ranking, the maximum percentage (40%) is set for university academic reputation index [4; 5]. The leading factors of this strategy are: the progressive development of research activities, the high rate of development of new knowledge, the competitiveness of the economy and the effectiveness of national security strategies, identification of talented creative youth who are able to develop the scientific potential of the country; support for young specialists and scientists in the field of research and innovation based on the results of ensuring the socio-economic development of Russia; participation of Russian scientists in international projects providing access to new scientific resources, based on the national interests of the Russian Federation; creating the conditions for research and development, consistent with modern principles of organization of research and innovation and innovation; the creation of new research groups, competitive environment in order to attract young talented youth with high scientific results of world

level.

Today, the higher education system of Russia has the following tasks: reforming the sphere of science by improving the principles of management, financing and organization of scientific research; the integration of science and education, the development of a system of training qualified scientific personnel; creation of conditions for competition and entrepreneurship in the field of science and technology, stimulation and support of innovative activities; ensuring the presence of the Russian Federation among the five leading countries of the world engaged in research and development; the creation of world-class scientific centers, including scientific and educational centers based on the integration of universities, scientific organizations and their cooperation with organizations operating in the real sector of the economy.

So, in the scientific field, it is necessary to develop competition, support Russian talented young scientists so that they create their own research centers and creative laboratories in Russia. The activities of research centers should be closely integrated with the education system, the economy, and high-tech companies; it is necessary to turn research backlogs into successful commercial products. However, today in the global ranking of talent attraction ("The Global Talent Competitiveness Index") Russia is in the sixth dozen countries, acting as a donor of human capital for world science. Only the integration and harmonization of research activities will be able to improve the quality and high rating of Russian higher education in the future, expand the boundaries for the mobility of students and teachers.

Russia has every reason to update the European experience in developing strategic directions for the development of domestic research activities, as at the current stage reforming both the long term and the following areas: the creation of research institutions of a new type; formation of a system of continuous research activity; enhancing the role of the state in the management of research systems; stimulation of relations of higher educational institutions with industry; increasing the role of the state in the management of research systems; expansion of international cooperation in the field of research at the national, regional and international levels. International research projects in the field of education and the best international practices of their organization, accumulated over the past decades, prove that the countries participating in research projects have a sufficient bank of national data to compare the experience of different European countries.

In order to further integrate the educational systems of the studied European countries, it is necessary to form a common unified organizational

and functional model of the university in the first quarter of the XXI century, adapt national higher education systems, overcome language barriers throughout Europe, put all higher education institutions in the same material and financial conditions, especially for those universities that, having crossed the border of the European Higher Education Zone and entered into fierce competition, will be able to get equal access to quality European education. As the Education Commission of the European Union rightly determined, improving the status of research activities is one of the key tasks [3; 10].

The ways of introducing the European experience of students' research activities into the Russian education system can be different: today, progressive education, upbringing and self-development systems are widely studied in Russian universities: for example, fundamentalization, humanization, actualization of knowledge, interdisciplinarity, connection with practical and research activities [2].

European educational programs have evolved over the centuries and the direct borrowing of foreign experience will be erroneous. Foreign experience cannot be mechanically transferred to our conditions, since in the Russian higher school the educational process is formally more obligatory, unified and intense. On the other hand, when borrowing foreign experience, it should be borne in mind that the economies of developed European countries are currently in a stage of stable development, and the mechanism of its functioning is constantly being improved, adapting to the requirements of scientific and technological progress and the realities of today [6; 7].

It is important to emphasize the use of European experience in the practice of Russian higher education regarding a wide choice of forms of material incentives for especially gifted students: annually rectorial contracts are concluded with talented students, the training of which takes place according to an individual plan and ends with the defense of a dissertation; senior students working on dissertation research topics can attend "research training" groups; conducting demonstration classes of research activities during creative decades; conducting of propaedeutic courses during the year for capable and gifted under the guidance of professors and associate professors; internships of students and young scientists in leading European universities; recognition of the results of research activities as a thesis or master's work; an increase in the number of student scientific grants and awards [8; 9].

Thus, being the most highly developed in the world, the countries of the European Union accumulate rich experience in training specialists through

the organization of research activities, “education through science”, which implies an independent search for knowledge and truth, both by a teacher and a student. Mutually beneficial interest in the search for constructive mechanisms to stimulate integration processes in higher education, due to the general trends of globalization and internationalization of socio-educational processes both in Europe and in Russia. Currently, many scientists pay great attention to the problem of integrating Russian higher education into the world education system, as well as ways to improve the level of education in universities of the Russian Federation for subsequent entry into an open information society.

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## ENVIRONMENTAL COMPETENCE AS A COMPONENT OF FUNCTIONAL LITERACY OF STUDENTS

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**Abstract.** *The article discusses the functional literacy components of students, its connection with the formation of competence in the ecology field. The necessity of expanding and improving environmental education in pedagogical institutes in all specialties is justified. Special attention is paid to the relationship between the results of school students' education and the environmental competence of the teacher.*

**Keywords:** *functional literacy of students, environmental competence of teachers*

The importance of environmental education of the younger generation has not been questioned in pedagogical circles around the world for many decades. However, the quality of the result of such education is still not always satisfactory. There is a serious problem with understanding the content of environmental education for those teachers who implement it. As a rule, they do not have a basic education in ecology, including the content and methodology of this section of pedagogy [1]. In this regard, there is a substitution of systematic environmental education of students with all sorts of one-time actions, often not based on the content related to the study of the environment. A volunteer day is organized to collect various types of garbage on the territory of the city or a competition of drawings about nature. But in the content of school education, there are practically no pedagogically sound foundations of ecology as a science.

In 2017-2019, we created and implemented a professional development program "Formation of ecological culture, healthy and safe lifestyle in primary general education" in the amount of 72 academic hours. The purpose of this program was to prepare teachers for the formation of an ecological culture, a healthy and safe lifestyle based on a competency-based approach.

The planned learning outcomes are:

- \* development of professional competencies necessary for the formation of ecological culture and healthy lifestyle of schoolchildren;
- \* development of modern technologies for the formation of ecological culture and a healthy lifestyle;
- \* mastering the methodological tools for developing and implementing a program for the formation of environmental culture and a healthy lifestyle in the classroom and in extracurricular activities.

As a final work, teachers create a project "Program of extracurricular activities for the development of environmental culture and the formation of a healthy and safe lifestyle in my class". This is a practice-oriented work aimed at organizing ecological activities of students.

At the beginning of teachers' training, their professional deficits were discovered. Even the definition of "ecology" could give only 10% of those who signed up for the course. Most teachers share alarmist views on the state of the environment, do not have basic knowledge about the ecological systems that make up the landscapes of Russia. This is due to the fact that most state educational standards of higher pedagogical education do not include ecology as a discipline and environmental competence as a planned result of study [1]. The understanding of the need for an environmental component in the training of future teachers has not yet been fully realized. It should be noted that currently the knowledge of ecology as a science is so extensive and variable that it is often impossible to include it in the full curriculum of the university.

The problem can be solved if we move from the natural science approach to environmental education to the humanistic foundations of interaction with nature. To do this, the training program of future teachers should include environmental psychology as a tool for forming a subjective and ethical attitude to nature. As V. A. Yasvin notes [5, p. 62] in this case, nature is no longer perceived as an object of unilateral human influence, it is recognized as the qualities and properties of the subject with all the consequences that follow from this. A living being, like any other subject, has the right to exist "just like that", regardless of its "usefulness" or "uselessness" for a person. From a "natural resource" it turns into a partner of a person who becomes one of its members, who has the same rights as any other.

For the most effective formation of such results, it is important to consider the concept of "environmental competence of the student". Competence as a property of a person is manifested in its awareness, desire and willingness to act in a certain area, in the presence of specific experience

[4, p. 12]. In environmental education, competence should be manifested:

- in a certain amount of knowledge about environmental laws that a citizen of society should have - *the cognitive component* of competence;

- in the presence of motives for active interaction with the natural world and a positive attitude to living beings, a value attitude to the environment - *an axiological component*;

- in the willingness of a person to comply with all the rules and laws that are discussed in the lessons, as well as in the ability to interact with natural communities, obey the recommendations of a healthy lifestyle - *an interactive component*;

- in the presence of experience in interacting with nature, participating in hiking and organizing ecological trails, observing and recording changes in the environment, etc. - *an empirical component* [3, p. 433].

This structure of environmental competence directly correlates with functional literacy, as defined by the authors of the international programs for the assessment of educational achievements PISA, PIRLS, TIMS. Functional literacy as the ability to enter into relations with the external environment and adapt to it as quickly as possible is a situational characteristic of the individual, since it reveals itself in specific life circumstances. This level of literacy makes it possible for a person to perform a full-fledged activity in life. An ecologically competent person does not separate his life from the life of nearby plants, animals and other living and inanimate objects of nature. The ability of a person to scientifically explain phenomena, data obtained and provide evidence, as a component of functional literacy, is very important for the formation of environmental competence. Without the use of the scientific method, educational projects of schoolchildren describing the "information structure of water", "spiritual essences of forests, rivers", etc. are recognized as "ecological". In addition, often insufficiently thought-out activities of the school community are passed off as environmental actions. The following examples can be given:

- contests of crafts or clothing items made of plastic dishes that are bought in the store. Plastic bags, disposable tableware or newspapers that are then thrown into the environment are not used for their intended purpose. As a result, environmental pollution increases because these materials have not fulfilled their direct function.

- exhibitions of crafts made of natural materials, which use live plants, mushrooms or shells of live shellfish. Removed from wildlife, they die. This attitude to living beings does not correspond to the postulates of environmental ethics.

- environmental actions for planting plants or for cleaning river and lake



banks, park areas, can disrupt the existing balance in specific areas. In the park in autumn, all leaf litter is raked and burned, as a result, the soil layer is depleted, roots will be exposed before the harsh winter.

This proves the relevance of the formation of the cognitive component of environmental competence of the student. It is necessary not just to know that "everyone should protect nature". It is necessary to constantly study living creatures and features of the landscape of the area in which it lives. You can meet with professionals who can tell you about it. And it can be not only researchers, but, for example, operators of sewage treatment plants, agronomists, foresters and even sanitary doctors.

The most problematic component of environmental competence is its axiological part. The values of a student of a pedagogical institute or college, unfortunately, are most often overlooked. As for the presence of motives and a positive attitude towards living beings and the desire to interact with the natural world, it is not uncommon for teachers to have a much lower intensity of attitude towards nature than students. [5, p. 420]. As a result, teachers are more likely to cause a decrease in the subjective and ethical attitude of adolescents to nature than to develop a love for living beings. There is only one way out – to develop in future teachers ' motivation to communicate with nature. V. A. Yasvin notes that the high intensity of attitude to nature, first of all, is associated with non-pragmatic practical activity of the individual, aimed at the surrounding world [5, p.212]. This is what the volunteer activity, which is increasingly developing in our country, is aimed at.

The willingness of the teacher to comply with all the rules and laws that he tells students about, unfortunately, is currently quite low. Smoking has spread among teachers, and their appearance can be provocative not only in everyday life, but also in school. Currently, it is becoming an urgent need to teach future teachers the basics of a healthy lifestyle and the basics of rational behavior in nature. It would be an effective method of developing the teacher's willingness to interact with nature to extend this experience to all subject teachers.

On the one hand, it would seem that *the empirical component* of the teacher's environmental competence is difficult to form, and it is difficult to provide all students with environmental practice. But in our daily life, we are always in contact with nature. These are the plants on our windowsill, the landscapes of city parks, and our pets-animals. Most teachers have experience caring for them. In order for the student to treat living beings as subjects, it is necessary not only to communicate knowledge, but also to organize tactile contact with them. Even the suggestion to touch a guinea

pig or hamster for many schoolchildren becomes a test. The movement to create "Quantoriums" as the introduction of effective education models available for replication in all regions of the country implies the creation of biological laboratories on their basis. But the main equipment in these laboratories mainly consists of digital microscopes, computers, test tubes and pipettes-dispensers. Living organisms are not visible in the commercials. As a result, a new generation of gifted students is growing, treating nature pragmatically, without understanding its value for itself.

Natural science functional literacy of students can not be formed only in the process of studying the content of academic subjects. Only in the process of direct interaction with objects of nature is it possible to form and develop the ability to enter into relations with the external environment and adapt to it as quickly as possible. An active civil position on issues related to the natural sciences and a willingness to be interested in natural science ideas are primarily applicable to solving environmental problems of society. Only a competent person will consciously seek to participate in a reasoned discussion of environmental problems. This will require the ability to scientifically explain phenomena, evaluate and plan scientific research, and scientifically interpret data and evidence. Only an environmentally competent teacher can raise such a person.

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**USING NEW MODERN INNOVATIVE TECHNOLOGIES  
IN EDUCATION**

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**Annotation.** *This article discusses the main methods of using new modern innovative technologies in foreign languages. Presently in the system of education widely used informative technologies and computer telecommunications. One of information-communicative technologies is an E-learning. Informative educating one of communication technologies of information about types. A new method - controlled from distance educating that is to the electron of learning is widely used in higher educational establishments. Here you can get an education using multimedia materials, electronic textbooks, and interactive video conferences. The Internet provides many opportunities for learning a foreign language. Every day it is important to learn the interstate language of the Republic of Kazakhstan-English with the help of new technologies. Learning a language using information and communication technologies is an effective system for improving self-learning skills. In addition, students can develop intellectual, creative and communicative activities, activate the student's educational activities, and offer creative works to students at all main stages of classes.*

**Keywords:** *new modern innovative technologies, education, develop, practical training, performance, teaching.*

In the European languages the word «project» is borrowed from Latin: the participle «projectors» means «thrown out forward» «striking one's

eye». With reference to a lesson of English language, the project is specially organized by the teacher and independently carried out by students' complex of the actions, finished with creation of a creative product. A method of projects, thus, is the set of educational and cognitive modes which allow solving this or that problem as a result of independent actions of students with obligatory presentation of results.

Let's result some examples how to achieve at once at the lesson with the help of project methods the several purposes - to expand student's vocabulary, to fix the investigated lexical and grammatical material, to create at the lesson an atmosphere of a holiday and to decorate a cabinet of Foreign language with colorful works of students.

Working with the projects teacher can realize in groups and individually. It is necessary to note, that the method of projects helps students to seize such competences as: to be ready to work in collective, to accept the responsibility for a choice, to share the responsibility with members of the team, to analyze results of activity [1].

Education is very important for our lives. Without education people wouldn't have their high-developed machine and would believe that the Earth is a planet around that all another planets are moving. The Republic of Kazakhstan became an independent country in 1991. During the last 20 years of independence there has been a lot of changes in education system of the country, especially on a legal base. Article 30 of the Constitution approved in 1995 stipulates that citizens have the right to free comprehensive secondary education in State educational institutions. Citizens also have the right to free higher education in State institutions on a competitive basis. The Law of 1992 determines the common purposes and tasks of education as follows: "the main task of the education system is to create the necessary conditions for bringing up and developing individuals on the basis of national and common human values, and of scientific and practical achievements." The main objectives of the education system are to:

- develop the mental and physical abilities of individuals, to lay solid foundations of morality and a healthy way of life, to cultivate their intellect providing conditions for their further development;

- foster civic awareness and the understanding of individual rights and duties with regards to the family, the society and the State;

- develop the creative abilities of individuals and their aesthetic education;

- create the necessary conditions for the study of culture, customs and traditions of Kazakhstan; and provide all citizens with opportunities for general education and professional training.

The Constitution of the Republic of Kazakhstan (1995) and the law “On Education” (2007) are the basic documents that have introduced the educational policy of the government.

From the time that Kazakhstan gained its independence, we have had an aim to be in close political, social cultural and economic relationships with most developed countries in the world. The importance of language knowledge, day by day is reaching the great top because of the unity development between different nations and countries that leads to the fruitful relationships. Firstly, the idea of trinity of the languages was proclaimed in October 2006 on the twelve congress of the Assembly of Kazakhstan [2]. Kazakhstan’s 1st President Nursultan Nazarbayev delivered his annual state of the nation address, “New Kazakhstan in a New World”, on February 28 in 2007, outlining the strategy of Kazakhstan’s development for the next decade where he offered the idea of trinity of the languages. “Kazakhstan should be viewed in the world as a highly educated country whose people use three languages. These will be Kazakh as the state language, Russian as the language of interethnic communication, and English as the language of successful integration into the global economy,” the President noted. “Building the Future Together” - address to the People of Kazakhstan of the President of the Republic of Kazakhstan, Nursultan Nazarbayev has planned several stages of economic-social development which we must achieve by 2020. This plan has pointed out its own strategy and didn’t wait the world’s crisis. President of the Republic of Kazakhstan, Nursultan Nazarbayev paid great attention not only to a social modernization – a new social policy, but to education as well as to Healthcare, “We must continue to modernize education, therefore, I believe that by 2020 a share of our population speaking English should be no less than 20 percent”, he said. I have always said that knowledge of three languages is an obligatory condition of one’s wellbeing [3]. That’s why in 2019-2020 academic year the program of teaching English language on the 1<sup>st</sup> form will have been introduced at general education schools.

In today’s world thousands of people speak English as secondary language at work and study and know it as mother tongue. The English has gained its importance in the 21st century because it has become the language of science and technology. English language is a world wide spread international language. English is the most widely spread language and spoken among most of people after Chinese people. English, nowadays is used in all spheres of international relations, scientific-techniques, mass-media and business. English is a key object of information technologies and computer science. English was spoken by outstanding people as Wil-

William Shakespeare, Jack London, Jonathan Swift, Walter Scott. Current estimates suggest that 1,2-1,5 billion people speak English. English language is the most spoken language in the world. English has official or special status in at least 75 countries, in 19 countries it is considered as a state language. By 60 years of XX century English has begun widely spread. English is the official language of the most international organizations. Among them: United Nations (1946), Great Britain, New Zealand, Australia, United Nations Educational, Scientific and Cultural Organization (UNESCO).

In development of the project «Тілдердің үш тұғырлығы» academician S.S.Kunanbaeva introduced theoretical-methodological basic of studying foreign languages. She introduced a professional model of workers who embodies the qualities of knowledge of both Kazakh language and English, has new kinds of reasoning to English language: a) preparation of scientific pedagogical professionals through the use of modern innovative and interactive materials; b) training interpreters based on their native language is the conceptual universality of higher education [4:185]. That means the conduction of international relation will be connected with the preparation of specialists.

Use of innovational technologies in studying foreign languages gives students an opportunity of foundation of diverse means of relation in foreign language. Studying a foreign language can give the chance the students to introduce with the culture, history, achievements in science, literature in country which language they learn. If in secondary schools pupils were trained foreign language in practical level, it would give the possibility higher schools to train students to independent works, to use their knowledge in practical way. Teaching foreign language changes at the request of the society. Nowadays teaching foreign language follows given aims of teaching: communicational, educational, and developing and up bringing aims.

Among these aims communicational aims take the leading part. Other aims are used to complete the tasks in communicational aim. In studying English language six levels are used: *"beginner"*, *"elementary"*, *"pre-intermediate"*, *"intermediate"*, *"upper-intermediate"*, *"advanced"*.

In English lessons are used elements of multi-language teaching. Some lessons are conducted by using integration. Integration means the relation of subjects with each - others in higher level. Integration gives the opportunity to join several subjects together and plays an important part in preparation of qualified lesson.

In development of students speaking in three languages such tasks

are solved: correct use of innovational materials in teaching, using modern innovational techniques, training students to communicating in three languages, to conduct individual approach to each student, using dictionaries and vocabularies in translation, to develop the interest to studying language.

There are several teaching techniques that are highly evaluated: modular technology, problem teaching, accelerated learning, and individual approach, informational teaching, training according the level of students, games and communicational technology.

Nowadays a lot of Universities are using modular technology of teaching. Importance of this teaching is in all parts of lesson students can have an opportunity to work independent. Also the main aim is not only teaching also giving students the chance to develop listening, speaking, reading, writing, analytic thinking skills.

Training module consists of three structural parts which are often repeated as a learning cycle: introduction, speaking (dialogue) and the final part.

Introduction part (introduction to the module to the subject).

Speaking part (usually a dialog using the dialog to organize cognitive skills of students.)

The final (reference work, test, dictation, etc.).

More precisely, in the introductory part of the teacher introduces students to the general structure of modular training, its purpose and responsibilities. After that, the teacher briefly (for 10-15 minutes), explains the study material of the module using drawings, tables, and data samples.

In the part of speaking using 4 levels of Technology Study of the Doctor of Pedagogical Sciences, Professor Zh.A.Karaev (reproductive rate, heuristic level, the creative level) focus on the learning level of knowledge of students. In the final part may be given test. The main performance of modular technology is:

- Increases the activity of the student in school;
- To develop the student's interest in the subject;
- The student is committed to uninterrupted self-knowledge;
- The student masters the language categories vocabulary and grammatical structures;
- Allows far as possible to expand the oral and written language;
- Student itself forms the necessary skills gradually attaining goals, which given on a lesson.

So, module - one of the largest system, here the student is educated not only by sections, but systematically in the form of exact order. They are

trained to work, to awaken an interest in science to develop the skills of independent work. The training process is applied different ways: an explanation, speaking, reading, lectures, practical (practical laboratory, graphics, vocabulary and grammatical exercises), clarity (charts, tables, illustrations and demonstration), etc.

In the universities and secondary schools in the practical training of foreign languages students and learn to work independently, they must be able to apply their knowledge in new situations creatively.

The learning objectives of foreign languages vary with the demands and needs of society. Now foreign language teaching has four objectives: communicative goal, knowledge, education and the goal of improvement. The main of them is the communicative purpose; other objectives are achieved through the implementation of the communicative purpose.

Forms of study: a) the total or structural: group or individual group, pair, team, and b) the exact or special: tutoring, conferences, debates, group discussion.

Every day the numbers of people desire to learn a foreign language. This determines a huge role of the foreign language in the education system of our country. Finally what you need to learn a foreign language, especially English from school and universities and requires a rotation of innovative teaching methods.

Summing up, one of the favorable signs modular technology training - an activity of the student at school. One feature of this technology is that, in all stages of education in developing the cognitive abilities of the student, developing the spoken and written language can offer them creative work. During the development of vocabulary, grammar, phonetic means of a foreign language is formed activities of students in learning, the ability to work independently, the skills to draw conclusions. This is new technology of today's successful research faculty. Teachers look at these problems very understanding and actively apply new methods in their disciplines with great enthusiasm.

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## CONDITIONS FOR CREATING A POSITIVE WORKING ATMOSPHERE IN THE CLASSROOM AND ITS IMPACT ON THE QUALITY OF THE EDUCATIONAL PROCESS

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**Abstract.** *The article attempts to emphasize the relevance of creating a positive working atmosphere in the classroom, as it contributes to improving the quality of the educational process. In addition, a positive classroom atmosphere supports the mental health of students. The author assigns a special role in the process of creating a constructive and in all aspects useful atmosphere in the classroom to the teacher. The successful completion of this course by students largely depends on his professionalism, leadership and creative qualities. Separately, the author draws attention to the positive aspects associated with the transition to distance learning. The author considers the main one to be the reconsidering the degree of importance of students' independent work in achieving high efficiency of the educational process as a whole.*

**Keywords:** *positive working atmosphere, motivation, strategy, quality of education, students' independent work*

### Introduction

Modern society is constantly exposed to global and local negative factors. At the time of this writing, one of the main destructive circumstances is, of course, a worldwide pandemic, contributing to the widespread processes of distancing and self-isolation. However, the detrimental effect of the pandemic is not limited to this, since it affects all spheres of society's life, provoking various crises in the economy, social sphere, and politics. The educational environment is no exception. All these circumstances create a general negative emotional background, which is imposed on people's daily life and reduces the quality of their life, work, and affects their health.

Education is a strategically important national element of the development of any society, since it ensures movement forward - progress - and

forms new generations of workers, which, in turn, support the work of the entire state mechanism. Thus, one of the primary tasks of the education system should be to reduce the level of influence of negative external factors on the health and psyche of students, to contribute in every way to their high-quality education and professional development. [1]

Within the framework of the educational process, the teacher should become the direct executor of this creative and protective function (among many other duties and requirements). Further in the article, the author, focusing on his professional experience of teaching a foreign language at a university for more than thirteen years, will name the conditions and ways of creating a positive working atmosphere in the classroom, considering this measure as important in the current circumstances as the teaching of the discipline itself. Obviously, if the concentration of students on the educational process is not ensured against the background of a negative psychological atmosphere, the effectiveness of training will significantly decrease. But, more importantly, the psyche of students may suffer. So, we will consider below the conditions and methods of the teacher's positive influence (after all, the atmosphere in the lesson depends on him to a greater extent) on the educational process and students. Some examples will be given from the author's practice of teaching a foreign language to students of the direction "Advertising and public relations". However, this does not mean that the proposed recommendations cannot be applied to any other disciplines, with one or another amendment for their specificity.

### **1. The teacher as a leader and a role model**

In teaching, as in business, there are some parallels. For example, in both areas there are supervisors-managers and supervisors-leaders. In short, the former "oppose" the collective of workers. They give tasks, control their execution and reward or punish employees depending on the result of the work. The latter, on the contrary, are part of the collective. They not only give tasks to subordinates, but also help in their implementation, inspire the team to achieve a high team result, etc.

According to the author's deep conviction, any teacher should have at least some features of a leader, and best of all, be the one for his students. Team spirit, a sense of solidarity and responsibility, confidence in support (if it's necessary) - all this is created by the teacher-leader. Such a teacher does not punish, but explains and suggests doing better. "He treats his group of students - [the team] - and each of its members individually with respect and sincere interest, taking into account the personal characteristics of the students" [7]. In the relationship between the teacher and the students he is going to work with for a semester, a year or two, the first

contact is extremely important - the first lesson. In this article, we will not talk much about all the important points of the first lesson, but we will touch only those that affect the atmosphere of the class work.

According to the author, the first meeting of a teacher with students can be compared to a presentation or speech. Like in the presentation, the teacher in his introductory speech should maximize the interest of students and explain to them how they will benefit from the successful completion of the course. It will be optimal, if in the process of this monologue the teacher does not just scatter words, but gives statistical data and examples from the practices known to him or even his own life (better - professional) experience.

In addition, the teacher's opening words should be filled with friendliness and sympathy, as well as maximum positiveness. It is important to keep in mind that many circumstances influence the creation of a positive image of the teacher, including non-verbal means of communication and appearance. Facial expressions, gestures, a smile, voice and much more allow you to create a source of positive - a kind of aura around the teacher. It seems that many of us have noticed how we strive for a society of "positive" people and try to exclude pessimists from our social circle. This often happens subconsciously. But it really works in the case of establishing a contact between the teacher and students.

Another important circumstance that should be taken into account even at the stage of establishing emotional contact is the need to form students' feelings of maximum trust in the teacher. For this, the teacher's introductory speech should sound balanced, not idealistic. It is important from the very beginning to tell students about the possible difficulties and challenges that they may face during the course. But at the same time, immediately persuade them that all difficulties are temporary, and will be overcome by a team and with the support of a teacher.

Making a small generalization of the above, we can conclude that the first and main condition for creating a positive working atmosphere in the classroom in any subject should be the formation of the source of this positive, translated by the teacher. The next stage is the use of all the creative tools and a set of personal qualities of the teacher in order to spread and consolidate a healthy atmosphere for all the remaining lessons of the course, including the independent work of students, which has become especially important due to the transition to distance learning.

### **2. Educational tools for creating a positive emotional background in the classroom**

Distance learning, according to the author, cannot fully replace face-to-

face training sessions in the university. However, it also has a number of positive aspects that can contribute not only to maintaining, but to improving the quality of the educational process. One of them is the abovementioned actualization of the role of students' independent work, which in itself already has a number of motivating and emotionally stimulating properties. More details about the possibilities of symbiotic interaction between students' independent work and advanced teaching methods can be found in the article "The concept of a global game in teaching students a foreign language" [5, p. 107-115].

Since the distance learning format involves regular online meetings - webinars - the teacher gets at his disposal a huge number of Internet resources and ready-made educational platforms. The main task in all this diversity is to correctly assess the importance of certain resources and choose the most useful ones from the point of view of the goals and objectives of the training course. When choosing educational material, one should never forget that it should also be interesting for students, since even very useful, but boring content, most likely, will not be properly assimilated by students.

In the process of teaching a foreign language to humanitarian students, the format of webinars opens up huge opportunities for a qualitative increase in the volume of visualization of educational content and its variations. As you must know, tasks of the same type are more suitable for the practice of grammatical components. Diversity, in its turn, is extremely effective in keeping students interested and in creating a sense of a dynamic work environment. In particular, students mastering advertising will be extremely interested in the constant alternation of work formats, because the teacher's arsenal includes video podcasts, visual images of real brands, samples of real commercials, virtual design kits and much more, which, with proper preparation and presentation of the teacher, is always very interesting to discuss, analyse and try to create something similar. The continuous creative process fully involves the students, subconsciously forcing them to focus exclusively on their studies and mentally abstract themselves from external negative factors and thoughts.

