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"An investment in knowledge always pays the best interest." Benjamin Franklin

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## MAIN DIRECTIONS OF MODERN HIGHER EDUCATION IN RUSSIA

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### ABSTRACT

The article considers the situation in the world educational system, difficult political and economic situation in our country, main trends of modern higher education in Russia; describes reasons for major transformation in Russian educational system, main directions of professional education in higher educational institutions: democratization, humanization and computerization of education; flexibility, accessibility and variability; multiculturalism; continuity and integration; accepting spiritual values, standards of behavior and their realization in human activities, respect for individual and human rights, morality, ethics; tolerance to representatives of different ethnic groups and faiths as well as to political views, respect for one's country and peoples inhabiting it; introduction of innovative technologies, change in teaching methods, and change of informational forms.

**Keywords:** humanization, integration, multiculturalism, trends, tolerance, educational process

### INTRIDUCTION

Opportunities for the evolution of the world community and individual states in the 21st century are inseparably linked with the concept of higher professional education to be built for these purposes, and how difficulties will be solved in the preparation of future graduates. A series of meetings between European politicians and educators formed a process that was named the Bologna process. At the World Conference on Higher Education, held in Paris in 1998, it was said that every society needed renewed higher educational system to eliminate the problems of the 20th century, to ensure its intellectual autonomy, to develop and improve knowledge for upbringing and teaching of responsible and well-educated citizens and qualified universities graduates, which is the only way to build a comprehensively developed nation.

### PROBLEMS

However, there is one fundamental issue which Russian higher education faces within the framework of the Bologna process: to what extent are the requirements of the Bologna Process universal for Russia? Trying to be a part of the world educational system, one ought not to forget about the specific geopolitical position of our country (Russia takes a unique position on the world map, occupying vast territories of Europe and Asia) and the difficult political situation in which our country finds itself in this current hard time, when the Russian Federation is a subject of a massive attack from many European and other Western countries. We should also remember that Russian education has always had high standards and has its own deep and diverse historical traditions in education.

### MATERIALS AND METHODS

The changes that have arisen in the 21st century in Russia's political and economic systems have influenced the structure of higher education. A network of educational institutions is developing, in which tuition fees are paid by students themselves, their agents or organizations. In all types of educational institutions the curriculum content is being changed, new educational disciplines are being introduced; the new Federal educational Standard has been introduced, technical support of the educational process is being developed and improved. There is an increase in those wishing to enroll in higher educational institutions.

Significant changes in many spheres of human activity, caused by geopolitical processes, have led to strengthening of interaction between countries and promoted intercultural cooperation. At the same time ethnic, confessional problems have become more acute. In these circumstances the choice of behavioral trajectory based on universal values has been actualized.

Since the educational trends reflect the state of society, let us mention qualitative characteristics of modern socio-cultural situation. It is the boundary of cultures that requires dialogue, understanding and respect for another culture and people.

Therefore, their formation should be regarded as a social order. It is aimed at overcoming the contradictions between the necessity to shape a person, capable of existing in the sociocultural situation of interaction between interethnic cultures, and lack of conceptual and terminological designation in describing sociocultural situation of modern society.

Determining the main trends of the current higher education in Russia, researchers O. Abdulina, I. V. Bestuzhev-Lada, M. N. Berulava, E. V. Bondarevskaya, Y.S. Branovskiy and others emphasize the following ones: democratization and humanization of concepts in education, humanization and computerization of education; its multistage; flexibility, accessibility and variability; multiculturalism; continuity and integration; increasing the fundamentals; introduction of innovative technologies, etc. These areas of the national higher school development include transformations that take place in the world educational practice: industrialization of education; change of informational forms of teaching for active and interactive ones, from strictly regulated, controlling methods of educational process to developing, activating ones; the organization of subject-subject relations and so on.

Consolidation of society, preservation of socio-cultural space of the country, elimination of tension between different ethnic groups - all these requirements are reflected in the concept of national education renewal. This implies that the focus of the educational process on teaching younger generation for activities in the context of cultural diversity will promote harmonization of relationships in society through dialogue and joint work.

Analyzing the current sociocultural situation, E.V. Bondarevskaya notes that the culture of the 21st century is a global integration process in which different ethnic groups and ethnic cultures merge [1]. Thus, interacting with other cultures, a graduate in modern realities should possess understanding, tolerance and respect for the cultural identity of other peoples.

Thus, specialists from the Saint - Petersburg Humanities University consider a Russian intellectual as a standard for the professional education. The university has prepared a model of an intellectual in a new millennium. It is commensurate with the type of a person with high professionalism and intellectual potential, closely connected with morality. M.S. Kagan reveals specific features of a specialist – intellectual: the ability to see another person equal to them in everything, combination of adherence to principles in upholding their thoughts with equally principled tolerance, condescension to the views of other individuals, observance of tact in a dispute [3].

Moreover, upbringing of a cultural individual appears to be one of the most important trends of modern higher education in Russia.

Culture is a historically determined level of social, creative and personal abilities development, expressed in the types and forms of people's lives and activities organization; in their relationships, as well as in material and spiritual values they create. It is the spiritual culture that we have in mind when we speak about general cultural component of education, about culture in general. It is the spiritual culture that is elusive, without which a human ceases to be a human.

## RESULTS

Education serves as the main mechanism for translation of culture in the body of society and cultivation of novelty. In other words, education must constantly recreate the existing culture and create the new one: for example, in the form of any types of educated people, texts and ways of life [2]. When a person assimilates culture, it means they accept spiritual values, standards of behavior and their realization in the activity.

Consequently, a person adopting a system of spiritual values and rules of behavior realizes them in their activity, thereby regulating their life activity and life activity of people around them and, thus, culture becomes an indispensable condition for successful communication and mutual understanding for any student and graduate.

Modern trends are particularly apparent in the language vocational education, as it is the one that most fully reflects different cultures interaction and interpenetration in the process of foreign language learning. Modern language professional education is based on a dialogical concept, which implies equal interaction of all participants in a communication process, as well as mutual conditionality and diverse dialogical connections among all components of the educational and methodological system.

## CONCLUSION

In conclusion, it can be said that humanization should become the major direction of professional education in higher educational institutions. Humanization should be seen as development of the educational process, where a personality will

be considered as its highest value. In other words, humanization is "humanizing". Future graduates ought to develop the following values in the course of their studies at a higher educational institution: respect for an individual and human rights, morality, ethics; tolerance to representatives of different ethnic groups and faiths as well as to political views; breadth of cultural attitudes; respect for one's country and peoples inhabiting it, and life safety [4, 5].

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## INTERACTION OF THE STATE REGULATOR, BANKING INSTITUTIONS AND REAL ECONOMIC SECTORS: CONCEPTUAL FEATURES

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### PE3IOME

In modern conditions, the analysis of the main areas of interaction between the state regulator, the banking system and the real sectors of the economy is gaining more and more theoretical and practical significance. The systemic nature of the interaction of the state regulator, the banking and real sectors of the economy, above all, is its ability to generate a set of internal and external principles of interaction, which in the economic environment predetermined the need to study various scientific concepts of economic development, in which the peculiarities of the interaction of sector entities are considered.

**Keywords:** state regulator, banking system, real sectors of economy, interaction.

### INTRIDUCTION

The effective functioning of the banking system, above all, manifests itself in its ability to offer the economy the desired amount of money supply, which in turn will have a positive effect on the development and functioning of the real sectors of the economy and will provide the opportunity to develop and to be at the proper level. As a result of the analysis of various theoretical and methodological approaches presented in the economic literature, we have identified three types of scientific concepts, the content of which differ from each other depending on the presence (or absence) of the relationships between the state, banking and real sectors and the degree of their influence on economic processes, which together determine the possibilities of the development of the interaction process and the provision of internal and external effects, depending on the combined effect of endogenous and exogenous factors.

The study of the nature and connection of structural elements in the interaction between the state regulator, the banking and real sectors of the economy such as principles and forms are considered in the works of Ukrainian scientists A.S. Galchinsky, A.A. Gritsenko, O.V. Dzublubka, A.O. Yepifanova, A.M. Moroz, A.A. Meshcheryakova, V.V. Glushchenko, I.V. Sala, V.S. Stelmakh, S.A. Tsiganova, N.M. Sheludko, russian scientists A.G. Bratko, Y.S. Golikova, O.I. Lavrushina, I.D. Mamonova, V.V. Maslennikova, V.V. Popkova, A.M. Tavassieva, V.M. Usoskina, M.A. Hochlenkova, O.B. Shirinskaya. However, despite the detailed elaboration of certain issues, ambiguity in the interpretation of a number of provisions related to the disclosure of the content of the interaction between the state regulator, the banking and real sectors at the macroeconomic level and the need for an integrated approach to the study of the interconnection of the processes of organization and implementation of promising forms of interaction remains unclear.

### MATERIALS AND METHODS

The first type of "Classical autonomy and random effects" encompasses a number of scientific concepts, the authors have recognized the autonomous character of the functioning of the state regulator of the banking and real sectors of the economy, and the interaction between them explain the necessity of implementing intermediary functions of banks, which is, above all, concentration loan capital and its redistribution between industries. Self-sufficiency and independence of the subjects of the banking and real sectors of the economy, determines the random nature of the generation of possible effects.

Start of capitalist relations, characterized by still weak development of the banking sector, credit and their role in economic development, marked by the formation of the totality of scientific concepts based on the principle of "classical dichotomy" (in Greek - the division into two or contrast between two parts of a [1]), which involves the independent functioning of the sectors and their subjects, and the denial of the significant impact of the results of their interaction on the state of each other and the economy as a whole.

For the first time, the interconnection of the boundary between sectors was established on the basis of the study of the genesis of industrial, and then the banking capital, by Marx, as the founder of the concept of reproduction. The author



established that industrial capital in the course of its cycle becomes different forms (monetary, commodity and productive). This bank capital, as a separated part of the money form of industrial capital, plays the role of catalyst for the expanded reproduction through the mechanism of formation and use of loan capital and interest, "some of the cost previously advanced into production with added value are removed from circulation, and not finding its immediate application is in the process of accumulation, creating loan capital" [2].

It is the banks, in the author's opinion, that stimulate the realization of accumulated goods with the help of loans, the size of which at a certain point in time, begins to exceed the reasonable limits and possibilities of repayment, increasing the problem of non-payment and the crisis of commodity production.

However, not all Marxist ideas about the peculiarities of interaction between the banking and real sectors have found their practical confirmation in modern terms due to the underestimation by the author of the ability of markets to self-development.