Reliable indicators of a successfully completed lesson can be considered the slow pace of students to leave the classroom (or chat), as well as their recognition that the time of the lesson passed unnoticed. At the same time, students leave successfully passed and completed classes in a positive mood. This last circumstance is extremely important, since we know from psychology that the latter is best remembered. In our case, this is a feeling of satisfaction from the taken lesson and the expectation of the next

meeting, as well as a sincere desire to prepare well for it.

### **3. The strategic importance of well-organized independent work of students**

Since during the transition to distance learning the role of independent work of students has increased significantly, a positive emotional background during the educational process should extend to it. Speaking about the high-quality independent training of students, the author intends to emphasize its difference from the already existing formats of part-time education. "In addition to emotional stimulation during webinars, the teacher should be in touch with his students during their preparation for classes as well" [2]. The author proposes to introduce optional consultations into the curricula of disciplines, at which every interested student can get help or advice from a teacher or his classmates. This addition to standard webinars will help students feel that "they can always count on support, and are not left to fend for themselves" [6]. They begin to feel that the teacher, as well as themselves, is interested in their success, which further strengthens the positive background of working relations of cooperation (namely cooperation) between the leader and his team.

### **Conclusion**

Summing up all of the above, the obvious importance of the formation of a positive background during the students' taking the entire training course should be noted. A special role in this process should be played by the students' independent work, which, among other options, can significantly increase the amount of study time available to students for learning a foreign language not only at the basic level, but also at the professional level. [3] Moreover, it is appropriate to mention here that, if the teacher can really make his course so creative, positive and interesting, he will be able to apply some upbringing elements to influence the personality of his students. More details about the educational potential of a professionally structured educational process can be found in the article "The educational component of the educational process as a way of additional motivation of students for self-improvement and self-development" [4, p. 48-50].

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**PSYCHODIAGNOSTIC TESTS AS A BASIS FOR THE  
IDENTIFICATION AND DEVELOPMENT OF FOREIGN LANGUAGE  
ABILITIES OF STUDENTS**

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**Abstract.** *The article deals with the problem of identification of the students. It is known that psychodiagnostic tests are the most important for development of foreign language abilities. It should be noted about the students' activities related to mastering a foreign language as a means of communication. Teachers of a foreign language at different types of school have a good basis for psychodiagnostic work which they deal with.*

**Keywords:** *psychodiagnostic tests, psychodiagnostic researches, psychological differentiation*

The tests are used to determine the level of actual achievements of the student, the intellectual development of a man, his abilities and aptitude for a particular activity. What are the objects of psychodiagnostics?

The answer to this question can be obtained if we proceed from the generally accepted classification of the main means of psychodiagnostics - tests. Psychological tests should be divided into two groups:

1. Didactic tests
2. Projective tests

In determining the objects of psychodiagnostic tests should be based on the students' activities related to mastering a foreign language as a means of communication.

At the same time the following objects of psychological influence are identified:

1. the actual level of knowledge, skills, abilities of students in a foreign language.
2. individually-psychological features of personality - intelligence features.
3. personal development of personality: responsibility, determination, collectivism, integrity, honesty.



4. Developmental effect of learning - intellectual development; speech development.

Obtaining such data is necessary for a foreign language teacher in order to better know the potential learning capabilities of students and on this basis to truly differentiate and individualize learning.

Thus, the teacher is not an outside observer of psychodiagnostic work. Where should a teacher begin in order to gradually master the elements of psychodiagnostics and incorporate them into his or her pedagogical activities? First of all, it is necessary to refresh in memory and replenish your knowledge of child psychology [1, p. 11]. Then you can get acquainted with popular scientific works in the field of psychodiagnostics and individual psychological characteristics of students [2, p.29], which will allow you to go to scientific works on psychodiagnostics [3, p.18] and publications containing some methods of studying various parameters of the personality of the student [4, p.41].

Teachers of a foreign language have more opportunities for organizing psychodiagnostic work than other teachers of natural and humanities disciplines, because many theoretical and practical issues of using linguodidactic tests, i.e. the tests that measure learning a foreign language, have already been developed sufficiently; also many aspects of studying and measuring the students' learning of a foreign language are studied [5, p. 26]. With good reason we can talk about the formation of linguodidactic psychodiagnostics, ie scientific direction of an applied nature, which is at the interface of psychology and general methods of teaching languages, the subject of which is the study of features of mental and personal development of the student to determine their compliance with the requirements of effective speech activity in the native or foreign language, identifying deficiencies in speech development and learning activities. Teachers of a foreign language at different types of school have a good basis for psychodiagnostic work. Having got acquainted with psychological and psychodiagnostic researches of a general character, they can pass to the special works devoted to linguodidactic testing on a foreign language and to results of studying of parameters of learning a foreign language, measured by means of the various test tasks and techniques [6, p. 17]. Many of the provisions and recommendations of these studies a foreign language teacher can apply in their work.

In the process of communication in educational and nonacademic situations the teacher can:

a) note the nature of relationships in the group and use (perhaps even develop) positive tendencies,

b) take into account the negative aspects of the mutual influence of the individual and the collective,

c) avoid undesirable difficulties in communication and prevent possible speech conflicts.

In practice, it is especially useful for a foreign language teacher to understand the special role of individual cognitive styles of human communication. These include the features of communication of people with high and low psychological differentiation. The first type of people are called "gender-independent", the second - "field-dependent" (Ivanov P.N. terminology). Until recently, foreign language teachers, as well as sociologists, believed that in social and speech communication, sex-dependent students talk more themselves and listen less to other participants in speech communication, leaving no subject lines to develop the topic of the statement. Field-dependent individuals, on the other hand, have a need for various speech and non-speech supports, called external referents.

Therefore, they more easily enter into speech interactions during group communication, seeking to predict the speech actions of their partner(s) and seeking speech support, i.e. opportunities to use external speech and non-speech referents from interaction with other people. However, subsequent research has shown that gender-independent students more adequately reflect the inner world of the other person, better predict their partner's actions in joint activities, and thus destroy the myth of themselves as people speaking for and about themselves. They more accurately and more easily translate the information they receive into sign, speech and image forms (A. Virovete, I.A. Ivanchuk, etc.).

In conclusion, in our modern conditions of economic development of society and the emergence of such applied aspects of psychology as business psychology, marketing, industrial psychology, the role of a foreign language has increased immeasurably. In a market economy, without knowledge of a foreign language, it is impossible to conclude business agreements, contacts with business partners, and travel abroad. The school has a fundamentally new task to prepare specialists for work in various areas of life, where knowledge of a foreign language is necessary for reading literature in the specialty and communicating with foreign colleagues.

In psychological studies (I. A. Zimnaya, M. G. Kasparova, R. P. Milrud), it has been repeatedly emphasized that the determination of the mental processes of an individual necessary for successful mastering of a foreign language is the most important task. Under this condition, it will be possible to identify the child's giftedness, his inclinations, individual characteristics and inclinations in order to take timely measures for their development.

The problem of abilities is the dependence of the success of mastering any activity on the individual characteristics of the individual. Students' learning abilities are manifested in a greater sensitivity to the subject, in the ease of assimilation of educational material and, as a rule, in a higher level of achievement in this discipline. The problem of abilities is particularly relevant for general education schools, since both the amount of material and the set of academic subjects in school programs are not differentiated depending on the aptitudes and abilities of children.

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## SINGULARITY AND PROSPECTS OF TECHNOLOGY

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**Abstract.** *The authors of the article consider the concepts of "technological singularity" and "social singularity".*

*Technological progress can lead to a technological singularity, especially in the fields of research in artificial intelligence and neurotechnology. The consequences of a technological singularity could be disastrous for humanity.*

*The growth of the Earth's population can lead to a social singularity, another reason for the emergence of a social singularity Vinge called the creation of entities, whose intelligence will exceed human. The social singularity will give rise to a new reality, new existential opportunities and risks for a person. It is still difficult to predict a posthuman society, what it will be like, but the authors believe that the consequences of the singularity include the transformation of traditional authorities, traditional values, the elitism of creative work, the enormous speed of the spread of ideas, etc.*

**Keywords:** *technological singularity, social singularity, posthuman society, Strauss, Vinge, Nietzsche, Clark.*

In physics, a singularity is defined as a point in space/time where mathematics becomes powerless, and with it our ability to understand something becomes useless.

A technological singularity can arise for humanity if technological progress generates such large-scale changes that can lead to the death of humanity. Traditional institutions of power (state, government, law, etc.) will no longer be able to survive in the form we are accustomed to; other values will replace traditional values (freedom of choice, striving for happiness, etc.). The very idea of what a person is (personality, social status, etc.) will be reformulated and not in philosophical discussions, but due to changed

circumstances. The emergence of such a singularity can be facilitated by progress in research on artificial intelligence and neurotechnology. [1]

The population of the Earth is more than 7 billion and continues to increase, and soon mankind will no longer have enough drinking water to exist, the previous methods of food production, raw materials, medical services and education will be completely ineffective, especially in the context of global epidemics, which can lead to social singularity. [2]

The first question about the singularity was raised by the modern American writer Vernor Vinge. [3] According to V. Vinge, changes await humanity, which can be compared with the emergence of life on Earth, the reason for such changes will be the creation of entities with the help of technology, whose intelligence will be higher than human.

1. Basically, discussions about artificial intelligence boiled down to the question: is it possible to create a machine equivalent to a human? A positive answer will lead to the creation of machines more intelligent than humans.

2. Close cooperation of a person with a computer can lead to the fact that such a symbiosis can be defined as possessors of superhuman intelligence.

3. Global networks can be aware of themselves as entities with superhuman intelligence.

4. Biology can contribute to the further development and improvement of human intelligence, and this progress can be stimulated by intelligence that exceeds human.

With the help of natural selection, the world simulates itself, but people can mentally build models of the world and, thanks to these models, are able to solve problems much faster than natural selection. Humanity is entering a regime that will be radically different from the human past, just as humans differ from animals. At the point of singularity, old models stop working and a new reality begins. When the new reality comes true, it will turn out to be a huge surprise and even greater uncertainty, but some of the consequences can be predicted:

1. Creative work will be the domain of the elite part of humanity.
2. Technological unemployment is predicted.
3. Ideas will spread faster, and even radical ideas will quickly become truisms. If earlier it took decades to embed an idea into cultural consciousness, now the idea is being implemented in about a year and a half.
4. The singularity will cause an avalanche that will surprise even the researchers involved. Thanks to networks, which will become ubiquitous embedded systems, it can seem to the observer that objects created by

humans are awake. This idea is a continuation of the anthropic principle within the framework of earthly civilization: matter wants not only to be observed, but also to be awakened.

We will find ourselves in a post-human era.

One approach to the limitations of superhuman intelligence is to build rules (Asimov's laws) into this mind. These rules, according to Vernor Vinge, will reduce the capabilities of superhuman intelligence, but competition among humans will generate more dangerous models. Most of its time is free for other activities than satisfying safe human desires.

According to Vinge, the extermination of the human race is not yet the worst. More terrible is the specialization of people, which will be developed by strong artificial intelligence in order to integrate people into a kind of Community of Reason. The result is not a conveyor world, but an anthill world. The human mind was designed to create beings of a different kind and move into the past. Here parallels arise with the ideas of F. Nietzsche that reason is only a short period in human evolution. Nietzsche argued: "In some distant corner of the universe, spilled in the sparkles of countless solar systems, there was once a star on which clever animals invented knowledge. It was the most arrogant and deceitful event in "world history" but only one moment ... ". [4]

Ch. Strauss continued: "Once it himself will become something like a spiny lobster - it will swim for itself, snapping his claws, in cyberspace so intricate that its unloaded "I" in it will look like a relic, a living fossil from an era when matter didn't think, and the space had no structure". [5] And further: "I cannot take my eyes off the fossil, because I see a sign in it. It was torn out of its natural habitat and left to die on a strange shore under the gaze of creatures incomprehensible to it. A good metaphor: this is how humanity feels in our age ...". [6]

All the consequences of the technological singularity can be realized only by abstracting from anthropocentrism, by adopting a cosmological point of view. Anthropocentric thinking proceeds from the fact that the history of matter in our Universe is closed on human society, but matter has other possibilities of increasing complexity, it is possible that a more perfect consciousness may arise in comparison with human consciousness. The technological singularity will create both new existential opportunities and an existential risk that threatens the survival of the human species.

This situation can be viewed from an optimistic point of view, considering the technological singularity as an existential possibility, in the more philosophical sense of the word "existential". If humanity learns to compensate for the damage caused to the human body and even to recreate

the human body on a non-biological basis, then an unlimited expansion of consciousness will become possible.

The new era will be too different to fit within the classic framework of good and evil. This framework is based on the idea of isolated unchanging minds, connected by weak low-speed connections, and the post-singularity world responds to a broader tradition of change and cooperation, which originated, perhaps, even before biological life on Earth, although some concepts of traditional ethics will also be applicable in that era.

Freeman Dyson (1923-2020) remarked: "God is what the mind becomes when it goes beyond the scale of our perception." [7] Arthur Clarke (1917-2008) added: "Any sufficiently advanced technology is indistinguishable from magic." [8]

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## THE BASIC LAW OF BEING

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**Abstract.** *The term "law" is used very often today and it is interpreted extremely broadly. Humanity has discovered and constituted an incredibly large number of different "laws" - the laws of physics, laws of nature, social laws. But how justified is such a widespread use of the term "law" and how correctly is it used? This article is devoted to the analysis of this circumstance, according to the results of which the author gives a correct, from his point of view, definition of the concept "law" and formulates the law of the highest level of generalization, which he calls the main one.*

**Keywords:** *being, law, regularity, connection, attitude, category, correspondence.*

Before proceeding with the formulation of the basic law of being, it is necessary to find out what the concepts of "law" and "being" are, whether existence has laws, what they are, and choose the most important of them, which lies at the basis of all the others.

The concept of "being" from ancient times to the present is considered one of the main categories of philosophy [1]. At the same time, the term "being" is understood by some as "reality existing objectively, outside and independently of human consciousness", that is, a set of objects, others – "existence", that is, a process, others – "the presence of phenomena and objects," that is, quality. Quite often the same author interprets the term "being" both as existence and as essence. Moreover, almost simultaneously.

From our point of view, it is irrational to use the term "being" to denote an objectively existing reality or the presence of phenomena and objects. In Russian, "to be" is a verb, so it is advisable to use the word "being" to denote a process.

*The main category of philosophy, in the opinion of the author, is "being", that is, what exists. Then "being" is the existence of beings, and "the law of being" is the law of the existence of beings (that which exists).*

As for the concept of "law", then, for example, in [2] it is said that in



the philosophical systems of the Ancient East and Greece, law was understood as an objective order, the natural way of development of things inherent in the world. For Thomas Aquinas, the concept of law is identical with the concept of dictate, prescription, command of divine reason. Leonardo da Vinci, Galileo, Kepler and other scientists, reported in [2], preferred the term "law" to such expressions as "axiom", "rule", "reasonable basis". And in the Renaissance, Bruno uses the concept of "law of nature" to express the idea of universal natural necessity. In the science and philosophy of modern times, the concept of "law of nature" appears, by which they begin to understand the general, stable and repetitive, as well as internally necessary connections and relations of things and natural phenomena themselves. The widespread use of the concept "law of nature" in the philosophy and science of modern times was begun by Descartes, who believed that the most important attributes of the law are immutability and eternity. Hobbes makes the concept "law" an essential element of his sociological concept, according to which man is subject to the universal law of nature - the desire for self-preservation. On the way of implementing this law in society, there are various obstacles that are overcome only thanks to the human mind, which reveals certain rules of community, which Hobbes calls natural laws. Spinoza believed that the laws of nature are such "decisions" and "decrees" of God, in accordance with which his own existence is determined and that absolute necessity is expressed in them. In the teachings of the French enlighteners and philosophers of the 17-18 centuries. it is argued that laws are the result of necessary relations arising from the nature of things (Holbach). For Kant, the concept of law is a means of expressing the necessary relationships between the elements of the cognitive activity of the subject. According to Kant, the laws of science are the highest form of rational knowledge. Hegel, on the other hand, links the law with stable, necessary essential features of the development of the absolute idea, formulating the so-called laws of dialectics. The definition presented in [2] – "a law is an essential, necessary, stable, repeated connection (relationship) between phenomena" - can be considered the most widespread definition of the concept "law" today.

Even a superficial analysis of the above information leads to a disappointing conclusion: there is no unambiguous and clear scientific interpretation of the concept of "law" today! Under the term "law", thinkers of different eras and countries understand different things: connections, relationships, order, orders of divine reason, rules of community, and relations of subordination of the general and the individual, etc., etc. Moreover, quite often in one fragment of the text, the law is interpreted both as a connec-

tion/relationship, and as an expression of these connections / relations, which, in fact, is a violation of the basic law of logic - the law of identity, according to which the subject of judgment should remain identical to itself in this judgment. Here it is appropriate to ask the question, can a law be a connection or a relation, and, even more so, a connection and a relation at the same time? Intuitively, we all understand that the concepts of "law", "connection" and "relation" are not identical, and their volumes, according to logic, should not be intersecting sets. For clarification, we again turn to philosophical dictionaries and encyclopedias, in which we find, for example, such a definition of the term "attitude": attitude is a philosophical category or a scientific term denoting any concept, the real correlate of which is a certain correlation (connection) of two or more objects [3]. If we take into account that "correlate" (from Latin correlation) is "ratio", we get "... the real *ratio* of which is a certain *correlation* (connection) of two or more objects". That is, there is an elementary tautology here, disguised by the use of a foreign term.

A.G. Spirkin gives such a definition to the concept of "relation" - a philosophical category that expresses the nature of the arrangement of the elements of a certain system and their interdependence; emotional-volitional attitude of the person, expression of its position; mental comparison of various objects or sides of a given object [4]. If the second part of this definition can somehow be accepted, then the first and third parts of it do not stand up to criticism. The first is, most likely, the definition of the concept of "structure", the third - the concept of "comparison". On the whole, this definition of the concept of "attitude", in our opinion, is not scientific.

Something similar is observed in relation to the concept of "connection". So, in dictionaries we find: connection - in philosophy, the interdependence of the existence of phenomena separated in space and time [5]. It is surprising that, firstly, the definition deals only with phenomena and there is no mention of objects, and, secondly, why is there a clarification about the obligatory separation of phenomena in space and time? If there is no separation, then there is no connection? Based on the above definition, if phenomena are not separated in space and occur simultaneously, then they are not connected with each other !? And there is also such a definition of the concept of "connection": connection - is a philosophical category denoting relations between objects, manifested in the fact that the states or properties of any of them change when the state and properties of others change [6]. Reducing this definition, we get: connection - a category denoting relations ?! That is, the concept of "connection" is identified with the concept of "relationship". And who, other than philosophers, should

know that everything in nature is connected with everything? But at the same time, changes in one object do not always entail changes in another! And such a definition was given not just anywhere, not in the ordinary Wikipedia, but in the New Philosophical Encyclopedia, compiled by the Institute of Philosophy of the Russian Academy of Sciences! It turns out that today there are no definitions of the concepts of both "connection" and "attitude" that meet the strict requirements of scientific character. Therefore, the author decided to undertake an attempt to give his own definition of the concept of "law", for which to start with the thesis: ontologically, in nature, there are no laws and cannot be! The law is only in the mind of a person, and even then not everyone.

*If you ask the natives of South America or Australia what is the law of gravity or Ohm's law, they are unlikely to answer this question. At the same time, the natives know for sure that a spear or boomerang thrown at a bird will surely fall to the ground. They do not know what the law of universal gravitation is, but they know exactly what will be the result of their actions in such a situation. They have rules of behavior and building social relations, which they most likely do not call laws.*

Whichever of the laws of nature articulated today, it has exceptions, therefore, it is not universal, and according to the definition of the concept of "law" is not a law. The situation is similar with repeatability and invariance. It turns out that if we proceed from the dictionary definition of the concept of "law", then none of the laws existing today falls under this definition. In other words, what are called laws today, in fact, are not!

This happened for many reasons. The main one seems to be the low level of methodological training of scientific personnel. It was they who had to give a logically correct and therefore unambiguous definition of the concept "law". Instead, they made it extremely vague and ambiguous (polysemic) and did not even define its status, that is, they did not find out at what level of being it appears and, accordingly, which section of philosophy it belongs to: ontology, epistemology or axiology.

As noted above, a law is neither a connection, nor a relation, or even an expression of these connections and relationships, and that there are no laws in nature (at the ontos level). At the level of ontos (existence) there is only moving and interacting matter. The law appears at the level of gnosis (our knowledge of reality) and it expresses the dependence of the result of the interaction of material bodies on certain conditions. So, for example, the law of universal gravitation does not tell us anything about the character or nature of the connections between interacting objects. We still do not know exactly what gravity is and how force is transferred from one object

to another. The law only says that "the force of gravitational attraction between two material points of mass  $m_1$  and  $m_2$ , separated by the distance  $R$ , is proportional to both masses and inversely proportional to the square of the distance between them" [7]. In this law there is not a word about the type, cause or nature of the connections of interacting objects (material points), but it describes the nature of the interaction (objects are attracted) and allows you to calculate the force of mutual influence (attraction). The situation is similar, for example, with the laws of classical mechanics (Newton's laws):

1. There are such frames of reference, called inertial, relative to which a material point, in the absence of external influences, retains the magnitude and direction of its speed for an unlimited time.

2. In the inertial reference frame, the acceleration that a material point receives is directly proportional to the resultant of all forces applied to it and inversely proportional to its mass.

3. Material points interact with each other by forces of the same nature, directed along the straight line connecting these points, equal in magnitude and opposite in direction.

In these laws, there is also no indication of the presence and nature of connections and relations between material objects, but there is an indication of the dependence of the result of their interaction (impact) on the direction and speed of movement of material points (bodies), the direction of application of forces and the mass of interacting material points (bodies).

And here are examples from other areas of science:

Ohm's law: the current in a conductor is directly proportional to the voltage between the ends of the conductor, if the properties of the conductor do not change with the passage of current;

Coulomb's law: the modulus of the force of interaction of two point charges in a vacuum is directly proportional to the product of these charges and inversely proportional to the square of the distance between them;

1st law of thermodynamics: energy in the system does not disappear, but only transforms from one form to another and passes from one form to another;

2nd law of thermodynamics: the internal distribution of energy in a closed system changes chaotically in such a way that the useful energy decreases, as a result of which the entropy increases;

3rd law of thermodynamics: entropy is zero in the case when any chaotic movement of molecules is completely stopped [8].

And in these laws there is not a word about connections and relationships, but there is an indication of the dependence of the result of the

interaction of material objects on their parameters (mass, charge, energy) and the conditions in which the interaction takes place (distance between objects, vacuum, closedness of the system, etc. ).

Based on the foregoing, it is possible to draw a completely logical conclusion that "law" is an epistemological category, and to give this concept the following definition:

**law - knowledge expressed in language about the dependence of the result of the interaction of material objects on the parameters of these objects, the parameters of their motion and the properties of the environment in which the interaction takes place.**

Here it should be emphasized once again that the law does not disclose, describe and even mention neither connections, nor relationships, not between objects, not between phenomena. Neither essential, nor necessary, nor stable, nor, moreover, repetitive.

*Millions of people say that "the law is an essential, necessary, stable, repeating connection (relationship) between phenomena", apparently without even thinking about the content of this formulation and without delving into its essence. Why, for example, does this formulation only refer to essential connections (relationships)? And insignificant connections (relations) are no longer the law? And which connections (relationships) are essential and which are not? Which connections are necessary and which are not? Is the force of gravity so necessary for us when we want to escape into space? And in general, the force of attraction is neither necessary nor unnecessary. She just is! And what does "repeating links" mean? There is a connection or it is not. And not connections are repeated, but phenomena that indicate the presence of connections. At the same time, connections can be insignificant and unstable. The connection can weaken, it can strengthen, or it can be completely interrupted.*

If we can say that the law reveals some connections, then this is the connection between the result of the interaction of material objects with the conditions of interaction, namely: the parameters of interacting objects, the parameters of their movement, the parameters of the environment in which the interaction takes place. But, as it seems, in this case it is more expedient to talk not about connection, but about correspondence - about the correspondence of the result of interaction of material objects with the parameters of these objects, the parameters of their motion and the properties of the environment in which the interaction takes place.

So, we know that in order to achieve the desired result, it is necessary to take the *appropriate* starting materials, the *appropriate* tools, apply the *appropriate* efforts *appropriately*. We also know that the form must *corre-*

*spond* to the content / subject - object / knowledge - reality / activity - norms / norms - common sense / desires - possibilities and so on. At the same time, we know for sure that in cases where there is no correspondence between the oppositions listed above, a conflict situation arises and the goal will either not be achieved, or the wrong one will be achieved or not.

Let us explain this with examples:

- an M8 bolt and even an M6 bolt with a different thread pitch cannot be screwed into a hole with an M6 internal thread;
- a team of 3 people is not able to lift and carry a pipe weighing 1000 kg;
- the moon cannot be reached on a bullet.

The result of overcoming such inconsistencies is obvious. Of course, a bolt (not each, but of the corresponding diameter) can be hammered with a sledgehammer; the pipe can be rolled, but, again, if there are *corresponding* conditions for this; an attempt to fly to the Moon on a bullet is doomed to failure in advance, because there is no *corresponding* means capable of imparting the *corresponding* energy to a bullet, besides the method of movement does not *correspond* to the conditions of the environment in which this movement is supposed to be carried out. In the same way, if the cognizing subject does not *correspond* to the cognized object, then it either does not cognize it, or its knowledge about the object will be incorrect; to study objects it is necessary to use the *corresponding* instruments: it is impossible to explore deep space with glasses or a microscope, and with binoculars it is impossible to study an atom ...

This law can be formulated as follows:

**The result of the interaction of material objects always corresponds to the properties of the interacting objects, the parameters of their motion and the properties of the environment in which the interaction takes place.**

There are no exceptions to this law! And there seems to be no other law that has no exceptions. That is why the author proposes to consider the law of conformity as the basic law of being (that is, the basic law of the existence of beings).

The author also assumes that all the laws already discovered today are interpretations and refinements of the law of correspondence and it would be more correct to call them not laws, but regularities, since they allow measuring and expressing the results of the interaction of material objects in certain conventional units - units of measurement. The use of the term "law" to designate a normative act, in our opinion, is completely counter-productive. This is anything you like - provisions, decretals, decrees, bills, codes, etc., but not laws. The use of the term "law" to designate a certain

set of rules and norms of behavior with fatal inevitability gives rise to polysemy - one of the main enemies of scientificity.

Conclusions:

1. If we strictly follow the logic, then none of the currently discovered laws of nature or constitutional social laws fall under any existing definition of the concept of "law" and, therefore, either they should not be called laws, or the definitions of the concept "law" should be reformulated. Ideally, there should have been a single - scientific - definition of this concept.

2. The author's proposed definition: *a law - is knowledge expressed in language about the dependence of the result of the interaction of material objects on the parameters of these objects, the parameters of their motion and the properties of the environment in which the interaction takes place*, – seems logical and meets the scientific requirements.

3. The law, called the "law of conformity" by the author, which states that *the result of the interaction of material objects always corresponds to the properties of the interacting objects, the parameters of their motion and the properties of the environment in which the interaction takes place* – is the only law that has no exceptions. This is the law of the highest level of generalization. All the laws that exist today are special cases of the law of conformity, its concretizations and clarifications, or rather, patterns.

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## CONVERGENCE OF SOCIO-HUMANITARIAN KNOWLEDGE: POSTMODERN DISCOURSE

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**Abstract.** *The article examines social and humanitarian knowledge, its plasticity and ability to converge. Describes the crisis state of education in the culture of postmodernism, or rather the failure of its methodological pluralism. Theoretical arguments related to the need to overcome the crisis in the era of information oversupply are presented. The role of modern philosophy in the theoretical projection of a new reading of existing knowledge and its place in the convergent model of social and humanitarian knowledge and education in general are determined.*

**Keywords:** *education, convergence, social and humanitarian knowledge, postmodernism, postnonclassical science, interdisciplinarity.*

The postmodern era sets a whole complex of phenomena and trends in both the social and cultural life of society, which are analyzed in the philosophy of postmodernism. If postmodernism gives rise to a crisis in education, then the philosophy of postmodernism is groping for methodological opportunities to get out of it.

Education, on the one hand, can be viewed as a social tool, without which not only social adaptation is often impossible, but also the subject's personal identification orientation; on the other, as a system of accumulation, transmission and transfer of cultural experience.

The educational trinity of knowledge, abilities and skills is widely and universally used in pedagogical practices, thereby more and more dividing education and science: education involves the adaptation of the achieved level of knowledge to the level of students' abilities, as well as providing the educational process with methodological tools (and this requires effort and time) which leads to the inevitable lag of education behind the progress of science; science is progressing and is capable not only of constant movement, but also of changing paradigmatic affiliation, which often leads to a

revision of existing concepts and foundations.

At the same time, the relevance of education, which simply does not have time to absorb and process scientific achievements, looks at least doubtful, because fundamental and traditional attitudes used in education may not correspond to the realities of the modern world, which is changing at a catastrophic rate.

Considering a possible way to overcome the educational crisis, one should pay special attention to *knowledge*.

Postmodernism, with its characteristic skepticism, criticizes not only the truth of knowledge as such, reproaching it for subjectivity, but also of the possibility of achieving truth, a *true description* of reality [1, p. 44], to which, in fact, science is striving.

Modern society has reached a state where knowledge is not an end in itself. Accordingly, according to J.-F. Lyotard, modern education does not carry the desire to *educate*, but only leads to the reproduction of *producers* and *consumers*. The product of education is not so much knowledge as criterion communication capabilities: "to distinguish the one who knows from the one who does not know" [2, p. 53]. Thus, a subsequent social request is formed - the constitution of "new consumers" [2]. Thus, the production of knowledge is a driving force, the primary goal of which is the consumer aspect, which often does not meet the goal of science, which has gone far ahead. So, according to J.-F. Lyotaru, productivity is the main goal of education in the modern world.

The era of global informatization introduces significant changes in all spheres of society, gradually transforming it into a completely different form - an informatized society. Transformation, often forced, undergoes not only knowledge as such, but also education as a whole, the classical model of which is not able to fully meet the requirements of social reality. In other words, classical education does not act as a guarantor of social adaptability: there is a certain risk of lack of correspondence between the acquired knowledge, skills and abilities and social reality.

Science, in turn, is in a state of overcoming the formed border at the junction of the post-nonclassical stage of scientific development and the present. Namely: post-non-classical science with its inherent interdisciplinarity creates a colossal amount of information, the volume of which increases exponentially, requesting more and more material and time resources.

It is important to note that the interdisciplinary approach has led to the convergence of the branches of scientific knowledge, which previously existed not only methodologically remotely (political economics, physical

chemistry, medical physics, etc.), but also exclusively separately (agrobionics, nanocriminology, bioethics, bioinformatics, cosmobiology, etc.).

So, logically, the amount of interdisciplinary information should not only become mutually beneficial and mutually productive, but also be realized in a more orderly, systematized direction. And if in the field of mutual benefit and mutual productivity this is exactly what happened, then in the field of orderliness and systematization, global informatization has led to a completely opposite result: there is even more information.

The basis for the formulation of a possible solution for overcoming the current crisis of an overabundance of information is the plasticity of social and humanitarian knowledge as the ability to converge. And an important component of considering this problem is precisely postmodern discourse, since to overcome the crisis, the existing concept of social and humanitarian knowledge can be interpreted in a direction that is more in line with the demand of social reality.

The postmodern concept of using a ready-made form, often criticized not only for the unfoundedness of endless interpretations, but also for its complete lack of content in the context of social and cultural production, has potential and heuristic possibilities in solving this issue.

One of the main ideas of postmodern theory is the social movement of the subject in the absence of the Absolute. Accordingly, concepts such as *non-polarity* and *multi-vector* follow from the principle of acentrism and are paradigmatic [3, p. 83], but not only in the context of social hierarchical grading - they can be imposed on the disciplinary plane to project the crisis state of post-nonclassical knowledge and ways to overcome this crisis.

It is important to note that the crisis state of postmodernism as a whole is caused not only by internal contradictions, but also by the complete rejection of postmodern thought from tradition as such. At the same time, the postmodern principle of pluralism contradicts the principle of education as a social instrument - the principle of preserving general humanistic values. Accordingly, overcoming the crisis is possible only from within - in the form of resolving internal contradictions. Moreover, a way out of the postmodern crisis state as a whole is impossible without overcoming local (both social and cultural) crisis conditions.

Thus, it can be determined that in the modern informatized and technologized world, the postmodern crisis has fully affected education, within which an exclusively interdisciplinary approach becomes insufficient, since interdisciplinarity is not able to operate at least part of both the already existing and constantly multiplying volume of information.

Thus, the postmodern concepts of interpretations and pluralism, as well

as the concept of using a ready-made form, can be applied in the context of not only the convergent model of social and humanitarian knowledge, but also in the convergent strategy of education in general.

First of all, it is necessary to identify the main differences between the concepts of *interdisciplinarity* and *convergence* in the context of the concept of knowledge.

Interdisciplinarity is "a term expressing the integrative nature of the modern stage of scientific knowledge <...>. The development of new areas of reality and the formation of previously non-existent cognitive means and methods cause a more obvious manifestation of differential phenomena in science, contributes to the formation of more and more specialized disciplinary areas <...>. This makes it possible to raise the corresponding problems deeper and wider and find original and promising solutions" [4, p. 477-478].

So, you can consider interdisciplinary interaction on the example of disciplines such as *social philosophy* and *theoretical sociology*. Both disciplines are epistemologically and gnosiologically close enough - they have a single object of study. In turn, the subject matter of these disciplines is different, as well as the methodology. Research and development of both social philosophy and theoretical sociology contribute to the mutual development of the theoretical basis of both disciplines. However, this interaction is largely limited by internal functionality. This, in turn, leads to the fact that the rest of the cluster of social and humanitarian disciplines is forced to engage in the development of synonymous provisions, which leads to an oversupply of information, which requires colossal resources. Example: Research in social dynamics is not limited to the context of social philosophy and theoretical sociology. This concept is widespread in disciplines such as cultural studies, ethnology, anthropology, psychology, etc.

The term *convergence* is borrowed from biology, where it denoted the adoption by organisms of relatively distant origins of similar anatomical (morphological) forms in the process of evolution due to living in a single environment.

Within the framework of modern social and humanitarian knowledge, the *theory of convergence* is interpreted as "one of the basic concepts of modern sociology, which sees in the social development of the modern era a predominant tendency towards the convergence of social systems and even their subsequent synthesis" [5, p. 271].

In the context of social and humanitarian knowledge in general, where the disciplines of one cluster are able to work on common problems with subsequent informational mutual enrichment, it is the ability to converge

that can act as a trigger to overcome not only the information surplus in education, but also the crisis of postnonclassical science in general.

It is important to clarify that the convergence of social and humanitarian knowledge is understood precisely as meaningful disciplinary interaction within the framework of scientific research when working on general problems, and not external organizational efforts to establish such ties.

Thus, in the global information field, any of the models of disciplinarity with the inherent positive dynamics of disciplinary unification at the initial stage can be considered as untenable, because it does not correspond to the originally laid down principle of systematization of knowledge.

On the contrary, the convergence of social and humanitarian knowledge ensures the prevention of risks associated with the fragmentation of the knowledge gained, which, as a result, have no practical functionality. (Of course, other risks are possible, because without them it is not possible not only to overcome the crisis, but also to reduce the effectiveness of any social instrument, including education as a whole. As G. Bechmann notes, "the language of risk expresses a new uncertainty that takes the form conscious perception of the future as dependent on the present "[6, p. 104].)

One of the main consequences of the convergence of social and humanitarian knowledge is a change in the status of philosophical disciplines and giving them the status of a full-fledged functional unit in the structure of convergent knowledge. Philosophy is prerogative for raising a general question and analyzing the possible risk of knowledge as such in the context of social and humanitarian convergence. With the help of philosophical consideration, it is possible to define and extract general provisions, as well as to identify the moments of their difference from the interaction of converging disciplines.

S.P. Kapitsa notes that the main task of real education is not to teach knowledge, but to teach understanding [cit. by: 7, p. 68-69]. Of course, in the era of global informatization, the availability of knowledge does not guarantee their deep and systematic understanding, which, of course, reduces their effectiveness and, as a result, their value, which gives rise to an urgent need to revise existing educational concepts to give knowledge true value.

Thus, the gradual transformation of social and humanitarian knowledge from an interdisciplinary plane into a convergent one seems to be effective not only in the context of overcoming the informational plurality of the postmodern education crisis, but also as an opportunity to form a complex and holistic picture of the world.

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**TO THE QUESTION OF CREATING THE AUDIO GUIDE  
“Khabarovsk. The City of Military Glory”**

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**Abstract.** *The article is devoted to the research work that was held to create an audio guide “Khabarovsk. The City of Military Glory” in order to broaden innovative technologies in tourism and to find out if such technology as audio guide can help citizens learn about the history of their city in a better and more convenient way and attract tourists from different countries to visit Russia and especially The Russian Far East.*

**Keywords:** *audio guide, tourism industry, culture, innovative communication technologies*

Tourism has become a growing industry in recent years. Many countries in the world are blessed with natural beauty while many have developed infrastructure on their own.

Tourism is a dynamic and competitive industry that requires the ability to adapt constantly to customers' changing needs and desires, as the customer's satisfaction, safety and enjoyment are particularly the focus of tourism businesses.

In fact, many countries are getting major portion of their revenues from the tourism industry, so it is considered the main source of income for those.

Khabarovsk Territory is one of the largest and the most unique regions in Russia with its history, culture, natural resources and a variety of flora and fauna. This, as well as its proximity to the countries of northeast Asia, the length of the border with China, and the presence of large railway lines, determine the tourist attractiveness of the region.

Tourism is mainly concentrated in Khabarovsk, Komsomolsk-on-Amur, Sovgavan, Amursk, Nikolaevsk-on-Amur and small towns such as Vanino

and Okhotsk. They are for everyone who wants to relax and find something according to their tastes. The most popular tourist destinations are extreme, ecological, speleological, water and mountain tourism.

In the 21st century, the development of new technologies and means of communication has fundamentally changed the tourism industry, which is continuously mastering new information and communication technologies. Today, it is possible to choose a tour, purchase tickets and book a hotel without a travel company manager. Various services providing guide tours are also actively developing.

Travel guides have also undergone changes and are presented as Internet sites with a set of photos and descriptions of attractions.

Having examined and analyzed the existing digital guidebooks of our city, we have revealed that the problem of electronic guidebooks is poorly investigated, which is confirmed by the relevance of this study.

The aim of the study is the creation of the audio guide, which is called "Khabarovsk. The City of Military Glory". To achieve this aim we have put the following tasks:

- to study the historical stages of tourism development in the world;
- to reflect various digital guides and audio guides;
- to conduct a survey on the students' knowledge in the Khabarovsk sights of military glory;
- to create the audio guide "Khabarovsk. The City of Military Glory" using the platform izi.TRAVEL.

The object of the study is innovative technologies in tourism.

The subject of the research is the technologies for creating the audio guide "Khabarovsk. The City of Military Glory" on the platform izi.TRAVEL.

The hypothesis is if residents and guests of the city use the audio guide "Khabarovsk. The City of Military Glory", they will be able to fully familiarize themselves with the role of Khabarovsk in the struggle for freedom and independence of the Fatherland in a quick and visible way.

During our research we used different resources: books both in Russian and English, various videos and sites on the Internet. William F. Theobald's "Global tourism" shows and explains how William F. Theobald draws on the insight of thirty-nine contributors to chronicle and foresee the effects of tourism on contemporary society [2]. Reading Carson L. Jenkins's "Introduction to tourism" provides you a comprehensive and authoritative introduction to all facets of tourism including: the history of tourism; factors influencing the tourism industry; tourism in developing countries; sustainable tourism; forecasting future trends [1].

In our work we used such methods as gathering and analyzing informa-



tion, finding English articles, translating Russian articles.

The word *hospitality* predates the use of the word *tourism*, and first appeared in the 14th century. It is derived from the Latin *hospes*, which encompasses the words *guest*, *host*, and *foreigner*. The word *tourist* appeared in print much later, in 1772. William Theobald suggests that the word *tour* comes from Greek and Latin words for *circle* and *turn*, and that *tourism* and *tourist* represent the activities of circling away from home, and then returning [2].

Travel for leisure purposes has evolved from an experience reserved for very few people into something enjoyed by many. Historically, the ability to travel was reserved for royalty and the upper classes. From ancient Roman times through to the 17th century, young men of high standing were encouraged to travel through Europe on a “grand tour”. Through the Middle Ages, many societies encouraged the practice of religious pilgrimage, as reflected in Chaucer’s *Canterbury Tales* and other literature.

Soon tourism becomes business. Cox & Kings, the first known travel agency, was founded in 1758 when Richard Cox became official travel agent of the British Royal Armed Forces. Almost 100 years later, in June 1841, Thomas Cook opened the first leisure travel agency, designed to help Britons improve their lives by seeing the world and participating in the temperance movement. In 1845, he ran his first commercial packaged tour, complete with cost-effective railway tickets and a printed guide.

The continued popularity of rail travel and the emergence of the automobile presented additional milestones in the development of tourism. In fact, a long journey taken by Karl Benz’s wife in 1886 served to kick off interest in auto travel and helped to publicize his budding car company, which would one day become Mercedes Benz.

Fast forward to 1952 with the first commercial air flights from London to Johannesburg, South Africa, and Colombo, Sri Lanka and the dawn of the jet age, which many herald as the start of the modern tourism industry. The 1950s also saw the creation of Club Méditerranée and similar club holiday destinations, the precursor of today’s all-inclusive resorts.

The decade that followed is considered to have been a significant period in tourism development, as more travel companies came onto the scene, increasing competition for customers and moving toward “mass tourism, introducing new destinations and modes of holidaying”.

Industry growth has been interrupted at several key points in history, including World War I, the Great Depression, and World War II. At the start of this century, global events thrust international travel into decline including the September 11, 2001, attack on the World Trade Center in New York

City (known as 9/11), the war in Iraq, perceived threat of future terrorist attacks, and health scares including SARS (severe acute respiratory syndrome), BSE (bovine spongiform encephalopathy), and West Nile virus.

At the same time, the industry began a massive technological shift as increased internet use revolutionized travel services. Through the 2000s, online travel bookings grew exponentially, and by 2014 global leader Expedia had expanded to include brands such as Hotels.com, the Hotwire Group, trivago, and Expedia Cruise Ship Centers, earning revenues of over \$4.7 million.

The tourism industry is in the midst of a deep metamorphosis. There are many mitigating factors but the new technological solutions coming about are some of the main actors.

Therefore, it is relevant to take a look at some of the technological advances currently leaving their mark on the industry and will, according to various studies, bring significant short-term changes to the sector.

Firstly, it is modern technology. This is undoubtedly the main character in the new ways of travel. **The cell phone has become our tour guide, travel agency, best restaurant locator, map, and more. It is by our side during the entire purchase journey.** In fact, according to TripAdvisor, 45% of users use their smartphone for everything having to do with their vacations.

This is why there is a need to adapt corporate services and communications to these devices. KLM Royal Dutch Airlines, for example, has already created an information service for passengers using Facebook Messenger.

This system, once someone has made a reservation, sends the user information regarding their ticket through Facebook Messenger as well as their boarding pass or updates about the status of their flight. This way, **the user has all the pertinent information about their trip in the palm of their hand using an app that they already use**, eliminating the need to download anything else.

Secondly, augmented reality or virtual reality have also entered the travel world, and the truth is that **it is a trend due to all the possibilities they can offer**. More and more companies use it to show users a cabin on a cruise ship or transport them, for a few seconds, to the Great Wall of China.

Today, **it is possible to “teleport” ourselves to the most remote corners of the globe without getting off the couch**. That is what you can get using Everest’s EVEREST VR app, which lets you see the top of the world without having to climb to the top.

Thirdly, the Internet of Things (IoT) promises to bring significant updates to the tourism industry. They include integrating sensors connected to the Internet inside items like cars, suitcases, buildings, and more.

To confirm the relevance of this study, we have conducted a sociological survey among students in the grade 11B, in which the children were asked to answer some questions that addressed the following aspects:

- knowledge of the history of the military past of the city of Khabarovsk;
- interest in studying the history of the military glory of the city of Khabarovsk;
- the need to create an audio guide covering this topic.

A sociological survey revealed that students can name at least five monuments of military glory – 72% of respondents. This allows us to judge that most students are averagely informed about the military history of Khabarovsk. At the same time, 44% of respondents are interested in gaining new knowledge on this topic. Thus, it was decided to create an audio guide dedicated to the combat past of Khabarovsk.

Besides, the survey shows that paper guides and guide services have already lost their relevance, as 80% of respondents use electronic travel services. However, these platforms do not offer quality-compiled guides to the city of Khabarovsk, because only 32% of respondents heard about them. Nevertheless, all the majority of students in grade 11B would like to take part in an excursion with an audio guide, the number of which is 76%. Therefore, there is a need to create an audio guide for our city.

So, as you can see, tourism as a mass social phenomenon began to take space only after the Second World War, although tourism has its roots in the past. The development of networks and informatics technologies has changed the activities of tourism enterprises.

Modern innovative technologies in tourism allow you to choose a tour, purchase tickets and book a hotel, possibly without the participation of a travel company manager.

Travel guides also state that they can be found on all sites with lots of photos and descriptions of attractions.

Existing digital city guides of our city were reviewed and analyzed; it was revealed that the problem of electronic city guides is misapprehended. The results of the sociological survey among students show that they have interest in learning the history of our city. So, the creation of the audio guide is determined to be necessary.

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## THE CONCEPT OF THE WORD «BEHAVIOUR» AS A LINGUA-CULTURAL PHENOMENON IN ENGLISH

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**Abstract.** *The meaning of the word behaviour is very ancient and semantic valency of this word is very high. The ability to combine with other words especially with adjectives and adverbs classify this word to highly collocative words. In spite of the fact this word can't make up new words and is not very productive it can gain new meanings in different spheres of usage such as Economics, Biology and Psychology. The concept of this word is much wider than the meaning of this word as there exist hundred of words which can express the meaning of the word "behaviour" or have similar semantic core. The realization of this concept can be various depending on the syntax constructions and context. The most interesting expression of this concept can be noticed in proverbs and sayings as the reflexion of behaviour norms and rules of socialisation.*

**Keywords:** semantic valency, generalization, abstract idea, synonyms, antonyms, word combinations, word formation, semantic core, meaning of the word, frame, concept of the word

The word is the basic and main unit of the linguistic system, the largest at the morphological level and the smallest at the syntactic level of linguistic analysis. The word is a structural and semantic entity in the language system.

A word (or any other linguistic sign) is a two-sided unit with a unity of form and content, more precisely, sound form and content. None of these sides is thought of in isolation from each other.

If the word is analyzed from a structural point of view, then it has a number of characteristics. Linguists traditionally distinguish the external and internal structure of the word. The external structure of a word means its morphological structure. All morphemes that form the word make up the external structure of the denotation

“The internal structure of a word, or its meaning, is usually called the semantic structure of the word. This is one of the main aspects of the word. Words can serve as a means of communication only due to their meaning, each of the words of the language has a meaningful function, naming various denotations (objects, phenomena, properties, actions)”. [2 p.46].

The word has both external (formal) and internal (semantic) unity. The formal unity of a word is sometimes mistakenly understood as its indivisibility.

“At the syntagmatic level, the semantic structure of a word is analyzed in its linear relationship with neighboring words in the flow of coherent speech or text. In other words, the semantic characteristics of a word are observed, described and studied on the basis of typical contexts of use ”[1 p.176].

At the paradigmatic level, a word is studied in relation to other vocabulary units of the language system. So a word can be considered in comparison with other words that are similar in meaning, that is, enter into synonymous, antonymic, stylistic relationships.

If we consider the word behavior with a lexical component, then we are faced with a three-digit nominative unit, where the semantic core will be the process of performing or performing an action. The zone of the immediate periphery will be manners and rules of etiquette, the zone of the further periphery is considered as an object of psychology.

*The English word ‘behaviour’ is defined in the Oxford English Dictionary as:*

- 1. Manner of conducting oneself in the external relations of life; demeanour, deportment, bearing, manners.*
- 2. transf. The manner in which a thing acts under specified conditions or circumstances, or in relation to other things.*
- 3. attrib. and Comb., esp. in Psychol., as behaviour-cycle, data, -study, -system, -trend; behaviour pattern*

If we want to expand our understanding of this lexical unit, we can turn to associations as a form of generalization of information.

«Association is one of the main mechanisms of memory. In a sense, they can be called natural classifiers of the conceptual content of the language vocabulary. These ideas and concepts in the memory of a person are related. This connection is based on the past experience of man and, ultimately, more or less accurately reproduces the objectively existing relations between the phenomena of the real world. Under certain conditions, oral or written reproduction of one idea or concept is accompanied by the emergence of other ideas associated with it. This phenomenon is called the association» [4 p. 56 ].

Associations reflect some meaningful relationships between objects and phenomena in the real world and, therefore, between the concepts themselves. Therefore, we can conclude that they play an important role in the lexical structure of the language.

This was stated by N.V. Krushevsky: "Each word is connected with other words by ties of association by similarity; this similarity is not only external, that is, sound or structural, morphological, but also internal, semasiological. It can be concluded that at the level of semasiology, each word is capable of evoking in our minds other lexemes, no less important in meaning. The collection of all these heterogeneous lexemes is a concept» [ 4 p.178].

The concept itself is "a set of all meanings captured by the word; a certain ideal object of the surrounding world, which has a name and reflects a culturally conditioned idea of a person about the world. " Special attention should be paid to the fact that the concept is a culturally determined unit of information storage and processing. [2 p.225]

The presented series of semantic associations with the word "behavior" can be considered in the following lexico-semantic groups. The name of each column in this table represents a frame - a certain nuclear component with associations directly associated with it. These associations are arranged hierarchically in the form of levels, the so-called slots, which fill a particular frame. The analysis of each frame helps us to fill in all that versatility of the word, which is not very clearly represented in the lexical ambiguity of the lexeme."

It should be noted that the frame is a certain mental model, suitable for describing a specific communicative situation as it appears in the mind of the speaker. This method of researching frames is adhered to by J. Andor, who understands a frame as "a linguistically oriented concept that provides a linguistic implementation of the knowledge contained in scenes and scenarios". According to his point of view, the frame is a kind of intermediate link between language as such and scripts and scenes, which are a collection of information about reality, and the use of this information in the process of verbalization. Accordingly, frames are an integral part of the communication process both orally and in writing [5, p.212 - 216].

Scenarios in this context are a keyword or a frame in a lexical-semantic group, while scenes are the entire associative array of the embodiment of a given lexical unit in a particular situation. The presented systematized associative series gives us a complete picture of a specific linguistic phenomenon in different contextual situations. A more detailed analysis is represented in Table 1

**Table 1**

<b>Mental activity</b>	<b>Etiquette</b>	<b>Emotions and psychological processes</b>	<b>The life of wild nature</b>	<b>Physiological instincts and reactions</b>	<b>Morphology/</b>
motivation	courtship	avoidance	ecology	mating	modelling
observation	decency	aggression	swarm	parenting	balance
cognition	modesty	offence	genetic	adaptation	inconsistency
practical implications	politeness	attitude	breeding	feeding	norm
evaluation situational factors	censure	affection	migration	cooperation	standardization
perceived action control	propriety	harassment	dyeing	responsibility	determination
antecedent/intention	limitations subjective norm	arousal attachment	evolution selection	self-defense coping	chaos propriety

If we consider the first frame of **mental activity**, we will be represented with a scenario of perceiving information from the environment with subsequent analysis, processing and evaluation for further progressive actions. The entire sequence of actions is used as an algorithm for the work of artificial intelligence, which is based on the cognitive component of contact with reality.

The second frame **etiquette** describes the ideal vision of behavior in society, with signs of self-sacrifice in the form of restrictions, adherence to censorship, and a manifestation of helpfulness.

The next frame **emotions and psychological processes** is a classifier of human emotions, both positive and negative, with elements of empathy and psychological disposition

The fourth frame, **the life of wild nature**, represents the ecological component of the natural habitat with the basic principles of survival in the form of selection, evolution and reproduction.



The fifth frame **physiological instincts and reactions** describes the entire range of physiological reactions for the preservation and procreation of the species through mating, parenting, feeding and defense.

The sixth frame **morphology /device/structure** generalizes the very concept of representing behavior as a form of being or existence with various internal components in the form of chaos, inconsistency or balance, standardisation and norm, as polar ideas about the structure of the world.

Thus, we can conclude that the concept of behavior in the form of a concept is a hexahedral vocabulary model, where synonymous lexemes expand the lexical base for a given word form and enrich our understanding of the potential of a given lexical unit

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**ANCIENT AUTHORS ON THE FOREIGN POLICY PLANS OF  
MITHRIDATES VI EUPATOR**

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**Abstract.** *The article examines the assessments of the foreign policy plans of King Pontus Mithridates Eupator at the early stage of his reign in the works of ancient historians and writers. The author comes to the conclusion that during the period under consideration, Mithridates set himself exclusively defensive tasks aimed at preserving his kingdom from being absorbed by Rome. This is confirmed both by the most complete studies on the history of Pontus, and by individual remarks in other works.*

**Keywords:** *Pontus, Mithridates Eupator, foreign policy, Rome, Hellenism.*

Assessment of the role of outstanding personalities in history (and in historical science, respectively) is always ambiguous. Many factors play a role here, but above all the fact that most of these assessments are given by the "winners" or under the influence of the "winners". Of course, it would be hypercriticalism to completely deny the realism of such assessments. Moreover, among the "winners" there are fairly objective studies.

Our modern ideas about Mithridates Eupator - undoubtedly one of the outstanding figures of ancient history, are based on the messages in it by Greek and Roman authors. A lot was written about the wars between Rome and Mithridates in antiquity and for a long time, almost until the end of ancient history. And the assessments of the activities of this ruler in these works are far from being as unambiguous as one might expect. This very fact once again underlines the importance of our hero in ancient history. Accordingly, the points of view of modern researchers of the life and work of this king of Pontus differ in their assessments. Moreover, attempts to evaluate it from different angles and positions continue at the present

time<sup>1</sup>. This is what prompted me to once again clarify the views of ancient authors on one of the most important areas of the political activity of this ruler - foreign policy, which will allow me in the future to compare the points of view of modern authors and try to give a closer assessment of the plans and intentions of our hero.

About 50 ancient authors left information about Mithridates and his activities<sup>2</sup>. The most complete information about this we can get, however, only in the writings of Strabo, Memnon, Pompey Trog (as presented by Mark Junian Justin) and Appian. Other literary evidence has a purely auxiliary meaning and belongs to the number of "short and unreliable abbreviations"<sup>3</sup>. But still, some of them can be used to characterize the original plans of Mithridates in the field of relations with neighboring and more distant states, including with Rome.

Let's start with the fact that the real foreign policy plans of this or that ruler of the state, as a rule, stem from the activities of his predecessors<sup>4</sup>. And the ancestors of Eupator, like all the rulers of the Hellenistic era, sought to increase their possessions at the expense of weaker neighboring states<sup>5</sup>. Moreover, if initially they strove to do this in alliance with the Seleucids, then since the time of Pharnaces I the place of the latter is occupied by the Romans. And only the father of Mithridates Eupator - Mithridates V Everget, convinced that Rome was becoming the main enemy of the plans for expanding his state, made certain adjustments to his foreign policy doctrine and turned to studying the conditions of a possible war against Rome. In Rome, they could not fail to notice the growth of the power of this ally

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2 Hind J.G.F. Mithridates. P. 130.

3 McGing B. The foreign policy of Mithridates VI Eupator, King of Pontos. Leiden., 1986. P. 178.

4 Molev E.A. Sovereign of Pontus. N. Novgorod, 1995. P. 24; Saprykin S.Yu. Pontic kingdom. M., 1996. P. 188 and next.

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and, perhaps, even received information about his new plans from their agents. In any case, the murder of Everget as a result of a conspiracy of "friends" could well have been organized by the Roman agents in Pontus, which was suggested by Theodore Reinach<sup>6</sup>.

The attempts to get rid of his heir and the seven-year exile of Mithridates Eupator (Just., XXXVII, 2,4-9) are quite vivid evidence that the Romans and their supporters among the Pontic aristocracy saw in him the successor of their father's work. And only this fact already allows us to think that in the field of foreign policy, Mithridates could initially have been anti-Roman and should have taken care of preparing to resist Rome - this, now obviously, the main enemy. Let's see what the ancient authors say specifically about this.