The main impetus for the change of the growth stage to the recession is increasingly the formation of gaps in the level of development of interacting sectors due to the rapid growth of financial speculation and technology while simultaneously ignoring the needs of the economy due to the concentration of high risks.

R. Hilferding [3] attempted to rethink Marxist theory of new conditions, pointing to the realization of the interconnection of industrial and banking capital in the form of financial capital by transforming bank capital into an industrial one. In contrast to the point of view of its predecessors, the author proceeds from the dominant role of the banking sector, depending on the power and capital of which fall into the subjects of industries, including through the purchase of banks voting shares of enterprises.

In this case, the author emphasizing the dependence of the real sector on banking, offers a recipe to avoid the negative impact of stock market speculation on the state of the economy on the basis of the omnipotence of banks.

Thus, the authors of the first type of our identified scientific concepts converge on the idea of self-sufficiency and the possibility of autonomous functioning of sectors, the interaction between which is episodic, not systemic. It is important to emphasize that the authors are unanimous in the fact that the tightness of the relationship between actors of interaction can not be determined by any external forces, limited to the effect of market laws. In our opinion, the current practice and the specifics of interaction between the subjects of the banking and real sectors of the economy, from the point of view of accumulation and mobilization of capital, assessment and risk management, as well as the existing regulatory norms for the subjects of the banking and real sectors, indicate the presence of the whole the spectrum of connections that determine not only the interdependence of the subjects of the banking and real sectors of the economy, its expressed institutional character and the ability to provide effects for the sectors themselves, and for the economy as a whole, as a macro environment in which the process of their interaction takes place.

In this connection, the set of scientific concepts, based on which the authors acknowledge the interdependence and interconnectivity of the banking and real sectors, the results of interaction between which may not always be positive due to the influence of a number of external conditions and factors, and hence regulated, We are united in the second type of concepts "Mutual conditionality, expected and regulated effects".

First of all, the authors of these concepts note that the strong interconnectedness of the subjects of the banking and real sectors of the economy most often becomes a reason for changing the cyclical stages, which requires methods of state regulation in order to provide the effects necessary for the sustainability of economic development.

Considering the peculiarities of the interaction between the banking and real sectors of the economy in his work "General theory of employment, interest and money," J.M. Keynes comes to the conclusion, that the economic instability generated by the speculative activity of banks becomes an important property of a market economy [3].

Moreover, J. M. Keynes reveals the psychological dependence of the dynamics of investment in the real sector on the expected profitability in the banking sector, which is expressed in the need to diversify banking investments in order to benchmark the effectiveness of projects with the profitability of financial instruments "if the company is risky, then the creditor will significantly increase the difference between the expected income and the rate of interest, which it considers appropriate to take money".

To balance the interests of the banking and real sectors and to restore the interaction between them, the author suggests, by introducing into the practice of financing and lending to enterprises at the expense of the state budget and initiating a

system of state purchases in order to stimulate private investment. In addition, J.M. Keynes proposes to use a comprehensive reduction in interest rates through the use of monetary regulation tools, despite some increase in inflation (except for cases of "liquid trap").

The measures proposed by the author can be used to eliminate the effects of the crisis, but not its underlying causes, as well as have a delayed negative effect in the form of rising public spending, taxes, public debt, reducing incentives to production and reducing consumption.

One can not deny that, in addition to psychological assessments, the wider range of factors has an impact on the activity and trajectory of the interaction between the subjects of the banking and real sectors of the economy. In a context of increasing the value of banking resources, the manipulation of the discount rate became an increasingly difficult process, in the economic science began to develop monetarist scholarly school, whose representatives in the person of M.Friedman, A.Schwartz, C.Brunner, I.Fischer, that state regulation should be limited only by the control over money circulation, since another, other intervention by the state in market processes inevitably leads to economic disproportions and contradictions.

In this regard, M.Friedman put forward a monetary macroeconomic concept, according to which the level of national income and the movement of the economic cycle are determined exclusively by monetary factors: "the exact amount of money, not interest rates, affects the state of the money market and the conditions for the issuance of loans" [2]. By separating money and credit markets, monetarists, determine the price of money by the number of goods purchased for a monetary unit, and the price of the loan - the level of interest rate [4].

This division formed the basis of the quantitative theory of money, according to which there is no connection between aggregate demand and the availability of loans, since the supply of credit depends on the propensity to save, and the demand for investment - from specific investment decisions [5].

In general, the monetary concept justifies the need for interaction between the sphere of capital and manufacturing turnover, recognizing their deep integration and the need for capital redistribution between industries, since the main function of money is to create incentives for economic development. Experts note that successfully used the recommendations of monetarists in Norway, when the Bank of Norway with the help of flexible inflation targeting was able to ensure price and financial stability in the context of the global crisis.

The timely actions of the monetary authorities to ensure large-scale access to liquidity turned out to be sufficient to stabilize the macroeconomic situation in the acute phase of the crisis, which ensured a budget surplus and stabilization of the balance of payments, which eliminated the need for excessive monetary emissions, macroeconomic balances and lower inflationary expectations [5].

However, new economic challenges, accompanied by unpredictable changes in asset prices in the current conditions of world economic development, are showing more and more disadvantages in monetary policy, as the measures offered by monetary actors are primarily aimed at eliminating the causes of inflation, but not on the solution crisis processes in the real sector, driven by factors mainly non-inflationary.

Thus, both Keynesian and monetarist scientific concepts equally recognize the mutual relationship between the banking and real sectors, and their interaction is an important component in ensuring macroeconomic stability, provided timely application of state regulation measures to address the objectives of sustainable economic development.

The third type of concepts "Mutual and institutional conditioning, managed and regulated effects" includes a number of scientific concepts that include not only the close relationship between the two sectors at different stages of the economic cycle, but also a powerful influence on the process of interaction of the institutional environment, while taking into account interests the subjects of the banking and real sectors, as well as the state and society as a whole.

The founders of institutionalism, as a direction of economic thought, based on the analysis of institutions (habits and stereotypes of the thinking of society by T.Veblen, the dominant and standardized social habits of W.Mitchell and collective actions to control, liberate and extend the individual action of J. Commons), in their studies refute the recognition of a market economy as an equilibrium system and give their explanation of the behavior of institutions of the banking and real sectors of the economy based on their inherent behavior [6].

Reflecting on the nature of the relationship between the state regulator, the banking and real sectors of the economy, one can note the growing role of bank capital and its parasitic influence on the process of social reproduction, on the basis that

the development of the production sphere does not always correspond to the interests of banks, causing instability in the economy. In a later period, the conclusions of T.Veblen were supplemented by W.Mitchell, who emphasized the study of psychological and behavioral factors and recognized the need for state influence on the economy in the field of monetary, financial and credit factors in the relationship with socio-cultural settings of society.

However, the recommendations of the authors related to the replacement of "financial capitalism" with "technocracy" or violent interception of the power of the real sector in the banking sector, do not correspond to the principles of functioning of a market economy.

I. Schumpeter's ideas fundamentally change the previously formed ideas about the peculiarities of interaction between the banking and real sectors due to the fact that he considers the process of interaction within the framework of the dynamics of economic development, considering that the static model does not correspond to the reality and the economic system, with all its input elements, should be investigated within the framework of the theory of development.

The basis of the dynamic nature of the economic system, the author calls technical progress, which is based on the Institute of innovations used in the production and sale of goods. In particular, the author points out that the role of the banking sector in the development of the real sector can vary depending on the stage of the economic cycle: at the stage of growth of enterprises in the real sector do not feel the need for banking resources due to their own abundance, and, conversely, during the transition from depression before the rise, the situation is dramatically changing, and more and more enterprises are in need of borrowing funds, necessary for financing innovations and acquisition of factors of production: "the banker makes it possible to make new combinations ..."[6].

The scholar argues that the need for additional funds needed for the active introduction of innovations in the real sector can satisfy banks by channeling their resources into the innovation sector and ensuring economic dynamism.

However, along with the statement about the boundlessness of bank lending and its important role in economic development, J. Schumpeter ignores such important, in our opinion, aspects of banking activity as the primacy of passive operations, the ambiguity of the process of mobilizing temporarily free funds for the formation of loan capital, the inflationary nature the credit expansion of banks that contribute to the sharpening of contradictions in the interaction between the banking and real sectors of the economy, and others. In addition, the author's conclusions somewhat contradict the proposed model of transition of the economy from one state of balanced equilibrium due to a slight decline in another equilibrium state, in part: "we see how the needs of industry in loans, but the banking world, are supported and stimulated by its activities, on the contrary, he tries to insert a stick in his wheel and even completely can refuse his support "[6].

Proceeding from the foregoing, the capacity and practical applicability of J.Schumpeter's conclusions in modern terms, in our opinion, is limited by the problems of long-term bank liquidity, the competitiveness of alternative sources of financing of investments in risk-raising innovations, the inflationary character of bank lending expansion, changes in institutional conditions in the period of changing the key stages of the economic cycle.

The study of asymmetry issues is first encountered in the work of W.Vicker, "On uncertainties and risks," subsequently developed by J.Acerloff, J.Stiglitz, E.Weiss within the framework of the theory of asymmetry of information, which is based on the uneven possession of information on its volume and quality, which leads to destabilization of relations and ineffective allocation of resources.

In particular, one of the founders of this theory, J.Acerlof, has shown that when uneven distribution or incomplete exchange of information between sellers and buyers, some transactions become impossible because the seller has a large amount of knowledge about the product than the buyer, which allows him to get knowingly an overpriced price for low quality goods.

Regarding the interaction between the state regulator, the banking and real sectors of the economy, the development of the ideas of R.Coase and J.Acerlof was continued in the writings of J.Stiglitz and E.Weiss, which created a model of deterioration of selection: the higher the rate on the loan, the lower the qualitative composition customers and higher lending risks due to the considerable labor input and costs associated with the control and provision of the desired behavior of the borrower.

Banks, when assessing the creditworthiness of potential borrowers, assume that the latter may silence information related to their quality so as not to cause doubts in the bank, which ultimately leads to an increase in the risk premium to the level of interest, regardless of the true intentions of potential clients.

In the event of a decrease in the capitalization of banks, there may be an increase in the real interest rate, a decrease in the attractiveness of credit products, which forces banks to improve the quality of their loan portfolios, without visible signs of raising rates on loans [6].

The study of the institutional aspects of the interaction between the banking and real sectors of the economy has also become the basis of the concept of "financial accelerator", developed by B.Bernanke, M.Hertler and S.Gilchrist. The authors showed that the banks used preventive measures in the form of analysis and assessment of the financial status of enterprises - borrowers, monitoring its status, ensuring the conservation and target use of resources - collectively represent the costs of banks, which they include in the value of loans provided by the bank, which makes external financing for entities in the real sector more expensive than funding at their own expense.

Researchers conclude that banking services (in particular, loans) act as a generator of shocks and shocks, causing the effect of "circles on the water", increasing or smoothing the amplitude of cyclical fluctuations: the deteriorating situation in the banking sector is aggravated by the decline in the real, leading to further deteriorate the situation of banks, reinforcing the economic downturn.

There is an increase in debt and a reduction in "secured" lending, which, in turn, causes the transition to an economic boom, and instead of conservatives, which are spending their own resources, speculators begin to dominate. With increasing demand for resources, interest rates are rising, which ultimately leads to increased economic instability due to massive bankruptcies, not payments for obligations and crises.

The preemptive study of financial innovation in the works of the post-Keynesians, in our opinion, reflects some of their one-sidedness in relation to the interaction of the banking and real sectors of the economy, since the interests and motives of the subjects of the real sector of the economy are ignored, no less significant in terms of their impact on development economy and its cyclic nature.

Contributing to the further development of this concept, K.Perez, disclosed the mechanism of interaction of the technical and financial and economic aspects of the process of generating long-wave oscillations and highlighting the "turning point": "the wealth, concentrated in a relatively small group of people, significantly exceeds what can be directed to real investment".

For this time, the gamble economy with infiltrative assets in the stock market is characteristic, which looks like a supernatural increase in wealth. Confidence in the genius of financiers is growing and attempts to regulate are creating an impression of obstacles on the path to social prosperity. A new ability to generate money encourages more and more people to participate in the distribution of a financial pie; as a result, the end of the phase of aggressive investment - the time of the financial bubble" [6].

In other words, the reason for changing the key stages of the economic cycle, the author sees in the overestimation and aging of technologies, which entails the inevitable decrease in production and income, and forcing to look for new ways to increase them due to the processes of reorganization of enterprises and the exit to foreign, less saturated markets in the real sector, stimulating a speculative race in the banking sector.

This point of view is shared by V.Mayevsky, pointing to the emergence of a new macro generation (macroeconomic subsystems existing in the form of clusters of innovations) in a context of slowing economic growth and the need to support the process of introducing innovations from the banking sector: "activation of credit emission in the ideal case should occur before the beginning of a recession in the economy".

Sharing the views of its predecessors recognizes the important role of introducing innovations and institutional changes that promote the transition to a stage of economic growth. As an example of an analysis of the impact of institutional changes on the interaction between the banking and real sectors of the economy in countries such as Germany, the United Kingdom, the United States, and Japan, he points out the dual role of this impact: on the one hand, institutional innovations stimulate risky bank lending to the real sector (creation of specialized long-term lending banks, strengthening of the legislative framework in the field of ensuring transparency of participants of interaction, removal of regional restrictions on the activities of banks, etc.); on the other hand, the desire of banks to implement certain financial innovations is always connected with the overcoming of existing institutional constraints, which complicates the implementation of innovations in the real sector [2].

In this case, according to the author, as a rule, a separate group of banks is allocated, which, at the risk, passes to the

development of new types of activities that do not fall under the existing institutional norms, and try a new way to financially support the realization of real innovations. Later, if the effectiveness of institutional changes is proven, this experience is taken over by other actors in the banking sector in the transition from depression to growth.

We associate the practical implementation of the conclusions with the active role of the state in management, the interaction of the banking and real sectors of the economy on the basis of integration of the institutional and innovative policies of the state in order to prevent "spontaneous" distortions in the transition to a new model of development. However, the contradictory view of us is that when trying to explain the stimulating role of the banking sector and its financial innovations in ensuring the transition from the depression to the stage of recovery, the author, on the one hand, points out that certain financial innovators will overcome the established institutional standards and their further merit in adaptation and mass dissemination of financial innovation aimed at stimulating innovation in the real sector.

On the other hand, we recognize that it is practically impossible to do because of problems related to resource provision, high risks in terms of "untested" specialization. It should also be noted that the rate is applied to innovative enterprises, the share of which is more than minimal, limiting the scale and ability of the conclusions in terms of their applicability in domestic conditions and explaining the reasons for changing the stages of the economic cycle and the impact on this process of interaction between the banking and real sectors the economy.

## CONCLUSION

The third type of our concepts is, in our opinion, most closely related to the explanation of the reasons for the unstable interaction of the state regulator, the banking and real sectors of the economy, which allows one to distinguish separate concepts of this type, namely, the theory of asymmetry of information and institutional and evolutionary concepts as reference in the research methodology along with the theory of systems and the theory of state regulation.

We believe that the further development of these theories in the context of the interaction of the state regulator, the banking and real sectors of the economy, requires the change of the adopted study vector from "assessment of the impact of interaction of sector entities on economic development" to "assessing the impact of cyclical economic development on quality, character and orientation the interaction of the banking and real sectors of the economy", as well as the account of a wider range of institutional factors that affect the asymmetric nature of the interaction of sectors.

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## NATURAL DYNAMICS OF A CITY AS A RESULT OF THE DESIGNER'S ACTIVITIES

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### ABSTRACT

The steady growth of the urban population, increasing role of cities in economic development and innovation, territorial development and the impact on the ecological situation, have produced new system of ideas about the city and the dynamics of its development in the last ten years. The developed theories serve strategic development and planning the city infrastructure, provide the conditions for creating system of processes management. The article considers the need of implementation of the actual results of interdisciplinary research on the city system into the architect's design process. The research reveals dependence of the influence which the quality of knowledge about the proposed facility makes on the end result of the design. By example of the urban scaling theory, the problem of the need to improve information support of architect's activity is indicated. Urban scaling theory, using the biological analogy as a main tool, is considered in the context of existing theoretical ideas about the city as a whole organism. It was revealed that, despite the artificiality inherent in the city as a result of design activity, according to this theory, the city has natural dynamics of development and system-level functions following the laws of growth similar to the growth of biological organisms. The purpose of this article is identification of the potential use of these theories in design as well as formation of the list of their positive and negative aspects.

**Keywords:** city, complex system, dynamics, metabolism, organism.

### INTRODUCTION

The activities of an architect, a designer and the planner is dual by its nature. Before accomplishing the plan, synthesizing the proposed facility, designer needs to analyze the processes, mechanisms underlying it, the natural conditions and the laws of its existence, from the standpoint of scientific knowledge. On the way to achieve its goals, the designer faces several challenges, so his understanding of these issues, as well as their causes, determine the choice of methods and the sequence of operations required for the final design solution. Theorists divide such problems into three categories. Common problems that often arise in engineering practice. Problems to be solved, regardless of the circumstances, they contain a small number of variables, designer is not obliged to delve into the essence of the problem, this is not necessary. The second type of complex problems appeals to a much greater number of variables, and obtaining a decision depends on the degree of technological development and the amount of available data. The task is solved only in case of availability of all necessary information about the object to designer; solution of this problem does not cause difficulties in case of access to the necessary tools. The last category of problems were outlined by Jane Jacobs in her work "The Death and Life of Great American Cities", as a problems of "organized complexity" [4]. They occur mainly when architect goes to the design elements at the city level, environmental design. Taking into account the number of elements, filling the urban environment, the solution to this problem can be presented in view of the game of chess, "but with millions of pieces, each following different rules of interaction with others, against millions of opponents, on a vast board" [2]. Calculating a great number of possible moves can be endless. So, no matter how much information you have, and how good the hardware is, without understanding the rules of the game, the problem becomes computationally infeasible. The architect is forced to apply the creative method, subjective perception of the city, based on their own experience.

### BASIC MATERIAL OF RESEARCH

In their discussions about a city, theorists, historians, philosophers and sociologists from antiquity of Plato and Aristotle resorted to metaphorical comparison of the city and its elements for an abstract description of the representation of the space surrounding them. Metaphors allowed increasing the attractiveness and objectifying scientific theories. According to Marx, a city is "a stage of social development," by Weber "a city is the market", "a city is like a social laboratory" at the Chicago School of Robert Ezra Park, it is "information city" by Manuel Castells. In social sciences and urban planning, there were developed "a minimum of four urban metaphors: the city as the market, the city as a jungle, a city as a machine, the city as an organism" [8]. Used metaphors in architectural theory organize knowledge and form a view on the nature of the city, help to shape the concept. The extent to which they are dependent on the understanding of the city can

be seen in the concept of "ideal cities" which were created in different historical periods. In addition to the fortification factor in, in design of the ancient cities the architect played a big role, making symmetrical and urban centric scheme, according to the aesthetic preferences of the era. Cities with similar composite structures had a common drawback such as the lack of growth prospects. Like the "ideal cities" (Figure 1), concepts that emerged at the turn of XIX-XX centuries: "Garden City" by Ebenezer Howard (1898), "Industrial City" by Tony Garnier (1917), "Linear city" by Arturo Soria y Mata (1882), the concept of urban renewal by J. Henares (1903-1909), "Metabolic city" by Kisho Kurokawa (1965) and many others, turned to the form [9]. Although the emergence of transport had to encourage consideration of the problems of functional zoning and settlement systems, they remained secondary.



Figure 1. Schemes of ideal cities.

Thus, there are many ideas about the city, but they do not have sufficient detail and, using them in design, architects and designers have been forced to resort to heuristics. Developing methods of analysis and synthesis of architectural objects and systems, the designer had to rely on their own experience and their own view of the city. This led them to focus on the problem of the structure forms an architectural object, almost completely relegating functional aspect to the background. In science, there was no proper theory and understanding of the problem. Recent studies provide an opportunity to give the appropriate weight of the functional aspect, output multiple parameters of urban activity under a common denominator. The purpose of this article is to review the current system of research within the biological conception of the city to identify opportunities for improving analytical and synthetic activities in the design of the architectural environment of the city.

In recent years, due to the steady trend of urbanization around the world, the city is seen from the perspective of synergy. Today most of the world's population already lives in cities. Understanding the dynamics of cities became dominating, the correct choice determines achievement of stability and balance in the relationship between nature and society. Synergetic approach involves the study of the city as a complex system, and aims to generate theoretical-methodological foundations of the science of cities, involving multi-disciplinary knowledge. In a sense, these events were predicted by Kisho Kurokawa, who considered the XX century as the machine age, "Le Corbusier declared that the home was a machine for living, and Sergi Eisenstein called the cinema a machine. Marinetti, the Italian Futurist, said that a poem is a machine ... not only for artists and the architects but for the general public as well, the machine was a longed for saviour that would blaze the trail for humanity's future" [5]. Kurokawa positioned movement of "metabolism", which came out from an analogy with living organisms, as a challenge to "Age of Machines" and announced the transition to the "Age of Life".