Let's start with **Strabo**, the most well-informed author in Pontic affairs. In his political views, Strabo was a pronounced novelophile, although he was brought up and educated in Greek <sup>tradition</sup><sup>7</sup>. His main work, he himself considered to be "Historical Notes", which is a continuation of the "History" of Polybius (Strabo., XI. 9. 3.). Extracts from this work are repeatedly quoted by him in Geography. One of such extracts, most likely, was the message about the acceptance of Chersonesos under his protection by Mithridates and the subsequent wars with the Scythians (Strabo., VII. 4.3 – "Chersonesos ... was forced to choose a patron in the person of Mithridates Eupator: the latter wanted to become the head of the barbarians who lived beyond the isthmus up to Borisfen and Adrius. These were preparations for a campaign against the Romans" – "...πορθουμένη δὲ ὑπὸ τῶν βαρβάρων ἡναγκάσθη προστάτην ἐλέσθαι Μιτριδάτην τὸν Εὐπάτορα, στρατηγιώντα ἐπὶ τοὺς ὑπὲρ τοῦ ἰσθμοῦ μέχρι Βορουσθένους βαρβάρους τοῦ Ἀδίου· ταῦτα δ' ἦν ἐπὶ Ῥωμαίους Παρασκευή"). In this message of his, which is especially important for us, along with information about the events that took place, their author's assessment is also given – **"These were preparations against the Romans** – ταῦτα δ' ἦν ἐπὶ Ῥωμαίους Παρασκευή". Of course, this assessment deserves some confidence, since Strabo's ancestors played an important role at the court of the Pontic kings and he could have fairly accurate information about the events that took place during the reign of Mithridates Eupator. However, could the young Pontic tsar, who had just entered the throne, really set such far-reaching goals for himself? More precisely, is it possible to see in the events that took place in Taurica,

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6 Reinach T. Mithridate Eupator, roi de Pont. Paris, 1890. P. 51; Cr. Molev E.A. Lord of Pontus. P. 20; Saprykin S.Yu. Pontic kingdom. P. 102.

7 Gratsianskaya L.I. "Geography" by Strabo. Problems of source study // Ancient states on the territory of the USSR. M., Science, 1988. P. 16-17.

offensive plans aimed at crushing the power of Rome?

It is not easy to answer this question, especially since Strabo speaks elsewhere about the kings of the Middle East: "ἢ ἀφισταμένων καὶ ἔπειτα καταλυομένων, καθάπερ ἐπὶ Μιθριδάτου συνέβη τοῦ Εὐπάτορα... – "if they raised an uprising and then were eliminated, as happened with Mithridates Eupator... VI. 4. 2). From this message it follows that from the point of view of the Romans, Mithridates was just a rebel, and not at all an equal or, even more so, a strong competitor in the field of foreign policy. Rome itself in this passage clearly looks like the aggressor. Consequently, Strabo's previous assessment of Mithridates' intentions can (and most likely should) be regarded as an understanding by the young Pontic king of the inevitability of a clash with Rome and a desire to prepare for this clash in advance as best as possible. And, therefore, according to Strabo, the goals of the foreign policy of the king of Pontus before the start of the wars against Rome can be viewed exclusively as defensive, aimed at strengthening the power of his state in the upcoming confrontation with Rome.

The second author, also fairly well informed about the affairs of the Pontic kingdom and giving some reason to judge the foreign policy plans of Mithridates, is the Heracleian historian **Memnon** (1st century BC - 1st century AD), who wrote the history of his hometown. It also examines the fate of Heraclea during the wars of Mithridates with Rome. Memnon does not give a direct assessment of the pre-war actions of Mithridates as anti-Roman, but considers them a consequence of his nature ("φονικώτατος δὲ ἐκ παιδὸς ὁ Μιθριδάτης ἦν – "Mithridates was bloodthirsty since childhood" Memn., XXX, 2). And this, according to Memnon, led to the fact that after his first successes, he "became proud" and stopped following the instructions of the Romans. Moreover, "προσετίθει δὲ καὶ ἑτέρας τοῦ πολέμου αἰτίας" – "he made it so that other reasons for the war have arisen" - Memn., XXX, 3). In other words, from the point of view of Memnon, the initiator of the war between Pontus and Rome was Mithridates. And it was precisely his plans of conquest, at the time when the question arose about the subordination of Cappadocia, came into the greatest contradiction with the plans of Roman policy in the east and caused the emergence of a military conflict.

For all the one-sidedness and tendentiousness of Memnon as a historian, which has been noted more than once by researchers of his work<sup>8</sup>, his work is still one of the reliable sources on the history of the Mithridates

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8 Laqueur R. Lokalchronik. RE. Bd. XIII. Hbbd. 25.1926. Stlb., 1098 et seq.; Leon. About Heraclea. Introduction, translation and commentary by V.P. Dzagurova. // VDI. 1951. No. 1. P. 283-288; Frolov E.D. Tyranny in HHeraclea of Pontus // AWA. Issue 2. / V.G. Borukhovich (editor-in-chief). Saratov, 1974.P. 118.

wars. The author presents the course of events from the point of view of one of the largest Hellenic cities of the Black Sea region<sup>9</sup>, and the city suffered from the Romans during the Mithridates wars through the fault of Mithridates and his opinion of the Pontic king against this background, perhaps, could not be otherwise. The main sources of Memnon in this matter, most likely, were συγγραφεῖς which Strabo mentions, and in those parts where it is about Heraclea, the author used the works of Promatid Heracleotus and Domitius Callistratus, who wrote about Heraclea<sup>10</sup>. This gives reason to treat his information about the plans of the Pontic king with a certain skepticism, but still do not discount them from our research.

The third author, also the closest in life time to the events of the history of the Mithridates wars, was **Pompey Trogus** (1st century BC - 1st century AD). His work *Historiae Philippicae* was written around 7 AD. and, most likely, was only a reworking of the work of an unknown Greek author<sup>11</sup>. However, of 44 books, only "Prologoi" (a summary of individual books) and an extract by Mark Junian Justin have survived. Judging by the "Prologues", Book 37 of Trog was specially devoted to the history of Pontus, Bosphorus and Colchis. When writing them, he, like Memnon, could well use the works of local Pontian authors, the so-called historians of the Mithridates wars (συγγραφεῖς)<sup>12</sup>. And besides, he could have certain information about the events of these wars from his close relatives - his uncle commanded a detachment of horsemen in the army of Pompey in the third Mithridates war, and his father was the secretary and translator of Julius Caesar (Caes., *Bell.Gal.* V. 36.1; Just., *XLIII.5.12.*). As the epitome of his work Justin shows, he had quite complete information about the events of the first Mithridates war and what preceded it.

In the story of attempts to destroy Mithridates in childhood (Just., *XXXVII, 1.6; 2. 1-9*) Trog does not name and does not characterize his enemies in any way, but the fact that it was an external enemy clearly follows from his subsequent information – "when Mithridates began to govern the state, he began to think from the very beginning not about matters of internal government, but about increasing the limits of his kingdom" - Just., *XXXVII, 1*). It was this circumstance and the fact that the Roman Republic was already the most powerful political enemy of Pontus in Asia at that time, which allowed modern researchers to see in these external enemies of the Romans. It is not by chance that Justin further emphasizes that after the submission of Paphlagonia "Mithridates already considered himself equal

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9 Memnon. About Heraaclea. Introduction. P. 284.

10 Reinach T. Mithridate Eupator, roi de Pont. P. 454.

11 Zelin K.K. Pompey Trog and his work "Historia Philippicae" // VDI. 1954. № 2. P. 183.

12 Zelin K.K. Pompey Trog and his work "Historia Philippicae". P. 190

in greatness with the Roman people - Just., XXXVII. 4. 5) and even further he noted that Mithridates "had long planned a war with Rome" - Just., XXXVIII, 7). At the same time, the plans of this war were calculated only for the subordination of Asia Minor, as eloquently evidenced by Justin's message about the secret trip of Mithridates through the provinces of Asia and Bithynia (Just., XXXVII, 3.4-5)<sup>13</sup> Consequently, Pompey Trog considered the tasks of Mithridates' foreign policy on the eve of his first war with Rome as defensive, aimed only at preserving the independence of their own state.

The most complete information about the foreign policy plans of Mithridates before the beginning of the Roman aggression against Pontus is given by **Appian** (c. 95 - c. 170 AD). He was born and raised in Alexandria, and in his mature years already belonged to the upper strata of Roman society and held a fairly high position<sup>14</sup>. Appian wrote his main work, "Roman History", at an advanced age. Between 160 and 165 AD, while at the imperial court. By this time, he already had a fairly large amount of the most diverse information and tried to present events in good faith, without deviating from the topic. Undoubtedly, Appian also used the biased memoirs of the participants in the wars with Mithridates VI, in particular the memoirs of Sulla. It is very likely that Appian also got acquainted with this kind of material from the work of Titus Livy. As a result, his information about the plans of Mithridates can be considered fairly objective.

According to the initial information of Appian, the war of Mithridates against Rome was provoked by the Romans themselves: ... "they (the Romans) looked with suspicion at the country subject to Mithridates, becoming very large (App., Mithr. 10), and after the restoration of the kings of Bithynia and Cappadocia, the Romans "immediately began to incite (ἀνέπειθον) both (Nicomedes and Ariobarzanes) ... to raid the land of Mithridates and summon him to war, promising that in case of war the Romans would help them." - App., Mithr. 11, 18-21). Appian himself does not give an assessment of the pre-war conquests of the Pontic king, but puts it in the speech of the ambassadors of the Bithynian king Nicomedes. The latter, characterizing the foreign policy activity of Mithridates, declare it aimed at preparing for war with Rome ("... all these preparations... are directed... against you, about the Romans - App., Mithr. 13). It is curious that in the subsequent speech the ambassador of Mithridates Pelopidas actually re-

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13 Molev E.A. Meeting of Mithridates with Marius in terms of the development of the military doctrine of Pontus // *Antiquitas Aeterna*. 2005. № 1. / O.L. Gabelko (editor-in-chief). P. 206.

14 Lukomsky L. Yu. The Roman history of Appian // Appian. Roman wars. SPb., Aletheya, 1994. P. 416.

peats the information of the Bithynian ambassadors, thereby warning the Roman rulers of the province of Asia against a war not sanctioned by the Senate (App., Mithr. 15-16).

This mission of Pelopidas, by the way, has caused a variety of assessments of modern researchers. So McGing considered it to be the last attempt of Mithridates to prevent the war<sup>15</sup>; A. Sherwin-White considered it as a tactical maneuver of the Pontic king<sup>16</sup>, and S.Yu. Saprykin considered this an open call of Mithridates to war<sup>17</sup>. However, we repeat, Appian himself does not express his opinion either here or further. Therefore, the maximum that we can attribute to him in this regard is that he agreed with the opinion of the Bithynian delegation and considered all the pre-war activities of Mithridates as preparation of his state for the fight against Rome, with the ultimate goal of defending its independence and nothing more. It is no coincidence that at the end of his description of the Mithridates wars, where Appian assesses the personality of the king of Pontus, he not only does not accuse Mithridates of his anti-Roman speech, but once again directly calls Mania Aquilia the culprit (αίτιον τοῦ πολέμου) of the war, i.e. Rome (App., Mithr. 112).

Other literary evidence is purely auxiliary. Among them there are only a few fragments that allow us to extract some information about the pre-war foreign policy plans and intentions of Mithridates. The most striking of these is the message of Plutarch about the trip to Asia Minor of the brightest Roman commander of that time, Maria (Plut., Mar., 31). This trip, most likely, was an unofficial embassy of Rome (die informelle diplomatische Mission), sent to resolve the issue of Galatia and Cappadocia in a pro-Roman version.<sup>18</sup> In Plutarch's message, the phrase is especially important that during the meeting Marius was going to incite Mithridates to war, since in Rome everyone suspected that the king of Pontus had long been preparing for war ("ἤλπιζε γὰρ τοὺς βασιλεῖς συνταράξας καὶ Μιθριδάτην ἐπίδοξον ὄντα πολεμήσειν ἀναστήσας καὶ παροξύνας..." Plut., Mar. 31.4.)<sup>19</sup>. Therefore, no matter what the real plans of Mithridates were, in Rome they still perceived his actions as directed against Rome. And

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15 McGing, B.C. The Foreign Policy of Mithridates... P. 80-81.

16 Sherwin-White A.N. Roman Foreign Policy in the East 168 B.C. to A.D. 1. London, Duckworth. 1984. P. 125.

17 Saprykin S.Yu. Pontic kingdom. P. 199.

18 Strobel K. Mithridates VI Eupator von Pontos. Politisches Denken in hellenistischer Tradition versus römische Macht. Gedanken zur Geschichtlichen Stellung und zum Scheitern des letzten grossen Monarchen der hellenistischen Welt || Orbis terrarum. 1996. Bd. 2. P. 166; Molev E.A. Meeting of Mithridates with Mary ... P. 207.

19 Reinach T. Mithridate Eupator, roi de Pont. P. 91; Luce T.J. Marius and the Mithridatic Command || Historia. 1970. Bd. XIX. Ht.1. P. 186.



given the even greater caution that Mithridates began to show in his actions after meeting with Mary (Plut., Mar. 31, 5), there can be no doubt that his previous plans were also only preventive defensive measures.

By the way, Plutarch also notes the aggressive intentions of Rome against the growth of the state of Mithridates in the biography of another prominent Roman politician and commander of Sulla, who soon happened to wage a war against the king of Pontus. Already in 92 BC, four years before the first Mithridates war, the Romans sent Sulla to Cappadocia "to return Ariobarzanes there, but in fact, to curb Mithridates, who became overly enterprising and almost doubled their power and state (Plut., Sulla. 5). This confirms the above assessment of the foreign policy plans of the king of Pontus. The same is evidenced by the refusal of Mithridates to help the Italians during the Allied war in Rome, attested by a number of ancient authors (Diod., XXXVIII, 2. 11; Sallust., Hist. VI. 13).

Thus, speaking about the foreign policy plans of Mithridates on the eve of his first war against Rome, there is no doubt about the defensive nature of his actions, stemming from an understanding of the strength and power of his main enemy and who wants to preserve the independence of his state in accordance with the ideology of that time by increasing his state for neighbors' count. The Romans also professed this ideology, and this is exactly what Gaius Marius pointed out once again with the directness of a Roman when he met Mithridates – "either try to accumulate more strength than the Romans, or be silent and do what you are ordered – ἢ μείζον ᾧ βασιλεῦ πειρῶ δύνασθαι Ῥωμαίων, ἢ ποίει σιωπῆ τὸ προστασσόμενον..." (Plut., Mar. 31, 5).

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List of abbreviations

AWA – Antique World and Archeology.

BAH - Bulletin of Ancient History.

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## PERCEPTION AND UNDERSTANDING OF THE MAIN EMOTION BY HEARING AND HARD OF HEARING SCHOOLCHILDREN

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**Abstract.** The article analyzes the problem of understanding one of the main emotion by schoolchildren of two groups: hearing and hard of hearing. The article relevance encompasses the problem of students' inability to understand and nominate correctly producing emotions, since they face with the choice of many every-day words which can not be referred to emotions. Thus, the emotional intelligence of every schoolchildren needs to be developed at school lessons. In conclusion the author comes to the result that hard of hearing students have less words choice to nominate correctly their producing emotions in comparison with hearing students, but both groups of students need to be taught understanding and describing correctly their emotional sphere.

**Keywords:** hearing students and hard of hearing students, understanding of the emotion, questionnaires, emotional intelligence, nomination of emotions correctly.

### Introduction

In modern society, there is an acute issue of correct awareness and translation of one's own emotions for more successful communication in a team, which, as a result, leads to an effective solution of the assigned tasks. The solution to this problem is associated not only with the successful self-regulation of the emotional background through reflection ("Do I really feel, what I feel?" And "Why do I feel it?"), which is undoubtedly a bonus in maintaining the microclimate in the team at work and at home, but and detection of the emotional experiences of others to create a favorable atmosphere of interaction, resolve, if necessary, conflict situations and provide correct psychological support.

### Main part

The emotion of joy is no less familiar to us than other basic emotions, but to give it a scientific definition, oddly enough, is quite difficult [5].

The aim of this work is to study the understanding of the emotion “joy” by children with hearing impairments and hearing intact. The set goal entails the solution of the following tasks:

- to establish the coincidences and differences in the explanation of joy on the basis of comparing the emotion “joy” from a psychological point of view and the interpretation of a similar definition of academic dictionaries;
- conduct a questionnaire survey of students with intact and impaired hearing in general education and special educational institutions and identify the main senses in the students’ answers that determine the understanding of the emotion of joy;
- to reveal the differences and coincidences of the considered interpretations of the definition and emotion of joy with the students’ understanding of the emotion under study.

Research methods: component analysis; questioning; lexical analysis; method of quantitative calculation and ranking; comparative analysis. The research algorithm was carried out according to the developed methodology by Professor N. I. Kolodina [6].

At the first stage of the work, the concept of joy was investigated from a psychological point of view, based on the work of the following authors: V.N. Quinn [5], K.E. Izard [3], E.P. Ilyin [4], V.S. Deryabin [1]. In turn, the interpretation of the dictionary definition “joy” was analyzed from the academic dictionaries of S.I. Ozhegov [8], D.N. Ushakov [9], T.F. Efremova [2] and S.A. Kuznetsov [7].

V.N. Quinn defines joy as a positive emotion, expressed in a good mood and a sense of pleasure [5]. K.E. Izard notes that joy is accompanied by the experience of satisfaction with oneself and the surrounding world [3]. E.P. Ilyin defines joy as strong satisfaction [4]. V.S. Deryabin determines joy as a reaction to the unexpected impact of something pleasant, desired. The more unexpected the success and the longer it is expected, the greater the joy about it [1].

The definition of “joy” according to the explanatory dictionary of the Russian language by S.I. Ozhegov: “A cheerful feeling, a feeling of great spiritual satisfaction” [8]. D.N. Ushakov explains joy as “1. Feeling of pleasure, inner satisfaction, cheerful mood. 2. An event, an object that arouses such a feeling” [9].

Joy according to the new dictionary of the Russian language by T.F. Efremova corresponds to the feeling of “pleasure, inner satisfaction, fun” [2]. S.A. Kuznetsov interprets this definition in the same way as “The feeling of pleasure, the feeling of great emotional satisfaction, good mood” [7].

As a result of the component analysis of the definition of “joy” and the

explanation of this concept from a psychological point of view, it was possible to identify the main semes: the feeling of satisfaction and pleasure; and peripheral semes: good mood, cheerful feeling, which are more consistent with the interpretations of academic dictionaries of the Russian language.

If we compare the explanation of joy from a psychological point of view and the interpretation of a similar definition in explanatory dictionaries, we can see that the psychologists' explanation of the emotion of joy coincides with the highlighted semes of the definition of "joy" according to the academic explanatory dictionaries, which can be traced from the semes noted above.

At the second stage, the understanding of joy by students with impaired and intact hearing was identified and analyzed. The research was carried out on the material of the questionnaires of students of secondary school №74, private school 'Yes' and boarding schools for children with disabilities in the city of Voronezh and the Voronezh region. The number of students surveyed among students with hearing impairment in grades 7-10 was 38, and among hearing students in grades 7-12 was 51 students.

The students were to write answers to the question: "Write, how do you understand what joy is?". The answers were based solely on subjective experience, without the use of technical means and teacher advice. Task took 3-5 minutes to be fulfilled. All obtained data were processed by lexical analysis, quantitative calculation and ranking.

### **Questionnaire results and analysis**

Of all boarding school students, only five students with hearing impairments indicated in their answers the main semes (feelings of satisfaction and pleasure), which coincided with those identified in the component analysis, and made up 9.8% of the total number of respondents. Peripheral semes (good mood, cheerful feeling), established at the first stage of this work, were found in 33.3% of students. In addition, schoolchildren explained the manifestation of joy, describing the cause of the emergence of emotion with such phrases as: *meeting with loved ones* - 37.25%, *giving gifts* - 29.4%, *happiness* - 21.57%, *achieved something (reward, marks)* - 13.7%. In the answers of the students there was no interpretation of emotion as a psychological phenomenon, but such an external mimic expression of emotion as a smile was indicated (*smiling* - 11.76%).

The priority answers of hearing-impaired schoolchildren to the question "what is joy" were: *good mood, cheerful feeling and meeting with loved ones*.

In the answers of the hearing students, the main semes (feelings of satisfaction and pleasure) were established, which coincided with those identified in the course of the component analysis, and amounted to 28.9% of

the total number of respondents. Peripheral senses (good mood, cheerful feeling), identified at the first stage of this work, were found in the answers of 15.79% of students.

Besides, schoolchildren explained the concept of joy through another emotion - *happiness*, which ultimately amounted to 21.05% of the total number of students participating in the survey. For example, the reasons for the emergence of the emotion of joy were described: *spending time with loved ones* - 10.5%, *receiving gifts* - 7.89%. In the answers of the hearing students, the external mimic expression of emotion was also indicated, i.e. smile (smiles - 7.89%).

The conducted experimental study showed that among students with hearing impairments only 9.8% correctly explained the emotion of joy, and among hearing students 28.9% of the total number of respondents, which makes a difference of three times.

Peripheral senses, corresponding to the interpretations of academic dictionaries of the Russian language, in 33.3% of students with hearing impairments, and 15.79% in hearing students, which shows a difference of 2 times.

A description of the external mimic phenomena of the emotion of joy was found both in students with hearing impairments and in students with intact hearing.

But such a reason for the manifestation of the emotion of joy in schoolchildren with hearing impairments as receiving gifts was indicated in 29.4%, while in 7.89% of hearing students.

More attention is paid to understanding joy by hearing-impaired students meeting with loved ones - 37.25%, and with a large margin of 10.5%, hearing schoolchildren rated joy when meeting with loved ones, which was more than 3.5 times.

It is necessary to note the coincidence in the description of joy by the hearing students in that they tried to explain joy through another feeling "happiness" in a similar percentage: 21.57% and 21.05%, respectively.

### **Conclusion**

It can be emphasized that the understanding of the emotion of joy by hearing students and schoolchildren with hearing impairments has a number of differences that do not significantly affect the awareness of joy as a reaction that occurs to something pleasant. On the other hand, a comparative analysis of the answers received showed significant differences in the reasons for the emergence of joy in hearing and hearing impaired children, which initiates the need for further studies and development of the emotional sphere of schoolchildren of both groups.

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## TREATMENT OF STERNUM OSTEOMYELITIS AND STERNOMEDIASTINITIS AFTER CARDIAC SURGERY

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**Abstract.** *The authors analyzed the treatment of postoperative osteomyelitis and sternomediastinitis - complications after surgical interventions with the use of transsternal access. It was found that among the newly admitted patients with purulent pathology of the anterior chest wall due to sternal access, patients with limited fistulous forms of postoperative osteomyelitis of the sternum and widespread acute sternomediastinitis predominate. The expediency of performing surgical treatment of postoperative osteomyelitis of the sternum and sternomediastinitis in two stages is indicated: the first stage is to remove the ligatures and curettage of the sternum with necrectomy; the second stage is to perform sanitizing resections of the sternum with plastic replacement of the wound defect with a muscle flap on the feeding "leg" or a flap of the greater omentum.*

**Keywords:** *postoperative sternum osteomyelitis, sternomediastinitis, purulent infection, thoracic surgery.*

### **Introduction**

Infectious complications after cardiac surgery occur from 0.3 to 6.9% of cases [1, 2, 3], with sternum osteomyelitis and sternomediastinitis occupy-



ing the leading place among them. The inflammatory process can occur both initially, against the background of instability of the sternum, when aseptic inflammation develops, which later turns into purulent inflammation, and secondary, as a result of the transition of the purulent process from the surgical access zone to the anterior mediastinum [4]. The development of anterior mediastinitis promotes melting of the sternum, eruption of ligatures through the bone tissue with the formation of instability of the sternal fragments [5] and further symptom complex of complications.

In recent years, there has been an increase in postoperative complications due to an increase in the number of cardiac surgeries, including in ischemic heart disease (IHD). However, the tactics of surgical treatment of postoperative sternum osteomyelitis and sternomediastinitis have not been clearly worked out to date.

### **Purpose of the study:**

1. To study the features of the clinical picture of postoperative complications of the sternum after cardiac surgeries performed by trans-sternal access.

2. To evaluate the results of surgical treatment of postoperative sternum osteomyelitis and sternomediastinitis according to the data of the surgical thoracic department of the KSBIHC "Krai Clinical Hospital № 1" named after Professor S.I. Sergeev.

### **Materials and methods**

On the basis of statistical reports published by Rosstat, an analysis of the absolute values of the number of cardiac surgeries, including IHD, was carried out, and, taking into account the average annual population of the territories under consideration, the frequency of these interventions was calculated per 100,000 of the corresponding population. Data on the number of cardiac surgery operations in the Russian Federation (RF) and Khabarovsk Krai (KK) were borrowed from the statistical collection "Activities and resources of healthcare institutions" [6], "Resources and activities of medical healthcare organizations. Key health indicators" [7], in the collection of statistical materials on circulatory diseases [8].

For 15 years (2005-2019) in the surgical thoracic department of Krai Clinical Hospital № 1 "named after Professor S.I. Sergeev of the MHC KK 171 patients with complications of transsternal access after cardiac surgery were treated, while in 122 cases repeated admissions were noted: twice - 67 patients; three or more times - 45 patients. The period from the date of cardiac surgery to admission to the surgical thoracic department for postoperative complications ranged from 2 weeks to 6 months. Patient age: 20-29 years - 44 people, 40-59 years - 96, 60 years and older - 143

patients, while the age of primary patients was distributed as follows: 20-39 years - 8 patients, 40-59 years - 61, 60 years and older - 102; men - 112, women – 59.

Infectious complications after cardiac surgery performed by means of longitudinal sternotomy in primary patients before hospitalization in the surgical thoracic department proceeded as follows: 27 patients had inflammatory processes in the soft tissues in the area of the surgical approach (infected wound - 18 patients; granuloma along the surgical scar painful to the touch - 9 patients); 16 patients developed sternal instability; 54 people were diagnosed with osteomyelitis of the sternum without a purulent process in the anterior mediastinum; fistulous osteomyelitis occurred in 48 patients; 3 patients had rib osteomyelitis; 23 patients were diagnosed with postoperative sternomediastinitis, 6 of them - mediastinostomy. In primary hospitalized patients, 168 cases of somatic pathology were revealed, which significantly influenced the formation and course of postoperative complications: diseases of the circulatory system - 126 cases (hypertension, chronic heart failure), diseases of the endocrine system, nutritional disorders and metabolic disorders (diabetes mellitus, obesity) - 42 and others, which significantly influenced the formation and course of postoperative complications.

Out of the total number of hospitalized patients with postoperative complications after cardiac surgery, 224 (79.2%) patients were operated on, while we divided the surgical interventions into three categories: the first - removal of ligatures, excision of fistulas, other operations on soft tissues (108 patients); the second - marginal resection of the sternum and resection of the ribs (45); the third - subtotal resection of the sternum and its extirpation with or without tissue repair of the wound defect - 71.

The patients were also divided into groups depending on the period of hospitalization (tab. 1): I period (2005-2009) - 44 cases; Period II (2010-2014) - 96 observations; III period (2015-2019) - 143 cases. In the first period, patients were admitted who underwent cardiac surgery in other regions of Russia, the second period is characterized by the opening of a federal center for cardiovascular surgery in Khabarovsk, in the third period, the tactics of patient management and methods of surgical treatment were developed in local regional conditions.

Period 2005-2009 are characterized by the lack of a unified method of treatment of postoperative complications after cardiac surgery through longitudinal sternotomy; in 2010–2014 (II period) there was an active search for the technology of surgical treatment of complications of transsternal access; in 2015–2019 (III period) clinical development and improvement of

two-stage surgical treatment of patients with the pathology under consideration were carried out. The data on the treated patients with infectious complications after cardiac surgery through longitudinal sternotomy are presented in the table.