Recent interdisciplinary research aimed at solving complex problems by designer, once again appealed to the urban metaphors for understanding the city as a "living system" or "the organism" [11]. This is found in the studies by Michael Batty, Horatio Samaniego, Geoffrey B. West. The results of their research go to urban scaling theory. For the demonstration there was chosen the theory, developed in the framework of Santa Fe Institute of research, in collaboration of physicists G. B. West and L. Bettencourt with biologists J. Brown and B. Enqvist. Scaling was used as means to identify underlying dynamics and structure of objects across the entire spectrum of science and technology. Scaling can be represented as a change in the qualitative properties of the object as a result of quantitative changes. Scaling is fundamental to physics. Galilei in one of the latest publications described the features of the scaling. They may be demonstrated by a simple example. If you take the bridge and double its length, it will feel much larger load, and according to the laws of mechanics, may collapse if exceeded limit of bearing capacity of the material. For the same reasons, very large aircraft cannot fly, the device does not work as intended if the engineers increase their original dimensions. Sizes play an important role. Focus of the research team on organisms is not accidental, because they as a complex system are characterized by even more stringent restrictions scale.

As a theoretical basis, the group of scientists selected ecological theory called "metabolic theory of ecology" as the most effective theory, concentrating on understanding how the interaction between physiological, ecological and evolutionary processes affect an individual's metabolic rate [3]. The theory helps to reduce the complexity of the object explanation of the properties inherent in the system, expressed in the language of mathematics; it produces a large amount of predictions, using empirical data. According to the metabolic theory, metabolic rate is fundamental in relation to the environment, as through metabolism the organism interacts with the environment. Metabolic rate is the rate at which organisms grow, change, and consume energy. Organisms operate, due to transformation of the energy in resources and form a complex system. The property of scaling is described by the set of power laws contained in the metabolic theory of ecology, in particular, the allometric relationships, first demonstrated by biologist M. Kleiber, which operate by the size of the body temperature, depending on the rate of metabolism at the individual level (Figure 2), as well as flows of substance and energy of population processes and species diversity at the ecosystem level. Despite the enormous diversity of species, practically all indicators of biological organisms are scaled depending on body weight in quarter-power dependence. Larger organisms consume quarter less energy per unit mass per unit time. Larger animals consume energy more efficiently. The physiological rhythms (life expectancy, pulse) are slowed down with the increase in size of the organism, demonstrating the universal scaling laws.

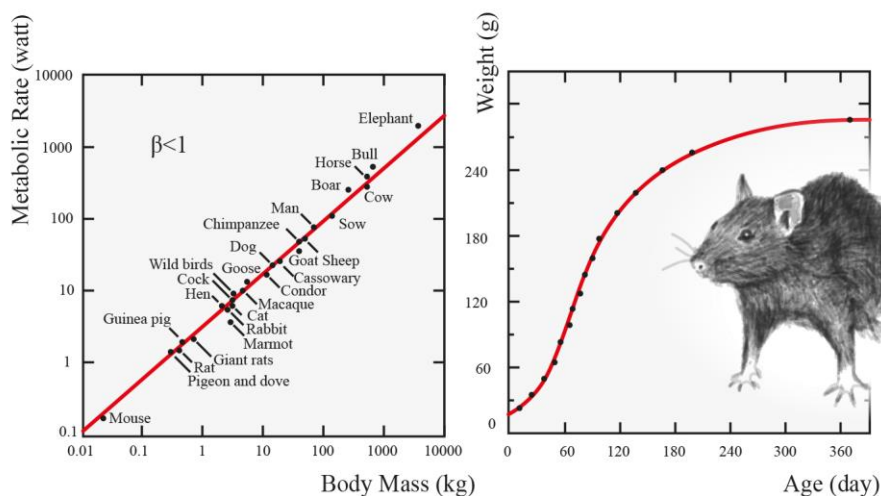


Figure 2. Graph of the rate of metabolism by weight in mammals, and the dynamics of their growth by example of the rat.

After collecting and analyzing statistical data of the cities in the USA, Europe, Latin America, Japan, Brazil, and China, these properties have been found in urban systems, even though they are different from large-scale power laws observed in biology. The authors demonstrate the equation depending on population size  $N(t)$  of the size indicators of the city, in time  $t$ , recording a power law scaling in the form of:

$$Y(t) = Y_0 N(t)^\beta$$

$Y$  – socio-economic or infrastructure urban indicators;

$Y_0$  - normalizing constant;

$\beta$  - variable reflecting the dynamics of the urban system, enclosing a ratio of quality to quantity indicators [11].

Despite the fact that the most important socio-economic, infrastructural, demographic urban indicators vary depending on the size of the city, there were identified two main types of urban dynamics.

The first type of indicators have the value of  $\beta > 1$  that characterizes, to a greater degree, socio-economic indicators, means economic growth, income, innovation, wages, wealth, the number of crimes, the number of patents, social interaction superlinearly, depending on the number of population as it can be seen from the graph. For example, when the city's population doubled from 40,000 to 80,000, it will show approximately 15% increase in wages [10]. Growth due to superlinear scaling stops at a certain time limit and causes a collapse. The second type of indicators with the value of  $\beta < 1$  open infrastructure indicators, land area, the area and the length of the pipeline, communications, roads, power lines [1]. For example, if we have increased the size of the city anywhere in the world, we need, on average, 15% less infrastructure per capita. Types of dynamics affect the growth of the city mode. Growth dynamics is sublinear, typical for



the animal world. Growth due to sublinear scaling, gradually slows down, resembling the growth of a living organism (Figure 3).

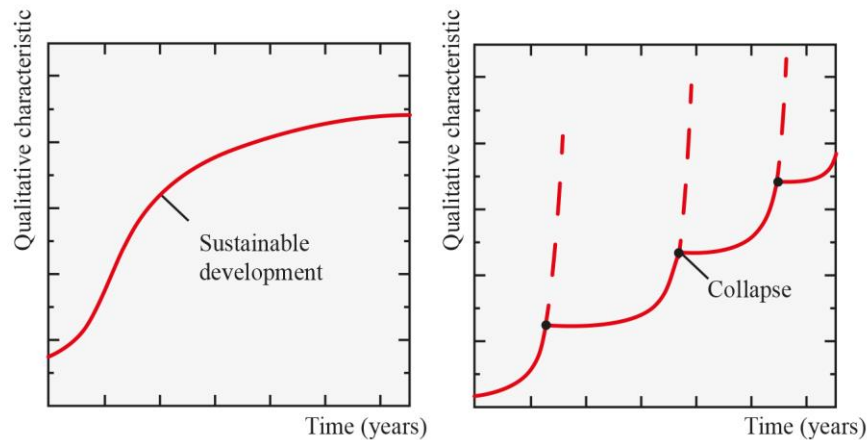


Figure 3. Graphs of superlinear and sublinear growth.

City exists, driven by fundamentally different underlying dynamics, the effect of economies of scale, competing with the growth of production, the economy and consumption of material goods. Finding a balance between these different rhythms, according to this theory, is the main task for achieving sustainable development. In cities any rate can be predictably scaled, despite the great variability of urban forms.

## CONCLUSION

Considering the consistencies detected in urban complexity theories, their imagination of universal and individual co-existing in the same plane, the existing discussion about globalization and traditionalism in architecture is added with question regarding the necessity of implementation of system knowledge into the process of architectural design. In rapidly, and sometimes suddenly, uncontrolled growing cities developing in contravention of urban policy, solving the problems related to architectural space are necessary to be considered in the dynamics that is impossible without modelling means of urban space and theoretical base of urban complexity. Although, there is an opinion that architecture does not require intensive informatization, that data can provide with wrong perception about quality of design result [7]. Methodology can sometimes turn out to be useless even if it is perfectly accurate. Nobody prevents from combining modelling with traditional design means, or refuse them. But adequacy degree of the solutions made by an architect depends on how well local spatial situation is studied, on quantity and quality of the information obtained by an architect and on type of design means he uses. That is why further methodological optimization of these data is required for their implementation into architectural process.

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## THE YALTA CONFERENCE AND THE PHILOSOPHY OF POWER: A REFLECTION OF HISTORICAL EVENTS IN THE POLITICAL CONSTRUCTS OF OUR TIME

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### ABSTRACT

This article presents the basics of the Yalta world. Four main elements of the Yalta system are revealed. The author studied the process of destruction of the foundations of Yalta-45. Unlike other scientific studies, the author applied the methods of philosophical analysis of the postmodern era. Main element: time. The second element: structure. The third element: the border. The fourth element: the dominance of worldview. In this article we prove that the necessary Yalta-2. However, history dominates the future. The history of the Yalta conference governs the present, not the other way around. The essential new monograph, a new scientific conference, a new scientific theory. Do not need pessimism or war Yalta-45. No need to turn Yalta-45 into a Ghost or a monument. Such steps give the future under the rule of Yalta-45. Optimism and positivity are needed. Yalta-45 must be the past. For someone nice, and for someone - not very. Yalta-45 should not be forgotten, but it is impossible to give it quasi-life. Only then will there be a new future. The future of Yalta's meanings, but not the political debate around Yalta. History and philosophy of power, not dogmas of political struggle. That's what the future needs, and Yalta-45, too.

**Keywords:** New world order, globalization, Yalta world, political philosophy.

### INTRODUCTION

Yalta Conference of 1945 is the last international forum with the participation of the leading countries of the United Nations in the pre-nuclear era. With its end, not only the next round of diplomatic relations between the countries of the Anti-Hitler Coalition ended, but the stock of Old World diplomacy completely exhausted itself. The same world, which was forging in Westphalia in 1648, vividly manifested itself in Paris in 1814, 1856 and 1919.

Yalta Conference of 1945 marked the end of total European hegemony and raised the issue of uniting diverse countries on different continents into a single organization. An organization that combines the solution of economic, political, social, military and police problems. A neat sounding of this issue at previous meetings of the heads of the Big Three ended in Yalta with the elaboration of specific documents that provided technical details for the implementation of this idea.

It was no longer a matter of declarations, though of a strategic nature, but completely unnecessary for implementation, but about the practical nuances of the work of the emerging United Nations. It was Yalta-45 that became the axis around which the postwar world began to spin [1, p. 5-9]. Yalta-45 laid numerous minefields for future political players on the planet Earth: the right of veto of the members of the UN Security Council, the new borders between Poland and Germany, territorial increments of the USSR in the Far East at the expense of Japan, the principles of political arrangement of post-war Eastern Europe, The United Nations as theoretically independent players of the USSR and BSSR.

The list could be continued on many pages. One thing is clear, the foundations of a new world order were formed in Yalta. And on the eve of the emergence of a nuclear factor in world politics. Potsdam only confirmed the Yalta agreements and rigidly marked those minefields that in February 1945 looked more like an idea of the leaders of the Big Three, and in the summer of the same year they became a factor with which diplomats of different levels had already to work. And the nuclear "Cudgel for Russian guys" in no way changed the vector of the geopolitical express launched in February 1945 in a non-nuclear era at the end of the Westphalian-Versailles world order system [2].

### FOUR ELEMENTS OF THE YALTA WORLD

Let us designate the foundations of the world order, which since 1945 have become the new norm for the world community.

First, it is a factor of time. The creators of the Yalta coordinate system have repeatedly stressed that they create a temporary structure whose purpose is to eliminate the possibility of war in Europe for at least 50 years. This was said by one of the creators of the "Yalta coordinate system" - F.D. Roosevelt, February 6, 1945 during a plenary session in the Great Hall of the Livadia Palace dedicated to the future UN. A little later, J. Stalin, having entered into a harsh polemic with W. Churchill, cited as an argument in favor of his point of view, Roosevelt's phrase about 50 years of peace and security, making it clear that he fully shared the American president's vision of the problem. Churchill said nothing, that, to admit, he did extremely reluctantly and seldom. And two days later, on February 8, 1945, at a diplomatic dinner at the Yusupov Palace (Koreiz village), he stated his point of view in the form of a toast in his expressive manner: "I must say that never before in the whole war, gloomy periods, I did not feel as much responsibility as I do at this conference. Now, for the reasons pointed out by the marshal, we understand that we have reached the top of the hill and the open country stretches before us. Let's not minimize the difficulties. In the past, peoples, comrades-in-arms, in the course of 5-10 years after the war, dispersed in different directions. Millions of workers moved, therefore, in a vicious circle, falling into the abyss and then rising again only because of their own victims. Now we have the opportunity to avoid the mistakes of previous generations and to ensure lasting peace. People crave peace and joy. Will the families reunite? Will the warrior return home? Will the destroyed houses be restored? Will the worker see his house? The defense of our country is a valiant business, but we still have great challenges ahead of us. We are to realize the dream of the poor so that they can live in peace, protected by our invincible might from aggression and evil. I lay my hopes on the wonderful president of the United States and on Marshal Stalin, in whom we will find peacekeepers and who, having smashed the enemy, lead us to fight against poverty, unrest, chaos, oppression. I hope for this and on behalf of England I declare that we will not lag behind in our efforts. We will unreservedly support your efforts. Marshal talked about the future. It is most important. Otherwise, the oceans of blood will be vain and scolded. I proclaim a toast for the bright, sunlight of the victorious world. " [3, p. 521] In all this vivid speech, a philosophically and literally gifted British gentleman marked the usual limit of peace efforts after the great wars - 5-10 years. He clearly wanted and made efforts in Yalta, so that this line was overcome, but as an experienced schemer and insidious representative of the parliamentary democracy of Britain refused to talk about the upper framework of the world. However, all his speech was tied to the generation of the last war and the one that was born directly during this war or immediately after it. Thus, Churchill made it clear that he was counting on one or two generations of the world, which fully corresponds to the lapidary accuracy of the forecast of F. Roosevelt and J. Stalin. No one dreamed of eternity or centuries.

Secondly, it is a factor of the United Nations. Yalta conference was held under the sign of the unification of free nations (including the USSR!) On a single playground. At different stages of the negotiation process, this site was called in different ways: both the United Nations and the Organization of International Security are not important. It was about the global representation of nations in the established world political club. For the first time in the history of the planet, the key players of the planetary organization were to become the countries of the East and Latin America. Moreover in the "Major League" on an equal footing with the right of veto for the first time invited to China and the Soviet Union (three months after the start of the "UN" project in Yalta, on another continent, in San Francisco, was convened by the United Nations Conference on an international organization with the participation of representatives of 50 states representing 80 percent of the inhabitants of the planet Earth). Nobody will ever forget that without the Yalta meeting of the Big Three, and without a concerted effort to build such a complex organization of the United Nations, the idea would get a dwarf exist in the format of the diplomatic "misunderstandings" - the League of Nations, which not only contributed to the world but undermined it.

Third, the factor of boundaries. In Yalta, new borders were established in Europe and Asia. Borders, which to this day remain relevant for both countries that have retained their statehood, as well as those that are successors to the no longer existing powers. Political regimes changed, social structure changed, separate regions merged and disintegrated, internal borders changed, but external borders remained unshakable since 1945. These are such countries as the USSR (at the moment the Yalta borders are the external borders of Ukraine, Belarus and the Russian Federation), Poland, the Federal Republic of Germany, Japan. Questions are discussed about the Yugoslav-Austrian and Yugoslav-Italian border. The questions on the status of Iran and Mongolia have been clarified. As a result of the Yalta meeting, the borders in Europe and Asia have been substantially transformed, and with the change in the state ownership of the territories, more than 5 million people have emigrated from their Lesser Motherland to their Greater Motherland. Just as many people changed their citizenship, and their children and grandchildren changed their language, culture, practiced inter-ethnic marriages and dissolved into a new national environment [4].

Fourthly, the idea of dominating individual world outlook socio-economic and political systems in certain territories was fixed. That is, clear spheres of influence were formed in Europe and Asia (Africa, Latin America, the Near and Middle East, with the exception of certain clearly localized territories, were left without a rigid binding to a particular system). It is precisely the spread of Soviet influence through the communist paradigm from Austria to Mongolia (including the support of a number of powerful anti-government organizations in the Near and Middle East, active participation, virtually

domination of the Chinese issue) that was the most controversial part of the results of the Yalta peace in the Western establishment. It is the creation of the USSR security belt from friendly and loyal countries that still causes the main criticism of both our domestic ultra liberals and the majority of Western politicians from the Right to the Left inclusive.

### THE DECAY OF THE FOUR ELEMENTS. UNDERSTANDING THE CRISIS IN RUSSIAN TEXTS

The four factors presented were global whales, on which the Yalta world held. In 1991, one of the creators of this world of the USSR ceased to exist. It is symbolic that this happened 46 years after Yalta meetings. At the same time, its sphere of influence collapsed - the fourth pillar of the Yalta world grid of coordinates.

The dissolution of Czechoslovakia, the unification of Germany, struck a blow at the spirit of Yalta agreements (enshrined in the serious international Helsinki Treaty on the inviolability of borders in Europe), but did not in principle contradict the letters signed in Yalta. The third pillar was thoroughly shaken and morally discredited. A series of Yugoslav wars in 1991-1999. The second pillar - the international security system - has already been questioned. The aggressive, predatory war of NATO forces in violation of the UN Charter (Iraq - 2003-2011, Libya), as well as the distortions of the UN resolution (Libya - 2011), finally discredited the idea of the International Organization for Security. The second pillar has not yet collapsed, but has already collapsed.

50 years after Yalta meetings, the world built by the diplomatic genius of the Big Three collapsed. In fact, some fragments remained of him, which by their size and beauty create an imitation of life, but no matter how serious a role they play. Now a new world order is being formed, which is formed by dynamic and minimally bureaucratic regional superstructures: NATO, EU, SCO, BRICS, EEMP. This is a new world with different rules of the game. The more unusual and piquant was to watch on the eve of the 70th anniversary of Yalta Conference mass statements about the need to create Yalta-2. On the importance and necessity of an authoritative international forum on the creation of new rules of the game in the changed geopolitical continuum. The excitement was extremely high both on the part of the publicists and on the part of the politicians ... But no matter how serious historical or political studies are devoted to the analysis of what all the same admires or oppresses, it still was not.

Since the beginning of the 2000s, at least in the Russian-speaking world, there has not been published any solid monograph or sensible popular scientific publication dedicated to the Crimean (Yalta) conference of 1945. In the majority (the absolute majority!) of scientific articles published on the eve of the jubilee of scientific articles, images created in the era of the Soviet Union were exploited, the main references were made to documents published in the Soviet Union, they referred to theoretical works either published in the Soviet Union or those that merely retold development published in the same Soviet Union. And this is despite the fact that no one has conducted a full-fledged analysis created by Soviet experts on Yalta conference [5; 6] ... except for the Soviet experts themselves and published in the Soviet Union. The materials were used, the facts were taken into account, theories were adopted by everyone from bloggers to ministers, from students to academics, and there was no understanding of what was being taken, for what or how it was created. At least the author does not know in this plan any specialized work more short abstracts or mournful-ceremonial article for the next anniversary.

### CONCLUSION

"Yalta Conference" is an event of the past. And like any past, it has objectively disappeared in physical space. As an active reality it does not exist, the creators of this reality as physical bodies no doubt function, and the political institutions they lead are radically transformed into a different quality. The only thing that exists in today's day from the practices of the past is the ruins of concepts, concepts, meanings that we can unearth as archaeologists, extracting from the tons of earth individual artifacts and DESIGN based on them the models of the past reality [7, p. 193-194]. But time after time we find ourselves in a situation where this obvious fact encounters both from Washington (the desire to bury Yalta conference) [8] and from a number of officials (too early to bury Yalta conference) to the situation of an eternally living present, on the register of which passes Yalta-45. Who either needs to be buried (and before that it is desirable to liquidate, which was done in the years of all major Jubilee celebrations by politicians and historians of the West with an enviable regularity) [9], or secure (withdraw from a coma, recover after ailment, restore in Yalta-2 format, restart) [10, p. 5-9].

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## SOCIO-ECONOMIC TRANSFORMATIONS IN CRIMEA (FIRST PART OF THE XIX CENTURY)

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### РЕЗЮМЕ

Приєднання Криму до Російської імперії ознаменувало новий етап розвитку півострова. Перша половина XIX в. була відзначена для Криму помірним розвитком. Проаналізовано соціально-економічні перетворення на півострові в першій половині XIX ст.

Ключевые слова: Крым, Российская империя, города, преобразования, первая половина XIX в.

### РЕЗЮМЕ

Приєднання Криму до Російської імперії ознаменувало новий етап розвитку півострова. Перша половина XIX ст. була відзначена для Криму помірним розвитком. Проаналізовано соціально-економічні перетворення на півострові в першій половині XIX ст.

Ключові слова: Крим, Російська імперія, міста, перетворення, перша половина XIX ст.

### ABSTRACT

The accession of Crimea to the Russian Empire commemorated a new stage in the development of the peninsula. The first half of the XIX century was marked for Crimea by moderate development. Socio-economic transformations on the peninsula in the first half of the XIX century were analyzed.