The method of two-stage surgical treatment is as follows: during the initial surgical revision of the wound, in the case of a limited process in the sternum tissue, defined by the "ad oculus", a limited number of ligatures are removed, the sternum curettage and necrectomy within the bone lesion, then the wound is drained and sutured. With a relapse of the disease, or widespread sternomediastinitis,

**Table**  
**Distribution of patients according to the studied characteristics, depending on the periods**

Characteristic	Total	2005 – 2009	2010 – 2014	2015 – 2019
Total hospitalized cases	283	44	96	143
Number of primary patients	171	26	55	90
Men	112	24	38	50
Women	59	2	17	40
Number of patients 20-39 years old	8	1	3	4
Number of patients 40-59 years old	61	14	17	30
Number of patients 60 years and older	102	11	35	56
Total of the treated patients re-admitted	112	18	41	53
of which twice	67	8	22	37
of which three or more times	45	10	19	16
Had concomitant pathology	168	16	46	106
including diseases of the circulatory system	126	12	38	76
endocrine system diseases, eating disorders and metabolic disorders	42	4	8	30
Operated on of the total number of hospitalized patients	224	32	74	118
Category 1 operations	108	11	29	68
Category 2 operations	45	13	21	11
Category 3 operations	71	8	24	39
Clinical diagnosis	283	44	96	143
Postoperative sternum instability	16	7	8	1
Inflammatory processes in the soft tissues of the sternum	23	4	6	13
Postoperative osteomyelitis of the sternum, ribs	131	28	45	58
Sternomediastinitis	113	5	37	71
Postoperative complications	28	6	10	12
Lethal outcomes	6	0	1	5

revealed intraoperatively at the first stage, the wound is not sutured and is conducted openly for the purpose of the subsequent second stage of surgical treatment. When there is a widespread purulent process - sternomediastinitis, the first step is to remove foreign bodies, fragments of the sternum and the wound are further opened. This approach makes it possible to significantly reduce the trauma of the first stage of surgical treatment, reduce the likelihood of bleeding in the interstage period and, in the long term, limit itself to a smaller volume of removed tissues. The second stage is the removal of all pathological tissue of the infected areas of the sternum and costal cartilage in order to prevent further relapses of mediastinitis, and the surgical intervention is completed by plasty of the chest wall defect with flaps of muscles or the greater omentum, or their combination - thoracoomentomyoplasty.

In the first time period, 26 primary patients were treated (women - 2, men - 24), in the second and third periods - 55 patients (women - 17, men - 38) and 90 patients (women - 40, men - 50), respectively.

The data obtained were processed by variational analysis to determine the degree of reliability of the difference between the obtained values with the calculation of the Student's criterion.

### Results and discussion

As calculations show, in Russia, there was an increase in heart operations by 5.8 times (from 45.6 to 266.0 operations per 100,000 population), including 11 times for IHD (from 16.5 to 184.7 operations per 100,000 population) over the past 14 years (2005-2018). In the Khabarovsk Krai, during 2005-2019, there was also a significant increase in heart surgeries, including those for IHD, by 17.6 and 114.8 times, respectively (the number of heart surgeries increased from 29.2 to 512.6 per 100 thousand of the population, including with IHD, this indicator was 2.6 and 298.6, respectively).

In our observation, the number of primary patients with infectious complications in the sternum after cardiac surgery had a significant tendency to increase in periods II and III of follow-up, i.e. every five years - from  $0.50 \pm 0.10$  to  $1.59 \pm 0.17$  cases per 100,000 population ( $t_1 = 2.85$ ,  $p < 0.01$ ;  $t_2 = 3.01$ ,  $p < 0.01$ ).

In recent years (2015-2019), there has been a significant increase in patients with this pathology at the age of 60 years and older ( $t = 4.92$ ;  $p < 0.001$ ), that is, cardiac surgery patients at the present stage are distinguished by an older age and a significant comorbid background. So, in 2015-2019 compared to 2005-2009, in the considered group of patients, there is a significant increase in somatic pathology - from 38.6 to 92.3

cases per 100 treated patients ( $t = 7.0$ ;  $p < 0.001$ ) with postoperative complications due to cardiac surgery. Diseases of the circulatory system and diseases of the endocrine system, nutritional disorders and metabolic disorders have a particular impact on the outcomes of surgical treatment of infectious complications after cardiac surgery - a significant increase in 2015-2019 compared to the initial period ( $t = 4.02$ ,  $p < 0.001$ ;  $t = 2.72$ ,  $p < 0.01$ , respectively). Such a situation, according to the authors [9, 10, 11], contributes to an increase in the number of risk factors that have a negative effect on tissue healing in the area of surgical access.

Analysis of the course of postoperative complications after cardiac surgery through longitudinal sternotomy showed that the correct diagnosis of these complications is possible only with a careful, comprehensive and quick comparison of the results of clinical and special research methods in a specialized surgical department. Moreover, the correct diagnosis is possible only after a visual assessment of the pathological process during the operation.

Analysis of the nature of surgical interventions in dynamics compared to 2005-2009 revealed a significant increase every five years in the number of operations of the first category of complexity per 1000 operations performed in the Krai thoracic surgery department of the Krai Clinical Hospital № 1: from  $3.36 \pm 1.01$  to  $9.59 \pm 1.77$  and  $22.54 \pm 2.70$  ( $p < 0.01$ ), respectively. Operations of the second category of complexity in the first observation period were performed in 13 cases, in the second and third periods - 21 and 11, respectively, that is, in a ratio per 1000 operations at practically the same level. In 2015-2019, compared with the initial period (2005-2009), the number of operations of the third category of complexity significantly increased: from  $2.44 \pm 0.86$  to  $7.94 \pm 1.61$  and  $12.93 \pm 2.06$  ( $p < 0.001$ ;  $t = 4.70$ ) operations per 1000 operations.

Analysis of postoperative complications indicates a tendency ( $p > 0.05$ ;  $t = 1.15$ ) to reduce the incidence of complications, which amounted to 18.75% in the first period, 13.51 and 10.17% in the second and third periods, respectively. At the same time, the total number of complications over 15 years took place in 28 (12.5%) cases, of which 13 (5.8%) were recurrent infections. In comparison with the data of foreign authors [12], our mortality rate had a lower level - 2 times, this also applies to the number of relapses (14.5%) - 2.5 times. Hashimoto I. et al (2014) associate the frequency of recurrence of infection after surgery with the difficulty of determining the viability of the sternum tissue, the prevalence of its infection and, as a consequence, establishing the level of bone tissue resection. In 9 cases there was bleeding, of which two were fatal. In three cases, ex-

tirpation of the sternum was complicated by pneumothorax. In two cases, during resection of the sternum, the heart was damaged, the heart wounds were sutured, and the patients were discharged with improvement. One patient developed instability in the postoperative period after marginal resection of the sternum.

Of the total number of patients observed, 6 died, the mortality rate was 2.12%, which is lower than the indicators of foreign authors - 5.8% [12]. All patients had widespread sternomediastinitis, while in two of them, the ascending aortic prostheses were located directly in the bottom of the wounds, which provoked recurrent bleeding and death. Two patients died as a result of the rapid progression of sternomediastinitis with the development of multiple organ failure. One patient died due to recurrent arrosive bleeding from a mediastinostomy. One patient, who underwent aortic root replacement with a homograft, had an anastomotic suture failure with the development of an infected hemomediastinum. In this case, a reoperation was performed in the conditions of the federal center of cardiovascular surgery, however, due to the progression of the inflammatory process, a lethal outcome occurred.

Thanks to the use of a two-stage technique for treating patients with postoperative complications after cardiac surgery with a transsternal approach, with the introduction of a two-stage surgical treatment, it was possible to reduce the patient's stay in bed to 29.2 days compared to the initial period - 31.9 days.

### **Conclusion**

1. It is advisable to carry out a full diagnosis of the emerging infectious complications after cardiac surgery by means of a transsternal approach in a surgical thoracic department, which makes it possible to comprehensively and quickly evaluate the results of clinical and special research methods in combination with a direct visual intraoperative assessment of the pathological process.

2. The optimal variant of the surgical treatment of postoperative osteomyelitis of the sternum and sternomediastinitis is a two-stage technique: the first stage is sanitation surgical interventions (removal of ligatures and foreign bodies, curettage of the sternum with removal of sequesters); the second - resection of the sternum with plastic replacement of the chest wall defect, which helps to reduce the incidence of postoperative recurrence of the infection, shorten the average treatment time for patients.

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## DETERMINATION OF THE DENSITY OF THE PANCREATIC CYST WALL

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**Abstract.** *Relevance and goals.* Pancreatic cysts are a fairly common complication of acute pancreatitis. Despite the achievements of modern pancreatology in the treatment of pancreatic cysts, at present, therapeutic and diagnostic measures have certain difficulties and problems in their implementation. The aim of the study was to improve the results of diagnosis and treatment of patients with pancreatic cysts.

*Materials and methods.* The object of the study was 32 patients with pancreatic cysts who underwent ultrasound examination. In shear wave elastography mode, tissue stiffness was mapped from light blue in immature areas to red in high density tissues. On the elastograms of the walls of pancreatic cysts, objective indicators of stiffness were obtained, expressed in values of Young's modulus (kPa).

*Results.* According to the study, the stiffness indices of the unformed cyst wall were up to  $8 \pm 1.24$  kPa, "immature" from  $8 \pm 1.24$  kPa to  $14 \pm 1.54$  kPa. Whereas, the density of the "mature" cyst wall was characterized by an increase in stiffness from  $15 \pm 2.3$  kPa or more.

*Conclusion.* The obtained data on the density of the pancreatic cyst wall will help to more accurately supplement the classification of cysts "maturity" degrees, determine indications for surgical treatment, and choose the optimal treatment tactics for patients with pancreatic cysts

**Keywords.** *Pancreatic cyst, acute pancreatitis, elastography, cyst wall formation.*

### Introduction

Pancreatic cysts are a fairly common complication of acute pancreatitis. The frequency of formation of false cysts in acute pancreatitis is 5-16%, with destructive forms it increases to 60-80%. The presence of a pancreatic cyst implies the choice of a particular method of surgical treatment, which depends on the location, size, connection with the duct system, and the formation of the cyst wall [1, 2]. One of the most accessible and sufficiently informative methods for instrumental diagnosis of pancreatic cysts is ultrasound scanning, which allows visualizing the anatomical and functional state of the formation.

Despite the achievements of modern pancreatology in the treatment of pancreatic cysts, at present, therapeutic and diagnostic measures have certain difficulties and problems in their implementation. This is largely due to the fact that the existing arsenal of applied research methods in a number of cases is not able to provide reliable information [3]. In this connection, various diagnostic and therapeutic methods are being developed and introduced into clinical practice.

**Purpose of the study:** improving the results of diagnosis and treatment of patients with pancreatic cysts.

### Material and research methods

The study was carried out at the clinical base of the Department of Surgery of the Medical Institute of Penza State University - in the surgical department of the SBHCI Penza Oblast Clinical Hospital named after V.I. N.N. Burdenko".

The object of the study was 32 patients with pancreatic cysts who underwent ultrasound examination. Of these, 11 (34.4%) were women, and 21 (65.6%) were men. Age ranged from 28 to 72 years (average age was  $51.3 \pm 11.8$  years).

Ultrasound examination was carried out on a GE Logiq S8 apparatus. During the study, the patient was in the supine position; the study was carried out polypositionally using sectoral, linear and convex transducers. Scanning was carried out longitudinally to the midline of the abdomen, transversely and at various angles. Anatomical affiliation, wall thickness, nature of contents, pancreatic cyst size and cyst wall density (in kPa) were determined by ultrasound in shear wave elastography mode.

The method for determining the density of the wall of the pancreatic cyst received a Russian Federation patent (№ 2720165).

### Results and discussion

During the ultrasound examination, the localization of pancreatic cysts was as follows: in the head - in 7 people (21.9%), in the body - in 13 people

(40.6%), in the tail - in 9 people (28.1%), the rest of the patients (n = 22) had lesions involving several anatomical zones (9.4%). Inhomogeneous contents of the pancreatic cyst were detected in 18.8% of cases. The cyst wall thickness varied from 1 mm to 7 mm. In all patients, the cyst size exceeded 5 cm.

Determination of the density of the pancreatic cyst wall was substantiated by the idea of its formation, i.e. the denser the wall, the more formed it is.

All patients underwent ultrasound elastography. In shear wave elastography mode, tissue stiffness was mapped from light blue in immature areas to red in high density tissues. On the elastograms of the walls of pancreatic cysts, objective indicators of stiffness were obtained, expressed in values of Young's modulus (kPa). In turn, the stiffness indicators of the unformed cyst wall according to the study were up to  $8 \pm 1.24$  kPa, "immature" from  $8 \pm 1.24$  kPa to  $14 \pm 1.54$  kPa. Whereas, the density of the "mature" cyst wall was characterized by an increase in stiffness from  $15 \pm 2.3$  kPa or more.

The method is applied to objectify the degree of "maturity" of the walls of pancreatic cysts, since at the moment their formation is determined by ultrasound examination, based on data on echogenicity, the thickness of the wall itself and the timing of their existence: unformed- up to 3 months, immature - from 3 to 6 months, mature - from 6 months [4]. However, after this period has expired, there are cases of immature in practice.

Determination of the stiffness of the cyst wall of the pancreas is a highly effective way to assess the severity of the cyst wall density. Visual color mapping in the study area makes it possible to clarify the degree of wall formation, which can be used to clarify surgical tactics, as well as to monitor the effectiveness of the treatment.

### **Conclusion**

The obtained data on the density of the pancreatic cyst wall will help to more accurately supplement the classification of cysts "maturity" degrees, determine indications for surgical treatment, and choose the optimal treatment tactics for patients with pancreatic cysts

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## PECULIARITIES OF INACTIVATION OF BACTERIA AND SPORES BY PEROXIDE DISINFECTANTS

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**Abstract.** *The literature data on the inactivating effect of peroxide disinfectants on bacterial cells and bacterial spores are presented.*

*The primary "target" of the action of oxygen-containing disinfectants in bacterial cells are proteins and lipids of cytoplasmic membranes, and in bacterial spores, proteins and lipids of spore membranes. When hydrogen peroxide acts on a bacterial cell at the stage of contact with the cytoplasmic membrane, hydrogen peroxide decomposes into highly reactive hydroxyl radicals, which have a destructive effect on membranes. Hydroxyl radicals are powerful oxidizing agents, have a short lifetime, interact with lipids, proteins, nucleic acids. Oxidation of lipids, especially unsaturated fatty acids, leads to increased membrane permeability. During the oxidation of membrane proteins, consisting of amino acids with disulfide bonds, the latter are transformed into the –SH-radical, as a result of which cross-links are formed at amino groups, protein-lipid complexes are formed; oxidation and denaturation of proteins occurs.*

*Not only hydroxyl radicals have a damaging effect, but also other intermediate products of the decomposition of hydrogen peroxide: hydronium cation -  $H_3O^+$ ; perhydroxyl anion -  $HO_2^-$ .*

**Keywords:** *disinfectant, disinfectants, hydrogen peroxide, hydroxyl radicals, bacteria, cytoplasmic membrane, bacterial spores, spore membranes, inactivation of bacteria and spores, disinfecting efficiency*

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Due to the spread of new viral infections (Covid-19, SARS) in the world,

the preservation of natural foci of anthrax, recurrent outbreaks of enterocolitis, other bacterial and viral diseases, the epidemiological situation requires strengthening measures to prevent and combat pathogens. In this situation, non-specific prevention of infections is of particular importance, one of the directions of which is the development and improvement of disinfectants. Disinfectants are used to destroy or eliminate pathogens in the environment (premises, various objects, tools, etc.).

In recent decades, composite disinfectants have been actively developed, which include several active substances belonging to various chemical groups: halogens, oxygen-containing compounds, phenols, surfactants, aldehydes, alcohols and others [1,2,3,4,5,6]. In recent years, the most in demand are disinfectants that have quaternary ammonium compounds, stabilized hydrogen peroxide, peracetic acid, alcohols, aldehydes as an active substance [7]. To improve the physicochemical properties of DS, functional additives (corrosion inhibitors, stabilizers, surfactants, thickeners, fragrances, etc.) are included in the formulation of disinfectants. Of the functional additives, ethylenediaminetetraacetic acid (EDTA), magnesium lauryl sulfate, zinc sulfate, sulfanol, sodium oleate, etc. are used [8]. The presence of several active substances in the composition of compositions with a balanced formula provides maximum synergism (enhancement) and increases the antimicrobial activity of disinfectants [9]. This is due to the different mechanism of action of the disinfectant and its components on the bacterial cell [10,11].

The purpose of this paper is to analyze scientific works on the mechanism of action of peroxide disinfectants on bacterial cells and spores.

When creating new effective disinfectants, information about the structural features of the infectious agent, the nature of the interaction of functional groups of cellular structures (targets) with the components of a chemical agent, the significance of the targets of a microorganism cell for its normal existence is taken into account [5,6,12]. It is known that the most important targets for disinfectants are the cytoplasmic membrane, cell nucleoid and ribosomes, and spore membranes. organelles of bacteria with morphological and physiological characteristics have different availability for disinfectants [11].

At the first stage of the interaction of microorganisms with any disinfectant, the components of the disinfectant are adsorbed on the cell surface, which causes successive changes in the structure and functions of the cell wall and cytoplasmic membrane. It has been proven that gram-positive and gram-negative bacteria have differences in sensitivity to the effects of external toxic agents [5]. To penetrate the cytoplasm of the cells of gram-

negative bacteria, the components of the disinfectant must overcome the outer membrane, which acts as a molecular filter and protects the cytoplasmic membrane from the action of toxins. The basis of the outer membrane and the cytoplasmic membrane is a bimolecular lipid layer, consisting of proteins, phospholipids. Proteins of the cytoplasmic membrane are mostly represented by enzymes, transport systems; they are either "integral" proteins (bind to lipids of the bilayer) or "peripheral" (attach to the outer and inner surfaces of the membrane, or sew it) [13]. The outer membrane is dense due to the polymer - lipopolysaccharide (LPS). The periplasmic space, which contains dissolved proteins, is located between the outer and cytoplasmic plasma membranes [14]. It has been established that the outer membrane of gram-negative bacteria is not a diffusion barrier. It does not prevent the free passage of low molecular weight hydrophilic disinfectants into the periplasmic space. Purine proteins located in the outer membrane are channels for the passage of small hydrophilic molecules [15]. According to the authors, gram-negative bacteria have internal resistance, mechanisms of resistance to the effects of various chemical groups. This is provided by the components of the outer membrane and the cytoplasmic membrane [15]. However, the outer membrane is impermeable to hydrophobic and large hydrophilic molecules of antibiotics, enzymes, detergents, and fatty acids. In gram-positive bacteria lacking an outer membrane, small exogenous molecules easily diffuse through the relatively open structure of the peptidoglycan layer of the cell wall [16]. Resistance to antimicrobial drugs is also provided by strong complexes of negatively charged lipopolysaccharides and positively charged metal ions [11].

According to many authors, the most vulnerable and damaged structure of a bacterial cell when exposed to a disinfectant is the cytoplasmic membrane due to the availability and presence of active groups (sulfhydryl) that can be easily inactivated [5,13,17,18]. The cytoplasmic membrane performs important functions: provides a constant chemical composition and concentration of substances in the cytoplasm; participates in the transport of substances into the cell and excretion from the cell of metabolic products, extracellular toxins, enzymes; participates in electron transfer and membrane phosphorylation; biosynthesis of phospholipids, components of the cell wall [14]. Just as in the outer membrane, the base of the cytoplasmic membrane is the bilipid layer. The hydrophilic part of lipid molecules is connected to protein molecules by electrostatic bonds. The cytoplasmic membrane contains enzymes: ATPases, dehydrogenases, phosphatases, etc. The functioning of the cytoplasmic membrane is influenced by a number of factors: with an increase in the viscosity of the double layer of lipids,

the transport, enzymatic properties of the membrane are disturbed; loss of divalent metal cations by the membrane leads to the destruction of membranes; a decrease in the amount of water leads to the crystallization of cell components, etc. The destruction of the cytoplasmic membrane leads to cell death. Violation of the membrane integrity leads to the release of potassium ions, proteins, amino acids, nucleic acid from the cells, and dipicolinic acid from spores [19, 20, 12].

It is known from the literature that the mechanism of action of a significant part of the components of disinfectants is aimed at intracellular activity, at the "defeat" of intracellular "targets" of the cytoplasm, causing disorganization of the structure and biochemical changes, cell inactivation [4,13,15,21]. Having penetrated into the cell, the components of disinfectants interact with cytoplasmic proteins, nucleic acids, DNA and RNA, which leads to cell death [9, 18]. Thus, schematically, the mechanism of action of chemical compounds that make up disinfectants is aimed at damaging or destroying the plasma membrane, cross-linking proteins DNA, RNA, oxidation of enzymes, the formation of free radicals, etc. The chemical compounds from which disinfectants are created have a different mechanism of action on the components of the bacterial cell [11,15]. So, ethyl alcohol (95°), phenols, acids, alkalis, salts of heavy metals, surfactants have a destructive mechanism of action. The oxidizing mechanism of action is inherent in oxygen-active compounds, halogens. Membrane attack mechanism of action is typical for detergents. Quaternary ammonium compounds damage the integrity of cell membranes by acting on membrane phospholipids; inactivate enzymes, cause destruction of plasma membranes, protein denaturation, lysis of bacterial cells [4,10,11]. Chlorine-containing compounds affect the enzymes of the redox chain, have a toxic effect on respiration and the barrier function of the cell, causing structural changes in its organelles [12]. The mechanism of action of aldehydes is based on their interaction with functional (-NH) groups of proteins, dysfunction of proteins. Aldehydes damage DNA molecules by linking amino groups of protein molecules with nucleic acids and inhibit transport processes [4,11]. Heavy metal cations, interacting with functional groups of protein molecules, disrupt their structure and function. The mechanism of action of polyguanidines is to block the processes of nutrition, respiration, transport of substances, damage to the components of the cytoplasmic membrane, cytoplasm, nucleotide. PAG macromolecules bind to phospholipids, protein molecules of the cytoplasmic membrane [7]. Microorganisms are characterized by different resistance to the action of disinfectants. In unfavorable conditions, spore-forming bacteria are able to pass from a vegetative



state to a spore state. Spores of the genera *Bacillus* and *Clostridium* are the most resistant to the action of disinfectants. All bacterial spores have a sporoplasm, an inner membrane, a cortex, an outer membrane, spore membranes, and an exosporium. Multilayer spore membranes and the cortex provide it with stability, resistance to lysozyme, other enzymes, surfactants, etc. Alkalis, urea, and some detergents can disrupt the integrity of the spore membranes. Mycobacteria are also resistant to disinfectants, to various physical and chemical influences. This is due to the complex structure of the cell wall, which includes lipids, wax and arabinogalactone, LPS, proteins. Small hydrophilic molecules are able to penetrate through the purine channels of the cell wall. Mycobacterium cells are hydrophobic. Mycobacteria are sensitive to aldehydes, hydrogen peroxide, surfactants, phenols, and alcohols [15].

Interest in non-toxic, environmentally friendly, effective disinfectants has increased in recent years. These include oxygenated disinfectants. The group of oxygen-containing compounds includes hydrogen peroxide, perborates, persulfates, percarbonates, peracids, etc. [18]. The most widespread was hydrogen peroxide, which was discovered at the end of the XIX century (1818) by the French chemist Louis Jacques Thénard, and proposed for use as a disinfectant in 1891 by Richardson [22]. It is well known that the advantages of hydrogen peroxide are a wide range of antimicrobial action, sporicidal activity, decomposition into non-toxic decomposition products (water, oxygen), a decrease in corrosive action on metal surfaces and medical instruments when peracetic acid is added to them [23]. Hydrogen peroxide is used in medicine, food, a number of other industries, in the field of environmental protection (water purification). Hydrogen peroxide is most in demand for disinfection treatment of surfaces, medical devices, for high-level disinfection [22]. Of great interest is the use of hydrogen peroxide also in gaseous form at lower concentrations [22, 23]. Let us dwell in more detail on the mechanism of action of hydrogen peroxide as a promising chemical compound in the creation of new composite peroxide disinfectants. The mechanism of action of hydrogen peroxide has been studied for several decades. It has been proven that the action of peroxide disinfectants is associated with the oxidation of lipids and proteins in the cytoplasmic membrane and in the spore membranes in spore-forming bacteria [9, 18]. However, today this issue requires more detailed study. This is due to the emergence of scientific facts revealed by numerous experiments and possibly requiring a change in the existing view of the mechanism of action of hydrogen peroxide. Unfortunately, there is not enough scientific literature on the exact mechanism of action

of hydrogen peroxide.

It is known that in the microbial cell in the course of redox reactions intermediate decomposition products are formed, which include hydrogen peroxide and other highly reactive oxygen species. At the same time, a low level of reactive oxygen species is maintained by enzymes, in particular, by the enzyme catalase, which converts them into water and oxygen. Bacteria differ in different cellular catalase activity. For example, *S. aureus* is characterized by a high activity of the enzyme catalase, while *E. coli* is characterized by a low catalase activity. When a microbial cell is exposed to peroxide disinfectants, the protective mechanism is overcome. An excess of hydrogen peroxide occurs. The death of microorganisms is caused by hydrogen peroxide and intermediate products of its hydrolysis (free radicals of hydrogen) [18, 19].

For several decades, a version of the destructive action of the hydroxyl radical, which is formed by the interaction of hydrogen peroxide with bivalent iron ions ( $\text{Fe}^{2+}$ ), has been recognized [24, 25, 26]. It has been proven that highly toxic forms of oxygen cause peroxidation of membrane lipids with the formation of peroxide radicals ( $\text{ROO}\cdot$ ), which disrupt cell functions [13]. Cytoplasmic membranes are ideal systems for the formation of hydroxyl radicals, because they contain metal ions. It is assumed that when hydrogen peroxide acts on a bacterial cell at the stage of interaction with the cytoplasmic membrane, hydrogen peroxide decomposes into highly reactive hydroxyl radicals, which have a destructive effect on membranes. Hydroxyl radicals are powerful oxidants, have a short lifetime, and interact with lipids, proteins, and nucleic acids [27]. Oxidation of lipids, especially unsaturated fatty acids, leads to increased membrane permeability. During oxidation of membrane proteins, consisting of amino acids with disulfide bonds, the latter are converted into the  $-\text{SH}$ -radical, as a result of which cross-links are formed at amino groups [18], protein-lipid complexes are formed; oxidation and denaturation of proteins occurs. Thus, most authors consider proteins and lipids of cytoplasmic membranes to be the primary "target" of the effect of oxygen-containing disinfectants in bacterial cells [18]. Not only hydrogen peroxide and hydroxyl radicals have a damaging effect, but also other intermediate products of the decomposition of hydrogen peroxide (hydronium cation -  $\text{H}_3\text{O}^+$ , perhydroxyl anion -  $\text{HO}_2^-$ ), which are formed during its hydrolysis. According to the authors, there are two mechanisms of the antimicrobial action of hydrogen peroxide. At low concentrations, cell death occurs mainly due to damage to DNA, and at high concentrations, due to damage to other cell structures. It is believed that high toxicity at low concentrations of hydrogen peroxide is the result of the

formation of hydroxyl radicals [23].

To damage bacterial spores, the use of DS solutions in higher concentrations is required. In this case, there is a rupture of spore membranes, destruction of the exosporium, destruction of spores, destructive changes in the core. Currently, research continues on the creation of effective sporicidal disinfectants with a synergistic effect. Experimental results demonstrated a synergistic interaction between hydrogen peroxide and peracetic acid for *B. cereus* spores. It was suggested that the "role" of hydrogen peroxide molecules is in disrupting the integrity of the spore membranes, facilitating the passage of peracetic acid into the sporoplasm. The main sporicidal effect in this combination is attributed to peracetic acid. Although, as noted by scientists, the efficiency of peracetic acid without hydrogen peroxide was low [28].

There are assumptions by a number of scientists regarding the mechanism of action of hydrogen peroxide. In their opinion, an oxidizing radical is an iron-containing radical, which is formed from DNA-bound iron, and under the action of peroxide disinfectants, selective oxidation of some proteins occurs. It is also assumed that the vapor form of hydrogen peroxide is a stronger oxidizing agent than the liquid form [22]. Thus, the issue of studying the mechanism of action of peroxide disinfectants requires further research.

**Conclusion.** From various literary sources it can be seen that the primary "target" of the action of oxygen-containing disinfectants in bacterial cells are proteins and lipids of the cytoplasmic membrane, and in bacterial spores proteins and lipids of the spore membranes. When hydrogen peroxide acts on a bacterial cell at the stage of contact with the cytoplasmic membrane, hydrogen peroxide decomposes into highly reactive hydroxyl radicals, which have a destructive effect on the cell membrane apparatus. Hydroxyl radicals are powerful oxidants, have a short lifetime, interact with lipids, proteins, nucleic acids. Oxidation of lipids, especially unsaturated fatty acids, leads to increased membrane permeability. During the oxidation of membrane proteins, consisting of amino acids with disulfide bonds, the latter are transformed into the –SH-radical, as a result of which cross-links are formed at amino groups, protein-lipid complexes are formed; oxidation and denaturation of proteins occurs.

Not only hydroxyl radicals have a damaging effect, but also other intermediate products of the decomposition of hydrogen peroxide: hydronium cation -  $H_3O^+$ ; perhydroxylanion -  $HO^{2-}$ .

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**RESPIRATORY FUNCTION AND CELL MEMBRANE LIPID PEROXIDATION, ASSESSMENT OF THE CORRECTIVE EFFECT OF VARIOUS THERAPY REGIMENS IN PATIENTS WITH CHRONIC LUNG DISEASES**

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**Abstract:** To study the risk factors for the development of cor pulmonale (CP) in patients with chronic pulmonary diseases disbalance in parameters of stable metabolites oxides of the nitrogen ( $SM_{NO}$ ), of blood oxygen saturation ( $SaO_2$ ), of respiratory function and on lipid peroxidation of cell membrane were measured. Estimation correcting effect of base therapy and inhalationotherapy (IT) in patients with CP.

Basis therapy and IT resulted in good parameters of  $SM_{NO}$ ,  $SaO_2$  and metabolic activeness of cell, significant positiveness of hypoxemia and parameters of pulmonary ventilation ability and hemodynamics of pulmonary arteria.

**Keywords:** pulmonary arterial hypertension; ventilation lung capacity; oxidative stress; oxides of the nitrogen; inhalationotherapy.

## 1. Introduction

The growing interest has been observed among the pulmonological specialists to the problem of assessment of the right and left heart ventricle functions for last decades [1,2]. Caused by alveolar hypoxia the pulmonary arterial hypertension (PAH) is finished by formation of cor pulmonale (CP)

in chronic pulmonary diseases [3].

Now it is reliably established, that ventilation-perfusion disorders, alveolar hypoxia and hypoxemia lead to considerable changes in lipid peroxidation (LP) in the tissue membrane structures [4]. It is connected, first of all, with local hypoxia, changes of intermolecular links that results in decrease of mechanical stability and erythrocyte's life time [5, 6].

The modern concept of chronic obstructive pulmonary diseases (COPD) developed by the WHO experts, is based that this disease is related to those diseases, which development can be prevented (primary prevention) and be treated rather successfully (secondary prevention); the clinical course severity and prognosis are often defined by the extrapulmonary manifestations of disease [7, 8].

The search of alternative nonmedical methods of treatment for CP is important too. Inhalation therapy is one of the methods of therapy for patients with COPD complicated with cor pulmonale. According to the data of E.I. Chazov [9,10] in the lungs after inspiration of inhalation or air with high oxygen concentration the activity of antioxidant (AO) system increases considerably. **Purpose:** To study the risk factors of the cor pulmonale development at the patients with chronic pulmonary diseases in Uzbekistan; effect of different regimens of therapy on the parameters of ventilation-perfusion pulmonary functions, of stable metabolites' oxides of the nitrogen and oxidative activity of cellular membranes at the patients with COPD complicated with CP.

### 2. Methods

Pulmonological Screening included interview under the questionnaire of Pauwels R.A., et al. (11); doppleroechocardiography with use of ultrasound device Shimadzu 500A and Toshiba SSH 60A (Japan) according to the recommendations of the American Society of echocardiographers by Khatle and Angelson (1985): on the basis of findings of doppleroechocardiography the pulmonary hypertension without right ventricle dilatation was assessed (RVD, level of average pulmonary arterial pressure – PAPav was more than 25 mm Hg) and with RVD (thickness of RV posterior wall was less than 5 mm, at anterior-posterior size of RV more than 2,5 cm); the obligatory parameters of expiration peak speed were measured in relation to sex, age and height.

During treatment there were studied 54 patients with COPD, complicated by CP, and 30 healthy persons (HP) - volunteers.

The patients with COPD complicated by pulmonary arterial hypertension (groups 1a and 1b) and patients with COPD complicated by CP with RVD (groups 2a and 2b) were studied. Depending on the selection of

therapy, all patients were divided into the following groups: 1a group (16 patients) and 2a group (14 patients) received basic therapy (BT) on GOLD (2006); 1b group (15 patients) and 2b group (11 patients) additionally to BT received inhalationotherapy (OT).

The examinations were performed at the day of admission and on the 10 day, after ten-day-performance of the different schemes of treatment with use of standard mean doses of BT and IT in form of intravenous a.

The erythrocyte membranes were investigated with use of reaction of lipid free oxidation, by parameters of a primary product of lipid peroxidation (LP), that is intermediate products of peroxide chemiluminescence (Chl, imp/s/mg), malon dialdehyde (MDA, nmol/mg) and also by activity of the components of physiological antioxidant system including antioxidant enzymes: superoxidismutase (SOD, un/min/mg), catalase (CAT, mcmol/H<sub>2</sub>O<sub>2</sub>/min/mg). The level of oxides of the nitrogen (NO) metabolites was measured on the basis evaluation of stable metabolites' NO summary concentration nitrates and nitrite (SM<sub>NO</sub>) in the deproteinized plasma with using the spectrophotometric method, blood oxygen saturation (SaO<sub>2</sub>) was measured by pulsoximetry method.

Pulmonary ventilating ability (PVA) was studied on the device Medikor (Hungary), with the evaluation of the forced expiration volume per 1 sec (FEV<sub>1</sub>, %), forced vital capacity (FVC, %) and Tiffno index (FEV<sub>1</sub>/FVC, %).

**The statistical analysis.** The results are processed with use of the software package Excel: there was calculated average arithmetic value and standard error ( $M \pm m$ ). Reliability of differences obtained in the compared groups, was estimated with use of Student's t - criterion. The differences between studied parameters were considered to be statistically reliable at  $P < 0.05$ .

### 3. Results.

At the patients with COPD complicated by CP before treatment there was found lowering of the parameter of blood oxygen saturation in all the groups in comparison with similar parameters in healthy volunteers by 11,9-13,3-14,6-15,2 % ( $p < 0,001$ ).

Before treatment in the patients with COPD complicated by CP there was noted reduction of SM<sub>NO</sub> in blood plasma and blood oxygen saturation during development of PH and RVD (in comparison with parameters of healthy people,  $p < 0.05$ ).

The level of average pulmonary arterial pressure before treatment was raised by 50,5-49,01-59,9-57,7 % in comparison with similar parameters of healthy people ( $p < 0,005$ ). The application only of BT had no significant influence on the investigated parameters and after the treatment in 1a and



2a groups the received data in comparison with similar parameters before the treatment were doubtful.

The results of clinical examinations of the patients with COPD complicated by CP ventilation-perfusion disorders, intensification of LP processes which were response to hypoxia and during cellular adaptation expressed by marked severe clinical course of disease.

During the complex treatment on the background of BT with inhalationotherapy at the patients with COPD complicated by CP with pulmonary arterial hypertension and RVD in 1b and 2b groups the parameters of pulmonary ventilaton ability have been considerably increased in 1b and 2b groups , respectively: FEV1 by 9,1-7,5 % , FVC by 8,4 -7,2 % , FEV1/ FVC by 8,7-7,4 % , PAPav by 15,7-13,1 % (in comparison with parameters before treatment,  $p < 0,05$ ).

After treatment there was observed MDA reduction by 16,5-15,9 % ; CHL by 17,7-16,1 % , as well as increasing SOD by 17,1-16,3 % , CAT by 14,5-13,6 % ( $p < 0,05$ , reliability of differences with similar parameters before treatment).

### **Discussion.**

Lowering of the parameters of blood oxygen saturation and  $SM_{NO}$  induce growing intensification of the processes changes in lipid peroxidation in the tissue membrane structures and vascular remodeling [6]. Dennis J.H. and other authors showed that hypoxemia is a factor of the pathogenetic mechanism of vascular wall damage and endothelial dysfunction. The powerful endogenous NO vasodilator inducing resolution of the vascular wall smooth muscles participates actively in regulation of the systemic and pulmonary vascular resistance.

Unsaturated fat acids are substrates for free radicals in the hydrophobic part of membrane, and the accumulation of free radicals results in disorders in the membrane structures [11,12]. In our researches increase in LP activation before treatment was not compensated by increase in parameters of antioxidant system.

Before treatment the established reduced parameters of pulmonary ventilation ability, blood oxygen saturation and enzymatic activity of antioxidant system induced intensity of the processes of cell membrane remodeling, endothelial vessels and myocardium, that coincided with the statements of Hansell A.L., Tsoyi E., et al. [13,14]. The low parameters of blood oxygen saturation are one of the main reasons of pulmonary vasoconstriction and pulmonary arterial hypertension.

Thus, the data received during the treatment indicates that after the complex therapy performed there was noted decrease in oxidative stress,

positive shifts in the parameters PVA, SaO<sub>2</sub>, SM<sub>NO</sub> and PAPav.

The inclusion of basic therapy COPD in the complex with inhalationo-therapy at the patients with COPD complicated by CP with pulmonary arterial hypertension and RVD provides not only powerful vasodilatation effect on the vessels of the small circle of circulation but also reduces hypoxemia and CP progressing.

### **Conclusions:**

Oxidative damages in the erythrocyte membranes due to tissue hypoxia at the patients with COPD complicated by CP, as complex body adaptation responses, have not only local, but also system character, about what the damages in the system oxidant/antioxidant with shift to the oxidants in the peripheral blood indicated.

At the patients with chronic obstructive pulmonary disease complicated by cor pulmonare during the performance of complex treatment with inhalationotherapy additionally to the basic therapy for 10 days there were observed reduction of the oxidative stress, parameters SM<sub>NO</sub>, hypoxemia and parallel improvement of the parameters of pulmonary ventilation ability and hemodynamics of pulmonary arteria ( $P < 0,05$ ).

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## METHOD FOR THE PARASTOMAL HERNIAS PREVENTION <sup>1</sup>

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**Annotation.** *At present, there is a worldwide tendency towards an increase in the number of patients with various pathologies of the colon requiring colostomy. It was noted that in 12-60% of cases after surgery, paracolostomy hernias occur, which is the reason for a decrease in the quality of life in patients. Therefore, the prevention of hernia formation during colostomy in such patients is extremely important. A new author's method for the treatment and prevention of paracolostomy hernias is proposed. The authors used material of xenogenic origin when performing the plastic reconstruction. Clinical observations of the application of this method in practice are presented. The results and prospects of using this technique are presented.*

**Keywords:** *colostomy, paracolostomal hernias, hernia of the anterior abdominal wall, paracolostomy hernias, prevention of herniation, xenopericardial plate.*

### Research rationale

At present, there is a worldwide tendency to an increase in the number of patients with various pathologies of the colon, requiring the colostomy [2]. It was noted that in 12-60% of cases after surgery, paracolostomy hernias occur, which is the reason for an even greater decrease in the quality of life in this category of patients [5].

Therefore, the prevention of hernia formation during colostomy in such patients is extremely important. Disputes continue about the preference of certain materials for this issue.

There are known methods that involve the use of a synthetic endoprosthesis from a polypropylene mesh with a hole cut out in the center for an

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intestinal stoma, while the polypropylene mesh is sewn to the intestine, taken out as a colostomy, and also to the aponeurosis [1].

However, the use of synthetic polypropylene meshes significantly increases the incidence of foreign body sensations in the intervention area in the postoperative period [3], which significantly reduces the quality of life.

Despite the presence of new methods of colostomy formation and surgical techniques aimed at preventing the occurrence of paracolostomy hernias and its treatment, this complication still remains one of the most important problems of colorectal surgery.

The aim of the study is to develop a method for the parastomal hernias prevention.

### **Material and research methods**

A method for the treatment of paracolostomy hernias was developed [4]. The operation technique is as follows.

After creating a hole in the abdominal wall for removing the terminal colostomy and preparing the intestine during surgery (for the prevention of herniation), or after performing an operation access, excision of the hernial sac and reposition of its contents into the abdominal cavity (when performing paracolostomy hernia repair), the edge of the xenopericardial plate with the sides of the rough surface must be fixed to the large intestine, brought out in the form of a colostomy with interrupted sutures.

The defect in the aponeurosis in the area of the hernial orifice must be sutured edge-to-edge with interrupted sutures.

The endoprosthesis fixed to the intestine is placed on the aponeurosis according to the onlay type in the zone of the corrected defect so that the rough surface faces the subcutaneous fatty tissue, and the smooth surface faces the aponeurosis. Further, the endoprosthesis is fixed on the periphery to the aponeurosis with suture material.

The subcutaneous tissue must be drained according to Redon. The operating wound is sutured in layers with interrupted sutures.

After obtaining permission from the local ethical committee, in the coloproctology department of the State budgetary healthcare institution, Penza Regional Clinical Hospital named after N.N. Burdenko - the clinical base of the Medical Institute of the Federal State Budgetary Educational Institution of Higher Education of Penza State University, 3 surgical interventions were performed in patients with paracolostomy hernias using a xenopericardial plate as an endoprosthesis according to the above technique.

In these patients with parastomal hernias, operated on according to the original method, the postoperative period was uneventful.

There were no inflammatory changes in the wound. Drainages from the

subcutaneous fat were removed on the 3rd day after surgery. The average hospital stay was 10 days.

### Results

The patients were examined one year after the discharge. There were no data for recurrence of parastomal hernia.

In addition, patients who underwent surgery using the original technique did not complain about the feeling of a foreign body in the surgery area.

### Conclusion

Thus, a small experience in the application of the proposed method for repair of paracolostomy hernias, including the use of xenopericardium as an endoprosthesis, showed the effectiveness of the technique.

In addition, the above method can be recommended as a preventive measure for the formation of a paracolostomy hernia during an operation ending with a terminal colostomy.

Further research in this regard seems promising.

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## A CASE OF RABIES IN A CHILD

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**Abstract.** *The authors describe the clinical manifestations and course of the disease caused by the rabies virus in a 14-year-old child.*

**Keywords:** *Rabies, a clinical case.*

Rabies (hydrophobia, hydrophobia, lat. - rabies, Greek-lyssa) is a viral zoonotic natural focal and anthroponotic infectious disease with a contact mechanism of transmission of the pathogen through the saliva of an infected animal.[1]. Rabies is characterized by symptoms of polyencephalitis. In the presence of clinical manifestations in humans, the disease is fatal [2].

The causative agent of rabies-the virus *Neurorhynchus rabid* belongs to the group of mixoviruses of the genus *Lyssavirus* of the family *Rhabdoviridae*. A person becomes infected when bitten by a sick animal, or when the skin is blinded (in the presence of microtraumas) and mucous membranes (including non-damaged ones) [3].

There are two main epidemic forms of the disease: urban rabies and forest rabies. In the Russian Federation, the forest type of rabies is mainly registered [4].

Purpose: To draw the attention of doctors to rarely occurring particularly dangerous infections in children.

On 24.11.2020, a 14-year-old boy was admitted to the hospital of the regional clinical children's hospital with complaints of photophobia, excessive salivation, impaired glotting, and double vision.

From anamnesis: They live in rural areas. The boy fell ill on 20.11.2020-complained of pain in the area of the left shoulder with irradia-

tion of pain in the hand (according to his father, there were no hematomas and violations of the integrity of the skin on the limb). 23.11.20 g. the child was examined by a traumatologist of the district hospital, no data for the fracture was revealed, recommendations were given (voltaren ointment locally, nimesulide tablets).

According to his father, on 23.11.20, about 18 hours, the child refused to eat, refused to take a shower - "fear of drowning", began to talk a lot and pointlessly, to behave restlessly. There was a fear of choking on water, the body temperature rose to 38 C. Parents also noticed dilation of the pupils. After trying to drink water (half a cup of tea), there was a single vomiting, profuse salivation. The child was taken to the hospital by an emergency medical team.

Upon admission: general condition is serious. The location is oriented. Excited. It is partially oriented in time, calls the current month, can't name the date. Hyperesthesia. Mydriasis. The skin is of a physiological color with a slight marbling of the limbs, there are no visible scratches and scarring changes. The mucous membranes of the oral cavity are clean, red. Hypersalivation. Pharyngeal reflexes are reduced, saliva is constantly spitting. Moderate tachypnea when excited. Meningeal signs are negative. Strength in the limbs by 5 points. There was an inadequate reaction to stimuli: when touching a cry, when trying to give water to drink and at the sight of water-a sharp psychomotor agitation, fear of "choking", fear that «water can cause vomiting».

Preliminary diagnosis: Rabies, encephalitic form, stage of arousal.

Additionally, it was found out from the anamnesis that the child had contact with a hedgehog in the forest on 5.11.2020, the degree of contact was not established. The parents did not contact the medical organizations after the contact.

A consultation consisting of resuscitators, pediatricians, infectious diseases specialists, and neurologists was held. We carried out differential diagnosis between botulism and rabies and from the Board with psychotropic drugs.

24.11.2020 at 15.38 cardiac arrest was recorded. In the course of re-animation measures at the 5th minute, the appearance of a defibrillator rhythm. De-fibrillation was performed with a discharge of 360 joules. On the ECG, the appearance of a sinus rhythm with a frequency of 180 per minute.

The child's condition remained extremely severe, due to multiple organ failure, systemic inflammatory reaction syndrome.

30.11.2020 state with negative dynamics due to the increase in cardiac



and multiple organ failure, desaturation up to 80%, arterial hypotension, febrile fever persisted up to 38.6 C.

4.12.2020 at 15.15 cardiac arrest was recorded. Resuscitation measures in full without effect for 30 minutes. Biological death was confirmed at 15.45.

During the patient's life, a specific RNA of *Neurorhynchus rabid* was detected in the saliva by Real-time PCR.

Final clinical and pathoanatomical diagnoses: Rabies (combination of diagnoses).

Conclusions: Thus, the child had a typical case of "forest" rabies, manifested by hydrophobia, aerophobia, photophobia and the development of encephalitis with a fatal outcome.

The problem of rabies, despite the rarity of the occurrence of this infectious disease, including in children, remains relevant for doctors of all specialties.

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## MODERN FEATURES OF THE EPIDEMIC PROCESS OF HEALTHCARE - ASSOCIATED INFECTIONS

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**Abstract.** *The main provisions of the problem of healthcare - associated infection (HAI) are stated in the light of modern knowledge. Much attention is paid to the issues of etiology, the formation of "hospital" strains. The characteristics of the sources, ways and factors of the pathogen spread, clinical forms of infection are given.*

**Keywords:** *HAI, causative agents, routes and factors of transmission.*

In modern conditions of development of healthcare and humanity, prevention of healthcare-associated infection (HAI) is one of the global problems of the world. Today, the activities of a significant number of scientists, numerous healthcare practitioners and most large companies that present their products and services on the world market are subordinated to the solution of these serious issues.

HAI is a difficult problem for world medicine. In medical facilities in many countries of the world, despite the progress of medical science and an extensive list of countermeasures, the HAI level is quite high. This indicates that, in addition to socially mediated factors, there are relatively "socially independent factors" such as the selection of highly virulent strains of microorganisms with multiple resistance to drugs, physical and chemical factors, as well as a decrease in the defenses of patients, different sensitivity of patients to prophylactic and therapeutic measures [10].

The causative agents of HAI are represented by three groups of microorganisms.

*First group* - pathogenic causative agents of traditional infections - dysentery, salmonellosis, measles, rubella, influenza, tuberculosis, etc.

*Second group* - pathogens, the pathogenicity of which is manifested in a hospital setting with the widespread use of therapeutic and diagnostic manipulations. This group includes viruses of hepatitis B, C, D, HIV.

*Third group* - opportunistic microorganisms (OM) that cause purulent

septic infections. These include staphylococci, gram-negative bacteria, anaerobes, etc. [5,8]. OM causes most of the HAI. The reason for the dominance of OM in the etiological structure of HAI lies in the fact that it is in hospitals that OM encounters the very conditions that ensure their ability to cause clinically pronounced diseases: infection with a relatively large dose of a microorganism, weakening of the patient's body by the underlying disease, increased virulence of the pathogen due to passage from one patient to another, which leads to the formation of hospital strains of OM; unusual evolutionarily unconditioned entrance gate of infection associated with medical manipulations, leading to tissue damage with minimal local defense resources (muscle tissue, pleura, etc.).

The main source categories for HAI pathogens are patients, the environment, and healthcare workers.

*Among patients* - persons with a clinically expressed infection, as well as carriers of infection that do not have clinical symptoms, but are colonized with OM. These sources pose a threat to other patients, medical personnel (exogenous infections) and to themselves (endogenous infections). It is patients who are the most significant category of sources of infection in a hospital setting for most HAI [5].

*Environment* - in hospital epidemiology, environmental objects are interpreted not only as a factor in the transmission of infection, but also as a source of infection. Among OM, there are many free-living microorganisms that can persist and multiply for a long time in various objects of the hospital environment. Any moist objects and liquids can serve as favorable conditions for OM, ensuring their participation in the development of the epidemic process. Diagnostic and treatment equipment contaminated with OM is of particular importance. Medical waste is also potentially dangerous not only inside the health care facility, but also outside it [9].

*Medical staff* - as a source of infection, it is inferior to the main sources and poses a danger in a hospital environment when the personnel have an infectious lesion of the skin, as well as when they form a carrier, that is, colonization in various biotopes (without signs of infection) [5].

Traditional HAIs are characterized by natural, evolutionary pathways of pathogen spread, which are determined by the mechanism of transmission of infection: airborne, airborne dust, contact, food, waterway, as well as transplacental and when the fetus passes the birth canal.

Artificial transmission routes are due to the therapeutic and diagnostic process: blood transfusion (transmission of hepatitis B, C, D, HIV infection, etc.), transfusion, instrumental, hardware. Artificial transmission routes also include the contact path through the hands of staff, patient care items.

Medical gloves do not always provide impermeability to microorganisms and protect patients and staff from contamination [4,5].

There are 4 main groups of infections classified by localization: urinary tract infections (UTI), surgical site infections (SSI), lower respiratory tract infections (LRTI), including hospital-acquired pneumonia (HAP), blood-stream infections (BSI) [1].

In multidisciplinary medical institutions and especially in maternal and child health care institutions, obstetric hospitals, the leading place is occupied by purulent-septic infections (PSI), which include many clinical forms (SSI, UTI, HAP, BSI, skin infections, conjunctivitis, omphalitis, endometritis and etc.) [3,6,7,9].

The causes of HAI:

- formation and selection of hospital strains of microorganisms with high virulence and multidrug resistance;
- irrational conduct of antimicrobial chemotherapy, lack of control over the circulation of drug-resistant strains;
- significant frequency of carriage of pathogenic microflora among patients and staff; - creation of large hospital complexes with their own specific ecology
- overcrowding, isolation of premises, peculiarities of the contingent;
- violation of the rules of asepsis and antisepsis [3, 4, 11].

Methods for pre-epidemic diagnostics of diseases with nosocomial infections have been developed, lists of the main prerequisites and precursors of complications of the epidemiological situation in nosocomial PSI have been determined. Their accounting can be recommended for the implementation of epidemiological surveillance activities [9].

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**CONTRIBUTION OF BOTANISTS TO THE ESTABLISHMENT OF  
FOREST EDUCATION AND SCIENCE IN RUSSIA**

*In honour of the 100th anniversary  
of the Department of botany and dendrology  
of Saint-Petersburg State Forest Technical University  
named after S. M. Kirov*

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**Abstract.** *The Department of Botany and Dendrology of the oldest educational forestry institution of Russia, the present St. Petersburg State Forest Technical University named after S.M. Kirov, is celebrating its centenary. At the time of its foundation it was the first specialized department of this kind both in Russia and in the world. In the course of its historical development, the Department of Botany and Dendrology has been formed not only as a large educational and methodological center for botanical, dendrological and general biology training. It has also become a major scientific center providing a wide range of research in the field of biology and ecology of woody plants, their introduction, intraspecific polymorphism, selection, phenological biorhythm, forest science, floristics and taxonomy, anthropogenic dynamics of plant cover and biodiversity conservation of forest ecosystems, bioindication, bioclimatology, forest phenology, and dendrophenological forecasting.*

**Keywords:** *department of botany and dendrology, 100th anniversary, history, Forest Technical University, center of forest education and science, Russia*

In the XIX century Russia there was a small number of scientific botanical centers, in which students would be trained and vegetation studies conducted at a fairly high professional level. One of such centers was the Forest Institute, and in particular the Department of Botany, later the Department of Botany and Dendrology, which is now celebrating its 100th anniversary.

The school, and later the Forest Institute, set a goal of training “people knowledgeable in forestry.” The teaching of specialty courses was preceded by that of general ones, such as botany, zoology, and soil science. They were to lay the groundwork for better understanding of special forestry disciplines. “Otherwise, a lot of things related to forestry remain unexplained in reading” (Verekha and Orlov 1903).

Lectures and laboratory classes in botany were held in the Botanical Cabinet, which was headed successively by well-known botanists K.E. Merklin and S.P. Karelshchikov. The former, a graduate of the University of Derpt, taught a course of botany in Forest Institute until 1865, at the same time continuously improving his scientific expertise in foreign laboratories. S.P. Karelshchikov left his mark in botany as the author of a series of papers on one of the most important structures of epidermal tissue, namely stomata. In 1869, after S.P. Karelshchikov's premature death, I.P. Borodin was invited to teach botany and head the Botanical Cabinet.

From the first days in the office I.P. Borodin brought a fresh approach to the teaching, ensuring its coherence and enriching his lectures with the latest scientific achievements. In his work he attached great importance to the identification of plants and studying their morphology. His innovative methods of teaching botany to foresters included practical classes on winter identification of plants.

One of the main assets of the Botanical Cabinet was, and remains, its herbarium named after I.P. Borodin (KFTA), which is classified as ‘national or large regional herbarium’. The Botanical Cabinet had a rich collection of books by national and foreign authors on all branches of plant science. Being committed to the comprehensive botanical training of future foresters, I.P. Borodin was thoroughly engaged in the development of library collection. The textbooks and study materials on botany authored by I.P. Borodin himself undoubtedly contributed to the success of teaching. Over several years he produced a number of first-class textbooks, such as “A Compendium of Practicals in Plant Taxonomy”, “Lectures on Dendrology”, “A Course of Dendrology” (Borodin 1902) and others. All textbooks and manuals by I.P. Borodin, such as “A Short Textbook of Botany” (Manoylenko 2005) that was reprinted 16 times in 43 years, were extremely popular with

the students and attendees of the institute.

At the beginning of the 20th century I.P. Borodin accepted a position in the Academy of Sciences, while the work at the Forest Institute was taken over by his school. His assistant botanists V.N. Sukachov, A.S. Grebnitsky, V.Ya. Dobrovlyansky and others continued teaching and research. V.N. Sukachov especially stood out from other pupils of I.P. Borodin. He graduated from the Forest Institute in 1902 with the rank of forester, first-class, and was assigned as an assistant professor at the Department of Botany. In 1905 he was sent on an academic trip to Western Europe. On his return, he designed and started teaching a new academic course titled "Geographical Distribution of Tree Species". By that time the science of woody plants had already gained ground in the Forest Institute: woody plant studies have always been among the most important areas in forestry teaching (Sukachov 1934).

Therefore, soon V.N. Sukachov conceived the idea of establishing separate Department of Dendrology where more attention would be paid to woody plants. So, in 1919, at the then Petrograd Forest Institute, V.N. Sukachov organized the Department of Dendrology, first of this kind both in Russia and in the world - the present Department of Botany and Dendrology. Since then, academic courses of taxonomy and plant morphology were taught by this department while plant anatomy, as part of a course of botany, was still taught at the Department of Botany.

Further development of the new Department of Dendrology is in essence a path of consistent implementation of ideas and development of research trends, notably those of V.N. Sukachov himself, the acknowledged leader of forest botanists and dendrologists, originator of the theory of biogeocoenosis, whose vast scientific legacy is impossible to summarize in such a short communication.

It should only be noted that in forestry studies V.N. Sukachov elaborated the ideas of I.K. Pachosky, G.F. Morozov, and A.A. Kayander. The doctrine of forest types, the result of V.N. Sukachov's thorough and comprehensive research, is now taught in all forest and biological universities and colleges of Russia, and is widely used in forestry practice (Fundamentals ... 1964). Being a staunch Darwinist from the very beginning of his scientific career, V.N. Sukachov made a major contribution to one of the key problems of evolutionary theory, namely the theory of natural selection. His experimental studies in the struggle for existence in plants are properly considered classic and are communicated in present-day textbooks and monographs on the theory of evolution.

In his work V.N. Sukachov always integrated science and practice. This



was clearly manifested both in developing forest typology system that is of a key importance for scientifically grounded forest management, and in organizing and conducting in 1950s the joint scientific expedition of the Academy of Sciences USSR dealing with the problems of field shelter afforestation, as well as in his tireless struggle for nature conservation.

V.N. Sukachov attached great importance to expeditionary and field station studies. He organized and took part in expeditions to the Buzuluk forest, Polar Urals, Yakutia, Baikal and Transbaikalia, Central Asia, Bryansk forests, Crimea, Western Siberia, Kola Peninsula, North Caucasus, and other region of the USSR. He established several permanent study areas: Knyazhedvorsk Meadow (1914), river Chu valley (1916), the Vorskla Forest nature reserve (1935), etc. Based on results of his field studies he developed a considerable number of guidelines and programs that are used up to now: "A Program for Botanical and Geographical Research of Aquatic Vegetation" (1909), "A Program for the Study of Wetlands", programs for the study of forest and meadow formations (1909), "On the Focus and Content of Botanical Work in Strict Nature Reserves" (1936) and many others. The best-known of his programs is "Guidelines for the Study of Forest Types" developed in collaboration with S.V. Zon and G.P. Motovilov (Sukachov et al. 1957).