Keywords: Crimea, Russian Empire, cities, transformations, first part of the XIX century.

### PROBLEMS

In the first half of the XIX century in Crimea there were transformations that concerned different spheres. So, on the peninsula, there were processes of expanding old and developing new cities. Here the foundations of future cultural and resort centers were laid. The consequence of the Patriotic War for the Crimea was the plague raging on the peninsula in 1812. Five years later, trade revived, the local population became somewhat enriched, which gave impetus to the development of **PROBLEMS**

cities. The tsarist authorities tried to create conditions on the peninsula for recreation and simultaneously considered it in their strategic and geopolitical plans. During this period, the outflow of the Crimean Tatars stopped. The population, on the contrary, despite the hungry 1833-1834 gg. and the first strongest cholera in the same period, increased, which in general favorably affected the development of the region's economy. Educational, social, cultural, medical, charitable and other institutions were opened. The life of the population of the peninsula was improving [1, p. 20; 6, p. 59].

Analysis of publications on the stated topic showed the absence of generalized studies. The exception is the work of explorers-travelers who lived and worked during the period under review, as well as some works of modern scientists [1; 2; 3; 4; 5; 6; 8; 12; 14; 15; 21], which reveals some aspects of the problem under study. Thus, it is necessary to analyze the features of the socio-economic transformation of the peninsula in the first half of the XIX century.

### MATERIALS AND METHODS

The first part of the XIX century for Crimea was marked by the development of the economy, including the resort and tourism sector. The consequences of the military operations that were conducted in the region were overcome, and most of the rich and noble people paid attention to the newly acquired land. At this time not to make a trip to Crimea was considered indecent for a man from a society that claims a certain horizon. If P. Sumarokov during his travels in 1799 and in 1802 saw in Crimea "bare uninhabited, which stretched for about 200 versts" [22, p. 110], then I. Murav'ev-Apostol, when he traveled across Crimea in the 1820s., wrote that travelers meet each other along the way [15, p. 17].

Thanks to the efforts of M. Vorontsov, the situation has changed for the better. In 1823, after returning to Russia, he assumed the duties of the Governor-General of the Novorossiysk Territory and the governor of Bessarabia. His

administrative activities contributed to the development of the province, as well as trade in the south of the Russian Empire.

Gradually developed cities and villages, created conditions for the reception of guests and travelers. In Ak-Mechet' there were 331 houses and 7 mosques at that time. This was the city - the predecessor of Simferopol. The foundation date of Simferopol should be 8 (19) February 1784. At the beginning of the XIX century in Simferopol district there were about 45 thousand people, actually in the city – a little over 2 thousand people of different nationalities [20, p. 200, 209]. As early as 1803, there were 197 stores in the city, 12 coffee shops, 13 inns, 16 taverns, 11 forges and 20 bakeries. The city was still very small: by the end of the 1830s it was located mainly in the square of the present streets of A. Pushkin, M. Gorky, L. Tolstoy and the Salgir River. Development of Simferopol contributed to the status of the "capital" and road construction: the highway to Alushta (1824-1826), and then to Yalta. The city becomes an administrative, craft and trade center. In 1836 there were already 1014 houses in Simferopol. The population of the city grew rapidly enough. For half a century the population increased 8.2 times and reached 16.5 thousand people [11, p. 251]. In 1827 there were about 746 houses in the city [19, p. 23]. The development of Simferopol was facilitated by the construction of roads: a highway to Alushta in 1824-1826, and later to Yalta.

Since 1833 active development of the city begins: a stone bridge was built through Salgir, two years later – many stone shops and two-story houses. In 1836 there were 1014 houses in Simferopol. Since 1838, the streets have become paved, there are sidewalks, buildings were built for charitable, hospitable (hospitals-shelters for disadvantaged and people with disabilities) institutions. Construction has become even more intense since 1842, after the approval of the general development plan for the city. So, already in 1845 there were 9 churches, 1656 houses, 489 shops, 13 plants and factories, including the production of various vases and vessels from Crimean marble [24, p. 643; 19, p. 23].

In the 1820's. in the city there was a first hotel of first-class type and it was called "Athenian". It was here travelers stayed for the night. The prices were too high. It did not last long. Soon the guests received a tavern "Odessa", in which the famous writer A. Griboyedov stayed. Near the city of Simferopol people were attracted by Chatyr-Dag mountain, which for a long time was considered the highest point of Crimean Mountains, according to the erroneous considerations of scientists of that time, and also the cave Kyzyl-Koba, which was a place of settlement of ancient people who lived in Crimea [15, p. 23].

In 1783, the construction of the city of Sevastopol - the fortress and the base of the Russian military Black Sea Fleet begins. Since the 20 of March 1805 to 1856, the city was subordinated to the Nikolayev-Sevastopol military governor - commander of the Black Sea Fleet, unlike the rest of the cities of Crimean Peninsula. In 1783, on the orders of the Empress, the construction of a military port began. The city began to position itself as the base of the military Black Sea fleet of the Russian Empire. So, in February 1804, Sevastopol was appointed the main military port of the Black Sea Fleet, and for merchant ships the port of the city was closed. In 1808 a commercial port was established here. Due to problems with the delivery of products and various goods and with the aim of restoring domestic trade in February 1820, the port of Sevastopol was reopened for merchant ships coming from the Russian ports of the Black and Azov Seas. Significant funds were sent here for construction. At the beginning of the XIX century. in Sevastopol lived 700 people, and in the 1840s. together with the military, there were already about 42.5 thousand people, with men predominating almost 8 times [20, p. 264; 10, p. 209; 9, p. 93]. In the period from 1833 to 1846 years. the number of houses increased from 1918 to 2200, respectively [19, p. 25].

The greatest pace of construction and consolidation of Sevastopol was with the commander of the Black Sea Fleet, appointed in 1834, Admiral M. Lazare. Serf batteries, docks, port facilities were built. By the middle of the XIX century. in the city there were several thousand stone houses, many military buildings, a large military hospital and a number of other institutions. It should be noted that prior to the Crimean War, Sevastopol was one of the most developed cities on the Black Sea coast, an important strategic point in the defense and offensive plans [7, c. 141–144].

Bakhchisaray and Karasubazar – cities that preserved their medieval and Asian appearance. On the orders of M. Vorontsov at the beginning of the XIX century. the reconstruction of the Khan's palace began. Travelers also attracted places of worship near Bakhchisarai, therefore, walks that were carried out on horses became more popular. Such places were: Mangup-Kale, Kachi-Kalon, etc. Bakhchisaray, and also Karasubazar were cities that served as a certain base for organizing these walks [15, p. 25].

By the beginning of the XIX century. Kerch was a very small village, but the establishment in 1821 of the "Complete Quarantine" (all vessels going from the Black Sea to the Azov, passed mandatory quarantine in Kerch) stimulated the development of the city. Kerch becomes a kind of transshipment point for imported and exported goods. Gradually the number of inhabitants increases, and in 1839 there were 7498 of them, and in 1849 – 12,000. The share of the Kerch port

in foreign trade grew. However, Kerch was only a staging post at that time, and only thanks to the efforts of M. Vorontsov here in the 20's. XIX century. The real one was built in the port, but the infrastructure development dragged on for the entire first half of the XIX century.

One of the most ancient cities of Crimea, Theodosius, is being restored and is developing. First of all, this is facilitated by a convenient port and trade. By 1849 there were already 971 houses in the city with 8,215 inhabitants. The city enjoyed a special interest, and already at the beginning of the century there were built 3 hotels. Twice a week from Feodosia to Kerch, as well as to Simferopol, Sudak went post carriages and tarantas, which caused a pleasant surprise for travelers.

The main purpose of most travelers, in addition to visiting Crimean cities, was to visit the South Coast. During this period, it was possible to get there in 2 ways: by sea and on horseback. Since the undeveloped terrain and the poor quality of the roads made it impossible for the crew to travel.

Yalta belongs to the new cities that sprang up in Crimea. By the beginning of the century it was a small village of 13 houses, one mosque and a church. The main obstacle in the development of the future city was the inaccessibility, lack of roads.

With the assistance of M. Vorontsov, the construction of a road to the South Shore, the construction of a mole and a port in Yalta began. A small village gradually turned into the center of the entire coast. Highways connected the village with Simferopol and Sevastopol, a seaport appeared. By decree of April 15, 1838, Yalta received the status of a city [12, p. 187]. The first hotel was opened in the early 1840's. and was called "Odessa". The further development of the city was closely connected with the development of the shipping company.

Until recently, completely wild places began to be actively mastered by Russian landlords, and soon the coast turned into a landscaped garden-park zone. The true center of the Southern Coast of Crimea was Alupka, the summer residence of Vorontsov, known for its palace, which was built in 1830-1837. However, the landscaped area stretched from Alupka to Alushta, but in subsequent years these lands were sold, and the territory was brought into full compliance.

Western Crimea in this period also started in development, but not as a resort, but as a medical region. The thing is that on the postal road between Simferopol and Gezlev was the village of Saki, which was famous for its curative mud, and also for the healing lake that was near the village. In 1828 the muds were examined by Dr. M. Auger [21, p. 89]. By the order of M. Vorontsov in 1832 a pavilion was built, and later a boarding house for the treatment of military ranks. This institution was opened in 1837.

Yevpatoriya (Gezlev) was also a cult place that most travelers tried to visit because it was one of the most ancient cities of the then Russian Empire. It is positioned as a small Tatar village, which by the beginning of the 1830s. had only one hotel, which was called "Yevpatoriya". In the city, beginning approximately from this period, once a week a vessel swims from Odessa [16, p. 37].

Cities of Crimea in this period, as necessary, were equipped with everything necessary for the reception of guests and travelers. M. Vorontsov made a huge contribution to the development of urban infrastructure, thanks to the efforts of which new buildings were built.

Particular attention should be given to how the development of manor construction in the first half of the XIX century, as rich and noble people stayed during their holidays in estates outside the city, and less wealthy rented housing in the city.

After the death of Alexander I's wife, Elizabeth Alekseyevna, Oreanda's estate passed by heredity to Nicholas I. In 1830 the king appointed the manager of his estate, M. Vorontsov, who was entrusted with the economic and monetary affairs of Upper and Lower Oreanda, appoint managers, gardeners of wine growers and other employees.

At the initiative of the Count, work was begun on cultivating the best European varieties of grapes, and in the tsar's possession it was planned to create a huge park, which later received the status of the "Imperial Garden in the Oreanda Estate". The foundation of this garden was closely connected with the name of N. Gartvis, who at that time was the leader of the Nikitsky Botanical Garden. To equip the garden in Europe, special seeds of various ornamental plants were bought, which were planned to plant the entire park area, and beautiful ornamental plants were also brought from the Caucasus [14, p. 12-13].