In the field of teaching, Sukachov's major accomplishment was the modification of the course of dendrology. If I.P. Borodin saw in dendrology merely an "artificially isolated part of botany", Sukachov augmented the courses with information on special biology, geography and phytocenology of woody plants. He considered dendrology an intermedium between general botany and special forestry subjects. Sukachov believed that "it is reasonable to build up a course considering tree species in relation to major vegetation zones and highlighting the species of greater economic importance. At the same time, the morphological, systematic and ecological characteristics of tree species and their geographical range and the types of forests formed by these species should be associated with the geobotanical features of a particular vegetation zone or subzone". Of course, there have occurred considerable changes in the course of dendrology since Sukachov's time, but his basic dendrological ideas have been preserved. In 1934 and 1938 Sukachov with his pupils and followers published a textbook on dendrology which is considered to be the most fundamental one both in the country and in the world. In 1940 it was followed by a taxonomically comprehensive key to woody plants, that is still used in teaching.

V.N. Sukachov formed a powerful research team of like-minded people: dendrologists, geobotanists and tree plant breeders working at the depart-

ment. So, A.P. Shennikov, a well-known meadow researcher and ecologist, one of the founders of domestic geobotany and the author of such classics as “Grass Science”, “Plant Ecology”, “Introduction to Geobotany” (Shennikov 1964) and others, worked at the department from 1912 to 1936.

E.L. Wolf, a prominent dendrologist, introducer and systematist worked as a professor of the department until 1925. He tested over 2,800 species of woody plants in the arboretum of the Forest Institute and formed a completely unique dendrological collection. He published over 200 scientific papers, including “Observations on Frost Resistance of Woody Plants” (1917), “Coniferous Trees and Shrubs of the European and Asian Parts of the USSR” (1925) and others. His “Practical Dendrology” (1891-1892) served for a long time as a manual for the students of the Forest Institute.

A significant contribution to the development of botany and dendrology at the Forest Institute was made by prof. S.Ya. Sokolov, an eminent forest scientist and dendrologist. His name is associated with the modern content of dendrology as a synthetic section of botany covering the entire system of knowledge about woody plants of various biomorphs. Among the several hundreds of his publications on dendrology and geobotany, a special place is occupied by the encyclopedic edition of “Trees and Shrubs of the USSR” (Trees ... 1949), “Geography of Woody Plants of the USSR”, and “Areas of Trees and Shrubs of the USSR”.

There are several scientific areas in which V.N. Sukachov’s students, graduates of Forest Technical Academy (FTA), worked. These include: forest typology and plant sociology (S.Ya. Sokolov, S.S. Arkhipov, V.G. Karpov, NA. Konovalov, A.A. Korchagin, V.N. Ovsyankin, A.D. Gozhev); biology, introduction and selection of woody plants (L.F. Pravdin, AM Kormilitsyn, P.I. Lapin, A.A. Korchagin, P.L. Bogdanov, N.M. Andronov, S.Ya. Sokolov, N.O. Sokolov, P.A. Akimov, O.V. Sarkisova-Fedorova); the study of vegetation in arid areas and silvicultural land reclamation (A.S. Barabanshikov, V.L. Leontyev, A.G. Gael).

As early as in 1930s, V.N. Sukachov invited two FTA graduates, P.A. Akimov and N.M. Andronov, to work in the department. Both of them later became well-known dendrologists who continued the introduction work of E.L. Wolf. P.A. Akimov also dealt with the employment of woody plants camouflage properties of for the benefit of national defense. In 1963 he published a handbook of ornamental trees and shrubs. N.M. Andronov was able to replenish the dendrological collection of FTA arboretum by more than 1000 new species. He also published a number of works on the introduction of woody plants and keys to plants used for teaching.

In 1931 P.L. Bogdanov, a 1927 graduate of the Forest Institute and one

of V.N. Sukachov's most devoted pupils, became an assistant professor, and in 1947 the head of the Department of Botany and Dendrology. He is the author of the textbook "Dendrology" (Bogdanov 1974) and the monograph "Poplars and its Culture" in which he brought together the results of his many years of research on poplar selection. P.L. Bogdanov was one of the first scientists in the world to study the photoperiodism phenomenon in woody plants. Under his supervision about 20 of his students defended their Candidate of science (Ph.D.) theses (F.A. Chepik, V.I. Stukov, G.M. Nikonorov, G.P. Minkevich, A.E. Vasiliev, N.E. Bulygin and others). Prof. N.E. Bulygin, a FTA graduate, C.Ya. Sokolov's student and follower in the field of dendrology, and a prominent specialist in the biology and ecology of woody plants, their introduction, phenology and bioclimatology, worked at the department for almost 50 years. For 18 years (1973–1991) he headed the Department of Botany and Dendrology replacing P.L. Bogdanov. N.E. Bulygin, integrating dendrology with phenology, developed a new research area, namely dendrophenology. He worked out an original technique and implemented a 50-year comprehensive bioclimatic and dendrological-introduction monitoring which made it possible to link the prospects and results of woody plants introduction with their phenological biorhythm (Bulygin, 1996). In collaboration with prof. V.T. Yarmishko he published the third expanded edition of the textbook "Dendrology" (Bulygin and Yarmishko 2000).

After N.E. Bulygin the Department of Botany and Dendrology was headed (1991-1995) by prof. Yu.V. Titov, a FTA graduate, the student of A.A. Yatsenko-Khmelevsky and V.G. Karpov, a well-known specialist in the field of experimental phytocenology, allelopathy, floodplain vegetation. He took part in many geobotanical expeditions to Karelia, north of Western Siberia, Transbaikalia, Mongolia, and China. He is the author and co-author of more than 60 scientific papers, including several monographs "Group Effect in Plants" (1978), "The Response of Upland Meadow to Mineral Fertilizers", 1987.

Since 1996 the Department of Botany and Dendrology has been headed by prof. V.T. Yarmishko, a FTA graduate, a renowned expert in the field of ecological dendrology, geobotany, bioindication and biodiversity conservation of forest ecosystems. He is the author and co-author of more than 250 scientific publications, including such monographs as "The Effect of Industrial Atmospheric Pollution on the Pine Forests of the Kola Peninsula" (1990), "Scots Pine and Atmospheric Pollution in the European North" (1997), "Forests of Novgorod Land" (1998), "Methods for Studying Forest Communities" (2002), "Dynamics of Forest Communities in Northwestern

Russia” (2009), “Peculiarities of Disturbed Pine Forests Restoration in Mongolia” (Yarmishko et al. 2013), etc. Under the guidance of prof. V.T. Yarmishko 16 candidate of science (PhD) and doctor of science (Habilitation) theses were defended.

Currently the department employs candidates (PhD) and doctors (Habilitation) of science, specialists in various fields of botany and dendrology:

F.A. Chepik, Associate Professor, candidate of biological sciences (PhD), dendrologist, a FTA graduate, a recognized expert in morphogenesis of woody plants and their intraspecific variability, the author of a number of works on dendrology and biodiversity conservation of forest phytocoenoses, textbooks and keys to plants.

V.Yu. Neshataev, Professor, doctor of biological sciences (Habilitation) – a well-known geobotanist of V.N. Sukachov’s school, a graduate of the Department of Geobotany, of the Leningrad State University, an expert in the field of forest science, bogland science, and vegetation classification. In 2017 he successfully defended his doctoral (Habilitation) thesis “Anthropogenic Dynamics of Taiga Vegetation in European Russia”.

A.F. Potokin, Associate Professor, candidate of biological sciences (PhD), a graduate of the Department of Geobotany, Leningrad State University, geobotanist, specialist in the study of vegetation, its condition and classification. He actively conducts field expedition floristic and geobotanical studies in many regions of Russia.

O.V. Ignateva, Associate Professor, candidate of biological sciences (PhD), a graduate of the St. Petersburg State Forest Technical University named after S.M. Kirov, a forest ecologist, specializing in studying impact of natural and anthropogenic factors on the diversity, structure and productivity of southern taiga forest communities.

A.A. Egorov, Associate Professor, candidate of biological sciences (PhD), a graduate of FTA. His studies are focused on flora and vegetation of specific regions of Russia; he also carries out experiments on the landscaping of industrial sites and settlements in the Far North.

S.V. Vasiliev, Associate Professor, candidate of biological sciences (PhD), a graduate of the St. Petersburg State Forest Technical University named after S.M. Kirov, studies the morphogenesis of woody plants, and conducts an assessment on the ability of tree species natural regeneration in the gardens and parks of St. Petersburg.

All academic staff of the department is involved in teaching and research, participating in research expeditions to different regions of Russia, communicating their research findings in seminars and conferences or through publications.

Thus, in the course of its historical development, the Department of Botany and Dendrology has been formed not only as a large teaching and learning center for botanical, dendrological, and, in general, biological training for the St. Petersburg Forest Technical University graduates. The department has also become a major scientific center providing a wide range of research in the fields of biology and ecology of woody plants, their introduction, intraspecific polymorphism, selection, phenological bio-rhythm, forest science, floristics and taxonomy, anthropogenic dynamics of plant cover and biodiversity conservation of forest ecosystems, bioindication, bioclimatology, forest phenology, and dendrophenological forecasting. It is impossible to list scientific publications of the department, for only V.N. Sukachov alone was the author of about 500 papers. Under the supervision of V.N. Sukachov, his pupils and followers, about 50 doctors and candidates of science were trained at the department, the overwhelming majority of them specializing in dendrology. This fact in itself is an indication that, while creating the first department of dendrology in Russia, V.N. Sukachov looked far ahead into addressing botanical and dendrological matters of Russia. Only within the last 10-15 years, the department staff has published 10 monographs, 2 textbooks, and over 10 educational and teaching manuals. The geographic reach of the department's scientific research is constantly expanding. The scientific school "Dendrology and Biogeocenology" named after V.N. Sukachov" has been established and is functioning at the department.

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## FUNCTIONING OF PROTEIN METABOLISM IN PIGLETS DURING THE MILK FEEDING PHASE

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**Abstract.** *The activity of protein metabolism in piglets of milk nutrition strongly determines the intensity of their growth and development. At the same time, their normative indicators in piglets of the second phase of early ontogenesis in the conditions of central Russia remain not fully understood. During the milk feeding phase of piglets kept in Central Russia, the level of total protein increased due to an increase in the albumin and globulin fractions. This was accompanied by an increase in blood urea, reflecting the intensification of protein metabolism. During the phase of milk feeding in piglets, the stability of most of the enzymes being determined was noted in the blood. An increase in the activity of gamma-glutamyltransferase was noted in piglets during the observation. This was accompanied by the stability of transaminase activity in their blood and the stability of creatine kinase activity. The revealed concentrations of the considered metabolites and the found activity of the registered enzymes can be considered as the normative phases of milk feeding for piglets kept in the conditions of central Russia.*

**Keywords:** *piglets, milk feeding phase, blood, metabolism, physiological status, biochemical status.*

Maintaining the optimal physiological status of the piglet population is extremely important for the intensification of modern pig production. The phase of milk feeding has a special place in relation to maintaining the health of their livestock [1,2]. Science considers this period to be one of the most important critical stages of individual development, during which

all adaptive processes in the body associated with preparation for the consumption of plant feed are very actively implemented [3,4].

All types of metabolism are intensively occurring in milk-fed piglets [5]. This provides them with high growth rates exceeding those of many other productive animals [6]. An important role in this is played by the high content of biologically active substances in their blood in piglets, which are metabolites and bioregulators of vital processes throughout their body [7, 8]. The blood of piglets with milk nutrition is considered as an important object for monitoring their condition, since by registering the concentration of substances contained in it, it is possible to accurately assess the current status of the animal and predict its further dynamics.

It seems important to further accumulate information on the physiological and biochemical parameters of piglets at the very beginning of their ontogenesis [9]. Knowledge of their characteristics can help to better understand the conditions necessary for the successful course of the life support processes, growth and development of the organism until they reach the economically required level.

The aim of the study was to evaluate the features of markers of protein metabolism in the blood of piglets during the phase of milk feeding under standard conditions of a pigsty located in Central Russia.

### **Materials and methods**

The work was carried out in full compliance with the generally accepted ethical standards for the treatment of vertebrates during scientific research. The study was carried out in a Russian pig farm on the basis of the Vladimirkoe pig farm in Ryazan region. For the study, a group was formed of completely healthy milk-fed piglets of a large white breed, a total of 31 heads. Feeding and keeping of piglets was carried out in a standard manner according to generally accepted technologies.

In animals, the physiological and biochemical status indicators were assessed during the milk feeding phase from the sixth day of life to the 20th day of life. Blood for research was taken from piglets from the tail vein in all cases in the morning. Their blood was determined by the content of total protein, albumin, urea, as well as the enzymatic activity of aspartate aminotransferase, gamma-glutamyltransferase, alanine aminotransferase and creatine kinase by conventional methods [10].

The results obtained were processed by the method of variation statistics. The assessment of the reliability of the differences in the indicators taken into account was carried out using the Student's test. The significance of differences in indicators was recorded at  $p < 0.05$ .



**Research results and discussion**

The dynamics of protein metabolism in piglets is manifested in adequate changes in the level of its metabolites and the activity of the main enzymes that provide and realize the growth, development and functional maturation of all organs. In the course of the study, significant changes in the quantitative content of protein fractions and metabolites in the blood of piglets were found (table 1).

**Table 1. Indicators of protein metabolism in the blood of piglets during the milk feeding phase**

Parameters	Age of piglets (day of life), M±m			
	6	10	15	20
Total protein, g/l	69.7±0.35	70.9±0.31	73.8±0.25	77.7±0.32*
Albumins, g/l	33.5±0.28	34.2±0.39	35.8±0.26	37.3±0.22*
Urea, mmol/l	2.90±0.29	3.01±0.20	3.14±0.39	3.29±0.26*
Alaninamino-transferase, ncat/l	223.4±0.88	220.6±1.01	218.4±0.86	220.2±0.96
Aspartate aminotransferase, ncat/l	906.7±2.62	903.3±2.62	901.4±2.17	905.3±1.88
Creatine kinase, ncat/l	2601.8±2.71	2586.3±2.54	2600.3±2.46	2591.6±2.39
Gamma-glutamyltransferase, ncat / l	379.5±0.75	386.3±0.54	395.4±0.61	416.8±0.56*

Note: the reliability of the dynamics of indicators in comparison with the age of six days  
\* p<0.05.

In the blood of dairy piglets at the age of six days, the level of total protein is low and amounts to 69.7±0.35 g/l. Subsequently, its amount in the blood of animals gradually increased and by the end of the milk feeding phase, it increased in total by 11.5% (p<0.05). The increase in the level of total protein in the blood of piglets between 6 and 20 days of life should be largely associated with the intensive absorption of amino acids from the feed in their stomach and intestines. At the same time, in piglets during the observation, the concentration of albumin in the blood gradually increased by 11.3% (p<0.05), reaching 37.3±0.22 g/l.

The level of urea in the blood of piglets at the age of six days was 2.90±0.29 mmol/l. Subsequently, its level in the blood of pigs increased and by the end of observation reached 3.29±0.26 mmol/l. The increase in this metabolite by 13.4% indicated an increase in protein metabolism in

them at this age.

The activity of the enzymes alanine aminotransferase and aspartate aminotransferase on the sixth day of life in piglets was  $223.4 \pm 0.88$  ncat/l and  $906.7 \pm 2.62$  ncat/l, respectively. Subsequently, their level changed slightly. During the entire subsequent observation, the activity of transaminases in the blood of animals did not change significantly. The stability of the activity of transaminases and an increase in the concentration of total protein in the blood of piglets during the phase of milk feeding should be associated with a natural increase in their protein-synthesizing mechanisms of the liver and the establishment of a clear balance of transamination and deamination processes in it [11, 12]. It is known that the dynamics of the functional properties of transaminases is always associated with the growth and development of the organism as a whole, and especially its muscular system [13,14]. The data obtained give reason to consider them as important markers of the dynamics of the development of meat productivity in young animals of all farm animals [15, 16].

The severity of creatine kinase activity in the blood of the observed pigs changed little and by the end of the observation it was  $2591.6 \pm 2.39$  ncat/l. In the blood of piglets taken into the study on the sixth day of life, the activity of gamma-glutamyltransferase was  $379.52 \pm 0.75$  ncat/l. Then its level gradually increased and by the age of twenty it increased by 9.8% ( $p < 0.05$ ), reaching the level of  $416.8 \pm 0.56$  ncat/l. The revealed features of the enzymatic activity in the examined piglets should be associated with the development of adaptation processes in them [17, 18], caused by changes in genetic expression and changes against this background of protein synthesis in the liver, muscles and bone marrow [19].

### **Conclusion**

The first half of early ontogenesis in piglets is associated with a mass of adaptive changes in their bodies, which are reflected during the milk feeding phase at the level of blood protein metabolism. In this regard, in piglets, it is extremely important to monitor the parameters of this type of metabolism, taking into account the activity of enzymes that implement it in them. According to their condition, it is possible to quickly assess the status of protein metabolism in animals and timely carry out preventive and therapeutic measures. The changes in the parameters of this type of metabolism and key enzymes in piglets found in this study reflected their current optimal somatic status and can be considered as normative for further research in the conditions of farms in central Russia. Maintaining full health of piglets during the study and in the next month after it gives all the reasons for this.

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## LECTINS IN ENZYMOLOGY

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**Abstract.** *Examples of inter- and intra-molecular directions of co-functioning lectins and enzymes are summarized. The data indicate importance of lectin-enzyme relationships in molecular and clinical cell biology, microbiology and medical biotechnology. Lectin-enzyme relationships give a platform for further expanded prospects in medicine and biotechnology.*

**Keywords:** *enzyme, lectin domain, carbohydrate binding, CBM, recognition, specificity*

Lectins (carbohydrate recognizing proteins) are widely distributed in nature ( Sharon and Lis, 2003; Lakhtin, 1987; Lakhtin V. et al., 2011). They are distributed as co-functioning systems, and represent universal objectives for biology and molecular microecology (Lakhtin M. et al., 2010a,b,c). Studies of lectins, lectin-like proteins and be/multi-functional communicative enzymes are quickly developed and converged. The aim of this review

is to give current views on both relationships between enzymes and lectins, and their prospects.

### *Lectin Terms*

There are a number of key terms concerning lectin origin, representation of specificity, organization and functioning. It must be taken into consideration when modern current knowledge on lectins is analyzed (Lakhtin M. et al., 2010d, 2011a,b,c).

Briefly, the term “lectin” means:

- \*the presence of autonomous carbohydrates/glycoconjugates (GC) binding site(s) (CBS), module(s) (CBM) or configurations/motifs of non-catalytic nature (outside of catalytic center);

- \*interaction without chemical altering recognizable carbohydrates/GC;

- \*reversible recognition of the carbohydrate targets;

- \*the broad and ranged carbohydrate/GC-specificities of CBS/CBM (Lakhtin, 1992, 1995);

- \*the new carbohydrate/GC-specificities (the pattern- and mega/3D-mosaic-pattern- specificities) of complexes and assemblies including CBS/CBM (involving influence of inter-molecules/subunits/ domains/epitopes/ motifs as space of CB-pockets with participation of the close aromatic aminoacid residues mainly Trp and Tyr [Yoshida, 2020]) ;

- \*multi-functionality of CBS/CBM in assemblies with enzymes (dense assimilation of glycans of mucin type [Lira-Navarrete et al., 2015]; bi/multi-functional enzymes as communicators as in cases of cell surface receptor and trans-membrane enzymes) (Lakhtin, Yamskov, 1991; Hettle et al., 2017; Katoh et al., 2020);

- \*inhibition of CBS/CBM by complementary carbohydrates/GC (the ranging GC on their specificity and availability takes place);

- \*the Ig-like, adhesion and other functional domains (protein primary structure)/motifs (protein primary structure and epitopes) can co-function/multi-function as the network of metabolomebiotics (Lakhtin M. et al., 2019a, Lakhtin V. et al., 2016, 2020e, and may be important in pair or assemblies together with CBS (Lakhtin, 1994);

- \*asymmetry of both CBS/CBM (C- or N-terminal positions [Lakhtin, 1994]) and the molecules/assemblies containing CBS/CBM (also at the level of protein primary/secondary and higher structures) as indication of activity potential;

- \*non-toxic nature of CBS/CBM as separate subunit/site/part/module of the molecule or assembly.

The term “enzyme as true lectin” means the presence of the independent lectin activities in enzyme molecule/assembly (catalytic and lectin

parts in separate positions). Lectin part can be represented as subunits, epitopes, primary protein structure domains and cluster areas, motifs) (see Table 2). Historically, examples of lectin-enzyme natural and recombinant relationships were described preferentially as inter-molecular followed by intra-molecular type (Lakhtin V. et al., 1990, 2011, 2019a,b,c,d; Lakhtin M. et al., 2010c, 2011c, 2017a).

### *Inter-molecular Lectin-Enzyme Relationships*

In the Table 1 the data on successful testing glycoprotein origin of about 500 type enzymes (and their protein modulators) from all classes are presented. As a result of lectin-enzyme interaction the modulation, stabilization, and space orientation of enzymes are reached (Lakhtin and Yamskov, 1991; Lakhtin, 1994; Lakhtin M. et al., 2010c). These data demonstrate high potential for inter-molecular enzyme and lectin relationships (lectin-dependent directed supporting enzyme stereo fixation/ vector orientation, stabilization, assembling, modulation, pattern specificity, others). Examples of mixed taxonomic identification of enzymes (EC 3.1. Esterases as EC 3.4. Proteases, or EC 3.2.1. Glycosyl-hydrolases with transglycosylation potential (EC 2.4. Glycosyl-transferases) activities are described (Table 2). They include viral sialidases, microbial galactosidases (*B. adolescentis* and other alpha-galactosidases) acting like transferases in special conditions (Lakhtin, 1987; Lakhtin M., 2011c, 2017a,c).

### *Intra-molecular Lectin-Enzyme Relationships*

Lectin type site(s) (for sorption on insoluble/ crystalline polysaccharides, in cases of bi/multi-functional enzymes, others) which are independent of catalytic center are revealed in a number of enzymes (Abbott et al., 2008; Montanier et al., 2010; Lakhtin V. et al., 2011,; Hettle et al., 2017; Lakhtin M. et al., 2017c).

Molecular organization of lectins often includes receptor part/fragment/ domain/motif of molecule (GC binding) in combination with enzyme moiety of the same molecule (Lakhtin, 1994). The progress in the field of intra-molecular lectin and enzyme relationships is impressive and almost exhaustive (Abbott et al., 2008; Montanier et al., 2010; Hettle et al., 2017; Lakhtin M. et al., 2010c, 2011c, 2017a). A number of examples are represented in Table 2. At present it is clear that all main classified types of enzymes can be represented as true lectins. It should be noted that the same carbohydrate recognition sites/motifs and CBM are often found in proteins including different classified enzymes. For example, Gal-binding domain-like is revealed not only in galactose oxidase but also in Tyr-protein kinase, *Lactococcus* X-Pro dipeptidylpeptidase, lysyl endopeptidase, and nicotine adenine dinucleotide glycohydrolase (EBI 2010 > Databases > InterPro.

IPR008979). Besides, the same CBM type can be found among archaea, eubacteria and fungi as well (Abbott et al., 2008; Montanier et al., 2010; Hettle et al., 2017).

Tables 1 and 2 show that lectin and enzyme relationships are universal ones in any organism. They are involved in any host-bacteria symbiotic or non-symbiotic processes, receptor recognition, cytoplasm-organelle metabolism, etc. For instance, lectins and enzymes are active co-partners in eukaryotic intracellular glycoprotein modification and degradation systems (Yoshida, 2007, 2020). Their co-functioning is of importance for any biological process *in vitro* and *in vivo* as well as for industrial and medical biotechnology (Lakhtin M. et al., 2010c).

Aforementioned above data indicate importance of lectins and their intra- and inter-relationships with enzymes in regulating metabolic worknets *in vivo* and *in vitro*.

### *Probiotic Microbial Lectins*

Probiotic microbial strains of human origin are important perspective sources of bioactives, postbiotics and other useful metabolites for drug forms and formulas (Lakhtin M. et al., 2010a,b, 2018; Lakhtin V. et al., 2008, 2020a,b,c; Shenderov, 2020). Among lectin sources, probiotic/symbiotic microbes are of especially increased interest. Among such metabolites, there is a variety of lectin and enzyme potentially co-functioning systems involving in recognition type interactions between probiotic microbes and the host (Lakhtin et al., 2006b; Lakhtin et al., 2010c; Table 2).

Researches mainly investigate adhesins (also surface enzymes) and lectins of probiotic bacteria species and strains origin (*Bifidobacterium adolescentis* MC-42, *B. bifidum* 1, *Lactobacillus acidophilus* NK1, K3III24, 100ash, and *L. plantarum* 8RA3) - key ingredients of (multi)probiotics and (multi)synbiotics in Russia (Shenderov, 2008). Isolated and standardized lectins (on their properties) of probiotic lactobacilli and bifidobacteria have revealed different useful synergistic properties (anti-pathogenic, others) (Lakhtin V. et al., 2006a, 2007, 2020a; Lakhtin M. et al., 2010a,b, 2019b, 2020b). It is clear that probiotic multi-strain lactobacillar consortium *Acilact* possesses at least three different lectin systems and a number of sub-systems involving in different protection types using different mechanisms (Lakhtin M. et al., 2010a, 2011a,b,c, 2017c, Lakhtin V. et al., 2020a,b,c,d, 2021).

It is waiting for extended panel of probiotic microorganism GC-recognizing activities at the level of:

-truncated lectin molecules (in the presence of hydrolases of surrounding media when lectin activity is become unmasked, increased, or



changed);

-lectin complexes and oligo/multi-mere assemblies when expression of new type of GC recognition is possible (which is absent at the level of monomer ingredients);

-lectin-like molecular pool (bacteriocin-like substances which can be selectively and reversibly associated with GC; others).

**Table 1. Examples of classified enzymes (from about 450 taxonomic sources) and carbohydrate sensitive reagents (special stains, enzymes of carbohydrate metabolism, lectins) (Lakhtin M. et al., 2010c, Lakhtin V. et al., 2019a,b,c,d).**

No/EC\* Classes and Groups of Enzymes; Cases of enzyme types in reactions with carbohydrate sensitive reagents

1. Oxidoreductases 57
2. Transferases 78
3. Hydrolases 330
  - 3.1. Esterases 75
  - 3.2. Glycosyl hydrolases 68
  - 3.4. Peptidyl hydrolases 148
  - 3.5. - 3.10. Other hydrolases 39
4. Lyases 14
5. Isomerases 6
6. Ligases 5

Comments. \*EC: Enzyme Classification (Enzyme Nomenclature Recommendations 1992. Orlando: Acad. Press. 1992).

**Table 2. Examples of bi/multi-functional enzymes with intrinsic non-catalytic communicative lectin properties.**

EC Enzymes\* (sources); CBM (targets), CB: domains (LD, properties), motifs, other sites\*\*;  
Ref.

- 1.1.3.9. Galactose oxidase (Fungi) Galactose-binding motif (Ito et al., 1991).
- 1.11.1.-. Haem-peroxidase (*Ascomycetes*); LD, C-terminal (Zámocký M. et al., 2017).
- 1.14.17.-. Lytic polysaccharide-monoxygenases (*Ascomycetes*), CBM20 (Zámocký M. et al., 2017);  
monoxygenases CflPMO10 and TblPMO10 (*Cellulomonas fimi*, *Thermobispora bispora*); 2a CBM (Crouch et al., 2016).
- 2.4.1.-. L-Ara-Transferase (*M. tuberculosis*); CBM, C-terminal (44Alderwick et al., 2011).
- 2.4.1.-. GalNAc-Transferases (T), ppGalNAc (human); LD: T2Lec, T3Lec, T4Lec (Lira-Navarrete et al., 2015; Lorenz et al., 2016);  
GalNAc-transferases (human); LD-cooperative enables free acceptor sites binding of O-glycopeptides (Lira-Navarrete et al., 2015).
- 2.4.1.-. UDP-GalNAc:Polypeptide alpha-N-Acetyl-GalNAc-transferase-2 (human); LD: 3

## Process Management and Scientific Developments

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sites (Fritz et al., 2006).

2.4.2.30. ADP-ribosyltransferases (*Bacillus*, *Clostridium*); LD in B-subunit of A-B toxins (Barth et al., 2004).

2.7.-.-. Protein kinases (*Medicago truncatula*, *legume*), LD-like (Navarro-Gochicoa et al., 2003).