The real development of the South Coastal System began in the 1820s. M. Vorontsov acquired the estate of Martyan, Ay-Danil, and was engaged in the cultivation of grapes. In 1823 he bought the Richelieu estate in Gurzuf, and then in 1824 he



settled in Alupka, buying up land from Reveliotti. Approximately during this period, according to some information a little later, noble Russian nobles begin to buy up lands in the region and build estates, such as the Golitsyns who settled in Koreiz, Naryshkins on Mishor, and Maltsev in Simeiz [15, p. 47]. In the 1830s. a construction boom began, homes were being upset and built, garden and park complexes were built, vineyards and wine cellars became widespread.

In 1837 Nicholas I undertook a large inspection tour of the western and southern provinces of the empire, and, of course, at the same time visited Crimean Peninsula at the invitation of Count M. Vorontsov. Together with his family, the emperor visited Vorontsov's estate in Massandra, then went to Yalta and granted it the status of a district town, then went to Pototsky's Livadia estate. Later, the royal family arrived in Oreanda. The estate aroused the Empress's delight, and the tsar gave it to his wife. After visiting the estate's family, Nicholas I gave the order to build a palace for the Empress, as Alexandra Feodorovna often ill and went to sanitation for Sicily. When her doctors came to the conclusion that the climate of the Southern coast was in fact similar to the Sicilian climate, then they decided not to hesitate with the construction of the palace [14, p. 15-16].

The construction of the palace in Oreanda was proposed in the Hellenistic style. Its construction took about 10 years from 1842 to 1852. "The flower beds around the palace are like bright carpets. The palace itself is of a strict style, a huge, regular square, brightly white among its parks. It has a particularly good patio and terraces facing the air gardens. Trellises, flower beds, fountains, creeping nets of roses and other plants surround it in a luxurious manner. A wide balcony on marble caryatids looks directly to the sea. But with all the beauty and correctness, I find the style of the palace too European and too flat for such a mountain Muslim corner. The farthest rock has already stepped into the sea. It complements the prospect of wild greatness. At its top is a tall mast, reinforced with ropes, as if on a ship" [16, p. 73].

The palace was designed by the famous German architect K. Schinkel. After receiving materials about the terrain in Berlin he made a plan for the building in the style of "neo-Greek", which the queen really liked. By 1852, by the highest arrival, the estate itself, together with the farm buildings, as well as the park zone, had been built.

In 1841, the Grand Duchess Elena Pavlovna and Maria Mikhailovna came to Crimea. They visited places of worship, such as Chufut-Kale, Kachi-Kalon and various cities. They were especially impressed by the palace of M. Vorontsov, in which they stopped.

Thanks to the wide gestures of the royal family, which popularized Crimean Peninsula, the inception of the resort began. However, an important role in the organization of tourist activities was the location and location of the Russian nobility in the region, and primarily on the South Coast. The fame of the Southern coast begins only with the arrival of Count Vorontsov in Crimea. Until that time, no one had thought to live here, except for a few entrepreneurs who started to buy vineyards there. Description P. Sumarokov, who was in Alupka in 1802 says about it as a "small Tatar village, consisting of 35 houses" [23, p. 195]. Alupka was transformed with the beginning of the activity of a prominent leader in the person of the most brilliant prince.

After the annexation of Crimea, Catherine II generously distributed plots of land to all her approximate people, who, in fact, during the entire first half of the 19th century were not subjected to a clear land survey. The land plots were different in size and on average ranged from 500 to 2,000 thousand hectares [15, p. 45]. One of the prominent figures who purchased a plot of land from M. Vorontsov was I. Fundukley. I. Fundundai's name is well known in the history of Russia and Ukraine, it is closely connected with Crimea. I. Fundukley is known not only as a public figure, but also as a remarkable historian and archaeologist. At the age of 34 he was appointed governor of Volhynia, and from 1839 to 1852 he was appointed vice- was the governor of the Kiev province. The life of Ivan Ivanovich Fundukley since 1834 is closely connected with Gurzuf.

At the end of 1834 - early 1835 I. I. Fundukley for 100 thousand rubles. buys from M. Vorontsov estate in Gurzuf [8, p. 12]. The garden is planned for English manners, on slightly inclined plots of land that form green lawns amidst a vast variety of trees and shrubs. The estate has a vineyard, quite extensive land, several buildings for the manager and servants. In a short period the estate acquired a completely different appearance. I. Fundukley as a hospitable host was able to host on September 14, 1837, Emperor Nicholas I, Empress Alexandra Feodorovna, Grand Duchess Maria Nikolaevna with a large retinue. The composition of the retinue included Adjutant General Count Orlov, Adjutant General-Adjutant, Ober-Stalmeyster Prince Dolgorukov, Dr. Arent and others.

The period of the second quarter of the XIX century is characterized by a phased development of the resort business in Crimea. It is during this period that interest in Crimea as a recreational region of the empire begins to emerge. In addition to the construction of hotels in the cities, the construction of farmsteads, especially in the South Coast area, became very

extensive. Gradual improvement of communication routes, intensity of routes makes the peninsula more accessible for travelers and guests.

## CONCLUSIONS

Thus, the edge was given special attention, since the Black Sea Fleet was based here in Sevastopol. The eventful history of Crimea was of increasing interest in comparison with other attached territories. Since joining the peninsula to the empire, besides the administrative apparatus, scientists and poets have rushed here, and the wealthiest representatives of the nobility have sought to buy up lands here.

Recreational potential of the peninsula was noted by leading scientists, and the rich history of the region only warmed the already existing interest of Russian wealthy inhabitants. However, a little later. At the initial stage, the infrastructure of Crimea was at a low level of development. There was no established communication network here. The settlements were in poor condition, as long military actions negatively affected the material improvement of most cities and villages. Skillful administrative activity of the heads of the province allowed to create all the conditions for the further development of the resort business. During the reign on the peninsula of M. Vorontsov there are fashionable, imported from the West, tendencies for the improvement of personal plots and various places for walking. In the modern understanding, the Governor-General of the region was one of the first in Crimea to give instructions on arrangement in the spirit of landscape design.

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## THE IMPORTANCE OF ROLE PLAY IN TEACHING ENGLISH

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### ABSTRACT

Role-play is an effective technique to animate the teaching and learning atmosphere, arouse the interests of learners, and make the language acquisition impressive. So this research will mainly focus on how to apply it successfully and take the most advantage of it in English class. The outcome shows there are four crucial factors for its success: the topic chosen should be real and relevant; the teacher need 'feed-in' the appropriate language; correct errors in a proper way; some of teacher's role are facilitator, spectator or participant. Incorporating role-play into the classroom adds variety, a change of pace and opportunities for a lot of language production and also a lot of fun.

**Keywords:** Role-play, Procedure, Feed-in, Overlap, Submission, social interaction skill.

### РЕЗЮМЕ

Ролевые игры являются эффективным способом оживить атмосферу обучения и изучения языка, повышения интереса учащихся и делает приобретение языковых навыков более выразительным. Таким образом, это исследование в основном может сфокусироваться на том, как успешно использовать этот метод и имеет определенное преимущество в английских курсах. Результат показывает четыре основных фактора для успеха: тема должна быть реальной и соответствующей, учитель должен быть опытным в соответствующем языке, уметь исправлять ошибки в нужный момент, некоторые учителя играют роль посредника, зрителя или участника. Включение ролевых игр в классах добавляет разнообразие, перемену темпа и возможности для большой продуктивности языка, а также для развлечения.

**Ключевые слова:** ролевые игры, усвоение ,покрытие, подчиненение, навыки социального взаимодействия.

### PROBLEMS

One of the staples of English as a Foreign Language (EFL) teaching is the role play. Role plays are used to allow students to practice speaking in a conversational situation, build confidence and fluency, assess progress, and put learning into action. They are often set up to target particular grammar points – simple past tense, future with 'going to', infinitives, etc. – and to test social interaction skills such as negotiating, interrupting, asking for assistance and making small talk. Role plays may be as simple or as complicated as the teacher desires.

### MATERIALS AND METHODS

Verbal instructions, secret messages, gestures and cue cards are all common ways of setting a scene. In the classroom there are four main types of role plays, but bear in mind that there are often overlap and particular situations may combine two or more of these elements.

**1. The conflict role play** puts participants on a collision course and asks them to deal with this as best they can. Situations might include attempting to change an airline booking at a peak time or asking a noisy neighbour to turn down the stereo. They test language skills under pressure and are best for students who have some maturity and confidence in their abilities.

**2. The cooperative role play** takes the opposite tack and requires participants to work together for the common good. Planning a sayonara party for the teacher, deciding the food list for a barbecue, brainstorming ways to attract tourists to local attractions are all cooperative role plays. Often involving 'safe' situations, cooperative role plays are good for gently easing shy students into conversations and for building relationships within a student group.

**3. Information gap role plays** are based around filling in holes in the participants' knowledge. Answering questions from customs officers, asking for timetabling details, making a library card or interrogating a murder suspect are all information gap type situations. If based on the students' real selves these role plays are simple to set up, but fictitious situations may

require more elaborate preparations. They are an excellent way to practice question and answer patterns and prepare students for real-life encounters.

**4. Task-based role plays** require participants to complete a set activity such as checking into a hotel, giving directions to a taxi driver, ordering a meal or getting the phone number of a potential love interest. They are useful for helping students to practice realistic survival English skills and are an excellent way to build students' confidence in their ability to function in real situations.

Role plays are an essential tool to have in the teaching box but it pays to be aware of where you want them to go. Here are some questions to ask yourself as you design a role play.

- What kinds of language structures or grammar points do I want my students to use, and will this role play incorporate them naturally?
- Do I know in my own mind I want to see occur in the role play?
- Do the students have the language and social skills to be able to manage the situation?
- Can I issue set up instructions clearly and make sure that all participants understand their own roles?
- Is the situation appropriate for the age, level and status of the students in this group?
- What do I want the students to take away from the exercise and how can I reinforce this through feedback?

Role-plays give students the opportunity to demonstrate how to use English in real life situations and make them focus more on communication than on grammar. Role-play activities can be a lot of fun however a class full of shy students may be reluctant to participate so it is important to know your students.

Regardless of what type of role-play you intend to do, it is imperative that students feel comfortable with the necessary structures and vocabulary.

This makes role-plays ideal for the final lesson on a particular topic. If students perform well, move on to the next chapter and if students struggle, address any mistakes in the following lesson. The feedback given in any role-play lesson should be primarily positive and focus on pronunciation, acting, and creativity. Role-plays are about encouraging your students and building their self confidence.