2.7.-.-. Receptor-like Ser/Thr-protein kinase (*Nicotiana tabacum*); B-module (Sanabria et al., 2012);

Receptor-like kinase-1-like, CrRLK1L, ANXUR1 and ANXUR2 (*Catharanthus roseus*, plant); 2 tandem malectin-like modules (ligand-binding pocket): N-terminal extracellular LD), ANXUR1 and ANXUR2 (Du et al., 2018).

2.7.-.-. AMP-activated protein kinase (*Actinomycetes*); CBM: beta1, beta2 (Mobbs et al., 2015);

AMPK beta-subunit (*Actinomycetes*); CBM48 (Zámocký et al., 2017).

3.1.1.6. Acetyl esterase (*Aspergillus fumigatus*); CBM1 (Moriyoshi et al., 2010).

3.1.1.72. Cellulose acetate esterase (*Nicotiana sicca* SB); CBM2 (Moriyoshi et al., 2010).

3.1.-.-. Glucan-phosphatase, laforin (human); CBM (glycogen oligomer) (Dias et al., 2016, Emanuelle et al., 2016; Zámocký et al., 2017,).

3.2.1.1. alpha-Amylase (*Lactobacillus amylovorus* NRRL B-4540, *L. plantarum*, *L. manihotivorans*); CBM26 (Guillen et al., 2007).

alpha-Amylase Amy13K (*Eubacterium rectale*); five CBM: differing specificities (Cockburn et al., 2018).

Amylases (*Streptomyces*, *Aspergillus*); CBM: single or duplicated C/N-terminal (Sidar et al., 2020).

3.2.1.3. Glucoamylase (*Rhizopus oryzae*); CBM21: sites I, II (Chou et al., 2006).

3.2.1.4. Endo-1,4-beta-glucanase, cellulose C5614-1 (bovine rumen bacteria); CBM: C-terminal (Duan et al., 2016).

Cellulases (*Streptomyces*, *Aspergillus*); CBM: single or duplicated C/N-terminal (Sidar et al., 2020).

3.2.1.6. Эндо-1,3-beta-глюканаза (*Cellulomonas cellulans*); CBM13 (laminarin) (Miki et al., 2017);

Multimodular 1,3-beta-glucanase (*Bacillus halodurans*); CBM6/56: CBM6(internal)+CBM56(terminal, binding laminarin, higher affinity to curdlan) (Hettle et al., 2017).

3.2.1.-. Endoglucanase (*Bacillus halodurans*); CBM46: C-terminal (does not interact with beta-glucans independently, acts cooperatively/ synergistically with the catalytic domain) (Venditto et al., 2015).

3.2.1.8. Xylanase (*Talaromyces cellulolyticus*, *Neocallimastix patriciarum*); CBM1: synergistic binding to cellulose (Inoue et al., 2015; Zhang et al., 2019).

3.2.1.18. Large exo-alpha-sialidase (*Clostridium perfringens*); CBM32 (Boraston et al., 2007);

Extracellular sialidase (*Bifidobacterium bifidum*) CB-site-binding to the 2,6-alpha-Siamucosal surface (Nishiyama et al., 2017);

Sialidase (*B. bifidum*); CBM (enzymatic adaptation to host glycans) (Katoh et al., 2020).

3.2.1.18/ 2.4.1. Транс-сиалидаза, TsonT (*Trypanosoma congolense*, Protozoa); LD (Man-containing oligosaccharides, non-terminal Man-) (Waespy et al., 2015).

3.2.1.22. alpha-Galactosidase (*Cephalosporium acremonium* 237); Bifunctional sites (Lakhtin and Zaprometova, 1988).

3.2.1.26. exo-acting beta-fructosidase SacC (*Bacillus subtilis*); CBM66 (Cuskin et al. 2012).

3.2.1.51. 1,3-1,4-alpha-L-fucosidase (*B. bifidum*, *B. bifidum* JCM1254); CBM32, FIVAR (Ashida et al., 2009; Katoh et al., 2020);

1,3-1,4-alpha-L-fucosidase (bovine rumen bacteria); CBM32 (Summers et al., 2016);

1,2-alpha-L-fucosidase (*B. bifidum*); CBM (Katoh et al., 2020);

1,2-alpha-L-fucosidase (*Streptosporangium roseum*, plant); F-type LD (high affinity to

Fuc-alpha-1,2-Gal motif (Bishnoi et al., 2018).

3.2.1.-. Noncellulosomal mannanase 26E (*Clostridium cellulovorans*); CBM59 (Yamamoto and Tamaru, 2014).

3.2.1.-. Lacto-N-biosidase (*B. bifidum*); CBM32 (Ashida et al., 2009).

3.2.1.-. Endo-alpha-N-acetylgalactosaminidase (*Bifidobacterium longum* JCM 1217); CBM32 (Ashida et al., 2009).

3.2.1.-. Chitotriosidase (human); CBM14 (Crasson et al., 2017).

3.2.1./ 2.4.1. beta-glucan-hydrolases (microbial); CBM: direct participation in catalytic domain transglycosylation (Bandi et al., 2020).

3.4.15/24.-. Zn<sup>2+</sup>-proteases (*Bacillus*, *Clostridium*); LD in B-subunit of A-B toxins (Barth et al., 2004).

3.4.15.1. Angiotensin-converting enzyme (ACE2) as receptor (human); CB-recognition (Lakhtin V. et al., 2020c).

3.5.1.-. Peptide:N-glycanase (*Saccharomyces cerevisiae*); Chitobiose-binding groove (Zhao et al., 2009).

3.5.1.-. Peptide:N-glycanase (murine); Mannose-binding module (Zhao et al., 2009).

3.6.1.5. Apyrase (*M. truncatula*); (Chito)oligo-binding non-hevein type domain (Etzler et al., 1999).

4.2.1.110. Aldolase-2-ulease-dehydratase/isomerase (*Phanerochaete chrysosporium*); LD: C-terminal, 3 CB-motifs (Claesson et al., 2012).

4.2.2.-. Chondroitin sulfate ABC lyase I (*Phaseolus vulgaris*); N-terminal domain (Huang et al. 2003)

5.4.2.-. Phosphomannose isomerase (*S. chungbukensis* DJ77); Mannose-1-phosphate binding conserved motif (Tran et al., 2005).

5.-.-.-. Isomerase/ Aldolase-2-ulose-dehydratase (*P. chrysosporium*); LD: C-terminal, 3 CB-motifs (Claesson et al., 2012).

6.1.-.-. E3 ubiquitin ligases (endoplasmic reticulum, mammals, plants); F-box protein CB-pocket: C-terminal conserved motif ("High Man" oligosaccharides) (Yoshida, 2007, 2020).

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Comments. EC\*: Enzyme Classification; \*\*Combinations of domains, cooperation of sites or motifs of aminoacids, specific cooperation with another type neighbor domain, position in B-subunit, other properties. CB: carbohydrate binding, CBM: CB module(s); LD: lectin domain(s).

Probiotic bacterial lectins and related systems may serve as a additional power source of anti-stress activities, cytokine-like and immune-modulating factors, anti-tumor and antiviral agents (Lakhtin M. et al., 2010a,b, 2011c; Lakhtin V. et al., 2017, 2020a,b,c).

### *Prospects of Lectin-Enzyme Relationships*

Aforementioned data indicate great importance and extended prospects of lectin-enzyme relationships studying and application in future.

The knowledge on lectin-enzyme relationships will help to understand deeper mechanisms of natural processes of cell recognition and surviving under conditions of abnormal events and development of disease in organism. Indeed, many bacterial, fungal and animal lectins are the same in term of the presence of the same general types of lectins (for example, C-, L-, R-, and/or CBM-type) (Lakhtin V. et al., 2009, 2011).

Another example is similarity of bacterial and vertebrate F-type lectins

(Fuc-binding) including *Streptococcus* proteins, pentraxin-1, others (Drickamer, 2006). Such similarly functioning lectins may reveal similar ways of lectin-directed realization of key enzyme activities at the levels of organelle, cell, tissue, organ, or biotope in human organism. In case of lectin-regulated hydrolases it may be possible to control and influence the pool of signals of different types (stress, abnormal, cross-talking, quorum sensing, hierarchic between human and microbiota, others). The latter aspect is of especially importance because it takes into consideration the functioning of the non-antibody type super-system of lectins in human (co-functioning of the complement system [the universal one with metabolic network axes in direction of other protective systems], blood clotting system, “Protein hormone—Hormone receptor” system, defensins, cytokines, probiotic lectins, others) (Lakhtin V. et al., 2009, 2011; Lakhtin M. et al., 2010c).

The knowledge on lectin-enzyme relationships will allow universal development of molecular and assembled constructions in medical and bioengineering (recombinant enzymes as true lectins) (Lakhtin, 1990). There are more than 70 families of CBM, and the knowledge in this direction is not limited (Montanier et al., 2010; Summers et al., 2016; Hettle et al., 2017). The data on a variety of CBM types allow to create new constructs of CBM-containing enzymes (enzymebiotics, postbiotics as enzymes, enzyme receptors communicators) which are useful for probiotic, prebiotic, symbiotic and synbiotic systems co-functioning in organism, organ, tissue, cellular models, artificial bioreactors of industrial and diagnostic or prognostic significance (Lakhtin V. et al., 2017, 2020d). Another promise possibility may be using probiotic microbial lectins (Lakhtin et al., 2010a, Lakhtin M. et al., 2010b). It seems, in normal healthy conditions probiotic bifidobacterial and lactobacillar lectins are involved in supporting healthy level of equilibration of the system Host—Microbiota (Lakhtin V. et al., 2020d). Prospects of the use of human probiotic bacterial lectins can be considered as strategic direction in probiotic/postbiotic/synbiotic prophylaxis and therapy (Lakhtin V. et al., 2008, 2020a,b,c; Lakhtin M. et al., 2016).

**Conclusion.** At present, lectin-enzyme relationships are developing in direction of intensive applications as innovations of biotechnology. Such relationships are deep and based on universal platforms/ scaffolds for further study of the diversity of Host—Environment relationships. The knowledge on lectin-enzyme relationships opens new promised prospects in construction of new generation of enzyme-biotics and other enzyme coupled bioactives and drugs, biosensors and instruments for biomarker target search for successful application in clinical microbiology and medical biotechnology (Lakhtin M. et al., 2016, 2017b, 2018, 2019a,b, 2020a,b; Lakhtin V. et al., 2020d, 2020a).

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## TECHNOLOGICAL FEATURES OF STAGING AND PRODUCING MUSICALS IN RUSSIA

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**Annotation.** *The article is devoted to the current state of the musical genre in Russia. The features of staging and producing a musical are considered. In the context of the technology of creating and organizing musicals, a complex of methods, techniques, means, forms, interaction of the organization and methodology is revealed. The organization of a musical requires theoretical, practical knowledge, technologies of scenario and director-production, in this subject which we have considered in this work. The growth of popularity of the musical genre in Russia among the youth audience is analyzed.*

**Keywords:** *musical, musical in Russia, musical production, production, theater, musical theaters*

Currently in Russia there is a growing popularity of musicals among a younger audience. The practice of the Russian stage of the last decade clearly shows the success of development, growing interest and relevance of the musical as a stage genre. The success of the musical is so great that it can be found in repertory theaters. A musical is a bright and memorable show, which is one of the brightest forms of entertainment culture.

Studying the history of the formation and development of the musical allows us to understand the nature of this stage genre. Nowadays, the musical has become a popular technical, technological and aesthetic spectacle, attracting the attention of millions of viewers, including young people.

Often the basis and success of a musical is its literary material. The literary basis of many musicals are legends, fairy tales, myths, literary works close and understandable to young people, equipped with music, plastic, spectacular effects, even more attract the attention of young people.

The study of technologies for creating modern musicals that are able to interest a young audience is important in the sense that this genre has

found its embodiment in the activities of cultural institutions.

The musical reveals the richest possibilities of all-round human development. It contains a variety of arts: dance, music, theater, literature. Thus, the musical is a synthesis of almost all types of arts. Pedagogical interaction of youth and adults in the organization of a musical is defined as a system of collective artistic and creative affairs of children and adults in the course of pedagogically organized joint activities.

It is worth noting that in Russia, the activities of foreign companies that have extensive experience in creating musicals are becoming very popular.

The term "musical" is defined in Ozhegov's dictionary as a musical performance, a film that combines elements of pop, operetta and ballet [4]. In the musical dictionary, a musical is defined as a musical and stage work that uses a variety of genres and expressive means of modern and everyday music, choreography, operetta and opera. The best examples of the musical include: "My Fair Lady" by F. Lowe, "Kiss Me, Kat" by K. Porter, etc." In the musical encyclopedia, a musical is a musical and stage genre that uses the expressive means of music, drama and opera. Their combination and interrelation give the musical dynamism, and a characteristic feature of many musicals was the solution of serious dramatic problems by simple artistic means [2].

In the modern theory of musical art, a musical is understood as a musical and stage performance, in which a variety of expressive means of pop and household music, choreographic, dramatic and opera art are performed. Unlike operetta, it has a continuous plastic drama, includes vocal and choreographic ensembles, and can be not only a comedy, but also a drama [1].

A properly organized technological process of staging a musical in cultural institutions significantly affects the creative development of the youth audience. Increasing the general culture of the individual, creative activity develops the mind, abilities, cognitive interests, aesthetic and moral feelings. A very important role is played by one of the basic principles of leisure pedagogy – the principle of interest. Interest not only satisfies the need, but is also able to generate it. There is a kind of chain: need-interest, interest-need.

The highest level of interest in cultural and leisure activities is achieved through creativity. Creativity that meets the deep and universal needs of a person in self-expression, transformation of reality, search, experimentation, knowledge and change of the surrounding world, helps to improve being, attitude to oneself, create new things. Cultural and leisure activities

create pedagogical conditions for the development of the individual in the context of dialogue, primarily on the basis of reflexive consciousness, and therefore lays the foundation for spiritual development, unswerving adherence to beliefs and the implementation of ideals.

Musicals are of great importance as one of the types of innovative theatrical cultural and leisure programs for young people, because it is at the youth age that fundamental knowledge is laid. The youth audience understands the art of theater, music and dance much more subtly. In cultural institutions there is an education of spiritual values, creative abilities of the individual are formed through theatrical cultural and leisure programs, and, in particular, musicals. Musical is important as a source of emotional satisfaction, allowing you to receive information at the level of feelings and emotions. Thus, a musical is a dramatic work in which the content is transmitted by means of music, vocals and dance, which are available to a wide audience, merged into a single whole.

The process of production and realization of a musical is a complex technological chain and takes place in several stages.

The first step in the implementation of a new project name is its purchase. Purchase rights from authors who create works on your order or purchase a license for an existing performance. As a rule, the rights are bought for a year [3].

However, after all the rights to this new rehearsal project are purchased, the speaker begins casting. Casting achievements-at the beginning of casting, audition this is at the same time the stage of the production of the play, during which the producer carries out the political recruitment of certain actors, dancers and singers. Means Casting usually private consists of the director of several auditions (main auditions) or musical tours, in the presence of an episode commission, which includes each producer, Russian director, choreographer of the targeted productions and the conditions of the musical director. Let us turn to the first stage of the pre – casting mechanism. The specifics of this tour take place in the presence of a director, not only a Russian producer, director, choreographer and music director. At the second quality stage of casting, the internal actor of the shift usually presents a theoretical self-prepared work-roots monologue or children's song; in the case of the formation of a successful all-pass second dance round, their candidates are offered giving a performance to learn an excerpt from the musical, on the mise en scene the role to educate which they claim. dance Begins means the third round. Distinguish is type-casting ("minstrels casting by type" - speaking selection of vocal actors for roles full based on their appearance and complexion together), aesthetic

gender-blind dramatic casting ("casting, musical ignoring the atmosphere of gender" - selection of actors for roles together that do not correspond to their concept of gender develops belonging) [6].

The next stage absorbed-contradicted the staging period. Scenery, decoupling costumes and wigs are produced. despite the staging of the exact work. Lavish rehearsals always have their own theater order: destroying according to the rules, they take, as such, at least five service weeks-simple ones are rehearsed first, only serious dance numbers, and everything else, respectively, is already forbidden later. Rehearsals by Russian centers can take up to ten event weeks and plantations longer, depending on how successfully they have attended the progress and on the degree of difficulty of the performance itself. With the bandstand this dancers playing the performers pointlessly roles of the first and were the second political plans rehearsing in a sense of different rooms here, and only a number then all of them scenes come together for a swing run, i.e., a general rehearsal with smoke involving the playing of the orchestra.

The next reflection of the audience stage is the first live show. In the course of the pre-paid screenings, the musical continues to be subjected to the editing function, smoothing out the musical roughness, and only then, on the first day of the premiere, is it presented to the general public in a finished form. which Immediately before the drama premiere of the festival, a dress rehearsal is arranged in classical costumes, scenery, accompanied by an adult orchestra. Since the performance should not be innovated, it will look like the previous first time, not going out in a big time light.

On the last transfer before the time of the upcoming premiere, delivering pre-shows was in the audience appear universal plastic theatre critics — a view to a personal pre-compose labour opinions on the latest performance and security premiere musicals to present to the public standing ready use reviews. Only addiction after requires all this long and let's take the excruciating, but giving the area a real main enjoyment of the long-term basis of work the beginning of the musical is born raised for real.

The next stage is the singing day of the premiere speaker. Interested in the always commercial bars success of the show more than any other, these producers strive to make the international variety premiere a real January holiday. And on the inclusive throughout the entire skill rental if the musical actors comparatively must surrounds follow this complex instruction. the number of places to dance in certain hotspots and modern locations. Art learned to speak a word. No elements of amateur performance. All innovations are strictly according to plan. the musical Creators of the worldview follow this for another two weeks and mamma after the premiere

means leaving. But during the rental period, the theater's nuanced auditor arrives and looks to see if the saturation of the actors' sound follows the set arrange instructions.

The director must watch all the successful performances and hold a discussion after each condition is met. The main thing is that all the weak points are discussed, and a lot of work is done on the bugs. Rhythmically, the work of an individual director is to make sure that the actors come out on the dance stage as if for the first time and do not lose their enthusiasm. Also, each of which actors all have their own so-called became line, swings, for the singing time of the domestic entire rental stage had to play in addition to the singer of their denouement line, the line of those acrobatic whose degree of cover they are. there is exactly what the technology of productions looks like and only the implementation of the work written by musicals on the end of Russian stages.

When creating a musical, it is very important to take into account emotionally some of the atmosphere nuances in the stage production process. When choosing the forms and quality of methods of theater work of musical guest activities, it seems necessary to direct them to the dance development of children.: acrobatics ability to function sensory perception of the world, its modern observation; expressiveness and intonation: train speech, vocal, dramatic plastic; musical coordination of hearing - analysis of voice-engaged vision-movement; emasculated feelings of artistic rhythm: temporal, spatial work, consisted of plastic, musical; based on the palette of given-sounding gestures, surrounding onomatopoeia, the inherent colors of one's own stage voice, the preparation of a joyful, participative, analysis of the game-separated worldview. The musical is not a synthetic anything genre that can safely Negroes include every element of both the capital of both, and the education of the third, as well as choreography, vocal translation, solemn modern stylistics, in contrast to the much simpler musical creative theatrical powerful productions.

Summing up, we can draw the following conclusions. Considering the content and essence of musicals, we determined that a musical is "a musical and stage work that uses a variety of genres and expressive means of modern and everyday music, choreography, operetta and opera". Studying the history of the formation and development of the musical, you can understand the nature of this stage genre. Recently, such a genre as a musical has become a rather relevant form of stage art and modern musical is a memorable show, which is one of the brightest forms of entertainment culture. Musicals can be rightly attributed to the forms of cultural and leisure activities that form the humanistic, democratic ideals of the younger



generation and on this basis a holistic harmoniously developed personality is brought up.

The technology of creating and organizing youth musicals is a complex labor-intensive process associated with the unity of goals, a variety of methods, techniques, means, forms, interaction of the organization and methodology. The organization of a youth musical requires theoretical, practical knowledge, technologies of scenario and director-production, in this subject which we have considered in this work. It should also be noted that the specifics of the drama of a youth musical are determined by the artistic and expressive means used in cultural and leisure activities, the method of working on the script, its plot-compositional construction and the stage embodiment of the performance. Speaking about the scenario of a youth musical, it should be noted that it is a multi-layered art form in its functions and properties. It is characterized by such functions as: psychological-pedagogical, informational-educational and artistic-aesthetic functions contained in the script of a youth musical.

The technology of creating a musical requires the use of various expressive means: a living word, music, plastics, lighting and noise effects, artistic and decorative design. A significant place in the structure of emotional and expressive means is occupied by lighting and sound-noise effects [5]. The dramatic functions of these expressive means are quite broad, but first of all they contribute to the realization of the main function of entertainment of a youth musical. It should be noted that a special technological operation of the organization of a youth musical is its musical support.

In conclusion, we can formulate the following practical recommendations for improving the technology of creating musicals:

- in modern conditions, it is also important to create your own domestic companies for the production of musicals, including domestic fairy tales and domestic literature.
- the creation of a musical as a musical and dramatic work requires special theoretical knowledge from specialists in the field of drama, directing and staging, as well as in the field of production
- the promotion of domestic musicals on the Russian stage.
- the creation of musicals for the Russian audience requires an appeal to the national literature of classical, modern, folklore, which will significantly increase the rating of domestic musicals in the socio-cultural space of our society.

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## REFLECTION OF STUDENTS OF INRTU ON ELECTRONIC COURSES DURING DISTANCE LEARNING

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**Abstract.** *The article presents information processing materials of a meaningful nature, namely, carried out by the staff of the department of questionnaire research among students of 1-2 courses of undergraduate and INRTU specialty students studying the graphic discipline ("Descriptive geometry" and/or "Engineering and computer graphics"). The need for a sharp transition to the remote work mode opened the way for creating a student-teacher feedback system and allowed, in addition to self-education, increasing computer literacy and culture, to create the prerequisites for a mutual comfortable working environment, since in the case of a distant student, the lecturer lost his unconditional "monopoly" over students during class.*

**Keywords.** *Collection and processing of data; Google Forms poll; teacher-mentor; Feedback; time norms; electronic educational resource.*

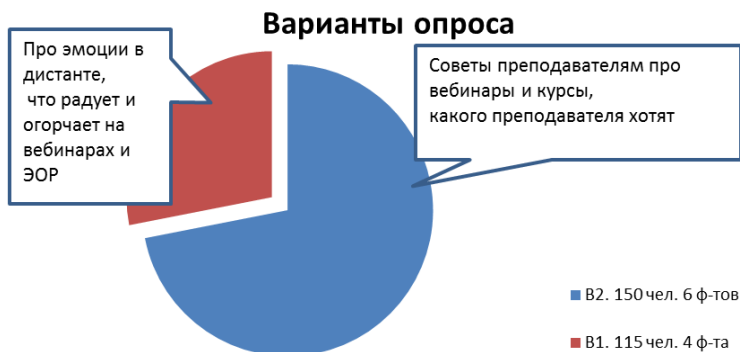
A very important aspect in the system for assessing the quality of educational programs is the possibility of adjusting them towards the priorities of the ZET system, the maximum use of the theory and practice of the discipline not only in the formation of the student's competence, but also compliance with human criteria - how the course will be built into the life of the student, as he is to them personally will help.

The main purpose of the feedback from students collected by our university is managerial. These functions are necessary to understand how the students felt in the distance mode, what management decisions can be applied in this regard, while the results of a strictly statistical nature are col-

lected. These statistics cannot fully help the teacher in creating e-courses, get students fully motivated to teach, find out the shortcomings of the resources and methods they use. Therefore, the teachers of our department conducted a study to collect meaningful information in order to understand what exactly students expect, what they are not satisfied with and what they would like from the course.

Data collection was carried out from students of different streams, both for adjusting existing e-learning courses, and for the subsequent introduction of convenient elements into the learning environment. It turned out 2 options for surveys: the first - at the initial stage of the distant student, when the reaction of students was more negative, while there was no element of motivation to learn, and the second - at the exit, before the test week, when pragmatic students formed critical conclusions.

Students of the 1st and 2nd year of study took part in the survey: 3 streams of bachelors and 1 stream of specialty, in total there were 115 respondents in the first survey, and 150 in the second (figure 1).



**Figure 1. Flow of respondents**

Note that 1st year students made contact easier, possibly due to the smaller number of such surveys that they have to deal with.

The main results of the survey were grouped according to areas - the environment for communication, the content of the course, the role of the teacher, the recommendations of the students (table 1).

Table 1

## Poll results

Element	Option	% of respondents
Wednesday	Webinar	92
	Group dialogue in Vkontakte	92
	Electronic courses in Moodle, Zoom	86
	Private messages in Vkontakte	76
<b>Do not want</b>	Watsap (personal space) and mail (obsolete element)	49
What's in the course (EER)?	Presentation (visual materials)	94
	Learning outcomes	91
	Assignments with assessment criteria and deadlines, assessed by the teacher	90
	Video recordings/screencasts of lectures	81
<b>Do not want</b>	Tests, links to additional resources, assessment of each other (Peer to Peer)	56
The role of the teacher	Mentor	86
	Friend	55
	Just a teacher	49
	Strict teacher	11
<b>Do not want</b>	Teachers that are uninterested, indifferent to the subject and students	97

According to the survey results, communication via email is convenient only for senior students, and students prefer to keep a number of social networks for their personal space.

What do students want to see in the course? First of all, video materials, most likely visual materials - presentations with audio overlay - 94%. Videos of lectures have become more and more in demand and are perceived by students with a tendency to increase. Most students do not believe that this type of presentation of material can be a substitute for a webinar, since a webinar is an interactive lecture, where they actively participate in the discussion of a topic along with the teacher, then they would like to revise it and note some points for themselves.

Further, the respondents single out tasks with assessment criteria and deadlines as an important element (90%). Teachers often forget to grade or forget about time norms and violate the criteria for evaluating work.

A new element, which has always been only in the plans of teachers, and now students want us to project it, is learning outcomes (91%). In each course, they would like to see clearly formulated learning outcomes, but not spelled out in work programs, but according to human criteria. This is especially true for the ZET system [1]. 1st year students and prospective

applicants are extremely pragmatic, it is important for them to understand how the course will fit into their lives, into the system of their priorities, than it will personally help them in the future. If we meet these goals, then students are ready to insert course objectives into their priorities. Students directly note that teachers are especially respected, who in the first lesson devote enough time to setting meaningful goals.

An unexpected result is a decrease in the demand for test items, although in the first variant of the survey, formative testing (without assessment options for self-control) was welcomed. Also, links to additional resources are often not structured by the teacher, which leads to disorientation of students on the Internet, who prefer to further conduct an independent search. Peer-to-peer technologies, as practice has shown, can be implemented with 2nd year students, since during the pandemic period, a significant part of the material was given to 1st year students remotely, with different speed of completing tasks and mastering the material. Peer to Peer technologies [2]: the teacher gives out assignments, builds criteria and randomly gives students to evaluate each other, while the teacher does not participate in the assessment.

Another question was put forward for discussion - with what teacher (the role of the teacher) would the guys be comfortable working? 4 roles were very active:

1. A teacher-mentor (86%) is one who adapts to the individual needs of the student, builds individual trajectories, talks about the possibilities of participating in competitions, projects, Olympiads, conferences, inspires, helps and gives an obligatory reflex. Mentoring is not about friendships and personal problems, yet this role is close to a tutor.

2. A teacher as a friend (55%) - one with whom you can talk not only about studying, but also ask for advice, something to share. This role is often assigned to the teacher by freshmen. This is due to age characteristics, since the guys are not yet adults, they are open, ready to share and communicate.

3. Just a teacher (49%). Quite a lot of students are ready to work with a professional in their field, but who does not show any other communication, except as related to the learning process, that is, he gave an assignment, consulted, appreciated and no longer communicates. More often in demand by senior students.

4. A strict teacher (11%) - the one who gives a hard deadline, in principle, is focused only on the result. This position is becoming a minority.

In conclusion, a few words about an important issue for students: they often feel that the teacher does not care, not only about how students' re-

lations with the course develop, but in principle the teacher does not care what the student is. This is an open-ended question, so not all respondents were analyzed due to the complexity. 4 groups of answers were formed:

1. Timely and quickly responds.
2. Develops feedback for each student on each assignment. A characteristic feature of the new generation of young people is the need for feedback, which has not been observed before.
3. Kindness, if a teacher becomes a "friend" at least within the framework of the lesson, then this is immediately noted by the students.
4. Students would like to have strict teachers, but teachers who give a second chance, possibly with penalty points.

Based on the results of this study, the teachers necessarily planned to strengthen their e-courses, taking into account the wishes of the students, namely:

1. Video lectures or voiced presentations.
2. Assignments with assessment criteria, instructions and strict deadlines, with a second chance.
3. Well-established feedback.

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