Mini-role plays can be done in any lesson as a practice activity.

Rather than just practice the model dialogue in pairs or groups, encourage students to be creative and use props to better reflect a real life situation. Students should have some space to move about the classroom and be given extra time to practice. If the model dialogue is four to six sentences total, a practice activity in pairs may take five minutes with only two or three demonstrations while a mini-role play of the same length may take ten to fifteen minutes to prepare with about ten minutes for performances. This activity can even be done in the same lesson as the introduction and drilling of a new topic if your students have a good understanding of the new material.

Role-plays can also take an entire lesson especially if students are put in groups instead of in pairs. A lesson such as this would be ideal after several lessons on the same topic. A directions themed role play might be best in groups of three or four where each student must say a minimum of three or four lines. Structuring the activity in this way will give your students some easy guidelines to follow. You can prepare your students by explaining the activity at the end of a class, placing them in their groups, and asking them to think about what they would like to do. Suggest that they bring in any props they would like to use and try to provide some if possible. In the next class, quickly review the target material before splitting the class into groups and dedicate half of the time to practice with the remaining half being for performances. If your students are really eager to perform, ensure that every group gets an opportunity to present their role-play to the class even if it means performing during the next lesson as well. If students are reluctant, then have only the groups that volunteer present.

Role-plays can be used as end of term projects for intermediate and advanced students. At this stage in their studies, they have sufficient knowledge to draw upon to enact real life situations and can get really creative. It is important to decide how you plan to grade your students so that you can explain it to them before they get started. If the project is worth one hundred points, you can break it into sections such as creativity, pronunciation, acting, attitude/enthusiasm, script, etc and assign a point value to each section. Four sections are probably enough. Perhaps each group of students can be assigned a different chapter of your textbook or a different theme. This project would take many lessons. There would be one class where you introduce the project, split the class into groups, and let students brainstorm followed by classes for script development, practice sessions, and final performances. A good method of checking the progress of each group is to have script submissions once or twice before the final performance. The first submission can be to correct grammar and

the second submission should be the final script. This will ensure that students can take chances and push their abilities, prevent them from practicing incorrect material, and verify that they are making progress on the project.

Role-plays can be immensely time consuming and require some real planning and structure but are generally easy to conduct once started. Students who struggle with English exams may finally get their opportunity to shine while students who generally perform well on exams will be challenged to prove their abilities in another way. Role-plays are less stressful than preparing for exams and enjoyable for both teachers and students.

Role-play is a very flexible teaching approach because it requires no special tools, technology or environments, for example student could work through a role-play exercise just as effectively in a lecture hall as in a seminar room. However, technology can provide significant advantages, and even new possibilities, for using the approach as a learning activity. Promoting interpersonal relationships: Role-play has also been accepted to improve interpersonal relationship among students. Role-play pairs or groups help students establish and maintain friendships with peers. Students who are isolated or alienated from their peers and who do not have friends are more likely to be at risk for violent or destructive behavior in society than those who experience social support and a sense of belonging. "To some extent, this interpersonal relationship also promotes their academic achievements. In addition, skills of improving interpersonal relationship with other peers are the foundation for the success in their social career in future." Role-playing also has been linked to increases in self-esteem, attendance, time on task, enjoyment of school and classes, as well as a decrease in dependence on the teacher.

## CONCLUSION

Lastly, it always helps if students are enjoying themselves. Role plays don't have to be deadly serious affairs, but as teachers we get more out of them if we approach them seriously and tie them in to our broader lesson goals.

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## INFLUENCE OF SOWING METHODS AND FERTILIZER NORMS ON GROWTH AND DEVELOPMENT OF THE AUTUMN BARLEY PLANT

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### ABSTRACT

In the article at the Ganja-Gazakh region's condition, the influence of sowing methods and fertilizer norms on the gray-brown soils to the growth and development of the autumn barley plant has been shown. It was determined that sowing methods and mineral fertilizer norms with the manure had a considerable impact to the size of the autumn barley plant, the mass of 1000 grains, the number of productive horns, the length of the spike and the number of grains in the spike.

**Keywords:** soil, barley plant, sowing techniques, fertilizer norms, height and development.

### PROBLEMS

Barley is one of the cultivated cereal crops grown in our country. This plant is a widespread cereal crop in our country after wheat. Among cereals, barley is one of the most valuable fodder plants in the world. Depending on the development phases, the temperature of the barley plant varies considerably. Oasis barley is resistant to frost, drought and heat. The barley's biological features allow it to grow in different soil-climatic conditions. The productivity of the barley plant still does not match with the country's demand [2].

### MATERIALS AND METHODS

Barley (*Hordeum L*) belongs to the group (*Poaceae*). Barley is used for food, feed, yarn and technical purposes, with precious grain crops. Herbs are made of barley slices and flour. If needed, add 20-25% of wheat flour. It contains 7-14% protein, 5.5% cellulose, 65% starch, 2.1% fat, 1.3% water and 2.8% ash. 1 kg of barley grain is 1.2 fodder units [3].

In the western part of Azerbaijan, there were found that fertilizers have an effect on the richness, development and productivity of barley, which was found that the medium-size of plant's height is 32.6 cm in pipetting phase for 3 years, and at the base of 2 vegetative irrigation in the variant of introduction of organic and mineral fertilizers ranged between 38.7 and 54.7 cm. This figure was 34.7 cm in the variant without the introduction of fertilizers and 40.3-57.3 cm in the fertilizer application. In the flowering phase, the plant has a height of 63.7 cm, whereas the number of crops increased by 89-121.3 cm with the use of fertilizers on the basis of 2% vegetation irrigation, the number of productive stems was 2-2.8, the length of the spike was 5.5-6, 6 cm, and the number of grains in the spike was 29.7-39.9 units. On the basis of four-time vegetation irrigation, these indicators varied between 93 cm and 93-129 cm in the fertilized version with the effect of organic and mineral fertilizers. In the full fertilization phase, the plant grew by 74.31.3 cm in height, 74.3 cm in size and 2 times as a result of fertilizers on the basis of vegetation irrigation. On the basis of 4-fold vegetation irrigation, this indicator was 80 cm non-using fertilizer variant and reached to 102.3-133.7 cm with the effect of, organic and mineral fertilizers. The number of productive stems was 2-3,0 with the length of the spike 5,9-7,2 cm, the number of grains in the spike is 31,4-41 [1].

Field experiments were carried out in 2012-2014 on the basis of autumn barley's variety Karabakh-82 on the Central Experimental Base of Plant Protection and Technical Plants Scientific Research Institute (former Azerbaijan Scientific-Research Institute of Cotton-growing).

The field experiments were based on 2 originals (2 x 6) after cotton pre-salt. Factor A: Sowing Methods: 1) Ordinary; 2) Tire.

Factor B: Fertilizer norms: 1) Control (no fertilizer); 2)  $N_{60}P_0K_0$  (Farm); 3) 10 t / ha of manure +  $N_{30}P_{30}K_0$ ; 4) 10 t / ha of manure +  $N_{60}P_{60}K_{30}$ ; 5) 10 t / ha manure +  $N_{90}P_{90}K_{60}$ ; 6) 10 tons / ha of manure +  $N_{120}P_{120}K_{90}$ .

The total area of each variant is 56.0 m<sup>2</sup> (8.0x7.0), the calculated area is 50.4 m<sup>2</sup> (7.2 x 7.0) and 0.8 m defense strips per repetition. 200 kg of seeds per hectare and 140 kg of seeds were harvested in hectare. Both methods of sown in autumn



in the second decade of October, SN-16 seeds were manufactured in the usual way, with sowing machines, and the grain was sown with aggregate "Oztekin" produced in Konya, Turkey.

In the experimental field there were used 34,7% of ammonium nitrate, 18,7% simple superphosphate and 46% potassium sulphate and half-burned manure (nitrogen 0,5%, phosphorus 0,25%, potassium 0,6%). Every year 100% of manure, phosphorus and potassium fertilizers are given under ground, nitrogen are fed twice in the early spring. Agrotechnical measures were taken for the Ganja-Gazakh region in the field of practice.

In the taken samples the indicators were determined: pH by pH-meter, total humus by I. V. Tyurin method, granulometric composition by N. A. Kachinski, absorbed bases by K. K. Hedroys, absorbed ammonia nitrogen by D. P. Konev, nitrate nitrogen by Grandval-Lyajju, general nitrogen, general phosphorus by K. E. Ginzburg and Q. M. Sheglova, mesopharynge phosphorus by B. P. Machiigin, total potassium by Smite, Potassium was designated in Blaze Photometer by P. B. Protasov method.

Plant Specimens: The absolute dry matter is determined by generally accepted methods of nitrogen in fat, protein, nitrogen, nitrogen, calcium, calcium and straw, according to 1050 C thermostat, general nitrogen, phosphorus and potassium by the method of K.E.Ginzburg, Q.M.Sheglova and E. Vulfus.

In order to determine the amount of nutritional ingredients in the field of practice, food potential ingredients of the soil, common humus, nitrogen, phosphorus, potassium and vegetable components have been determined prior to their experimentation.

The analysis of soil samples shows that these lands are not highly supported by the naturally occurring forms of nitrogen, phosphorus and potassium. The pH was increased to 7.8 in the 0-30 cm layer in the water solution, increasing to the lower floors and being 8.3 in the 60-100 cm layer. Total humus, nitrogen, phosphorus and potassium in the 0-30 cm layer 2.15; 0.14; 0.13; 2.35%. However, the lower floors are gradually decreasing and decreasing by about 0.81 in the 60-100 cm layer. 0.06; 0.05; 1.51%. The absorbed ammonia nitrogen is 18.8-5.8 mg / kg, the nitrate nitrogen is 10.5-2.8 mg / kg, the mesenteric phosphorus 16.3-5.1 mg / kg, the exchange potassium 265.5-108.3 mg / kg hesitated between.

According to the amount of humus, these lands are considered to be less popular in our republic (S.Aliyev, R.H.Mammadov, FH Akhundov, 1981). The agrochemical threats we have on gray-brown soils indicate that, according to the gradient received in our republic (Gulahmadov ES, Akhundov FH, Ibrahimov SZ, 1980), these lands are easy to plant you are provided with foodstuffs in the drainage. Therefore, it is important to use organic and mineral fertilizers together to maintain high yields and maintain soil fertility.

Increasing the productivity of cereal crops, including autumn barley, is one of the important issues in the modern era. Thus, the study of the efficiency of sowing methods and fertilizer norms in the growing of barley barleys is one of the actual problems in order to maintain soil fertility in Ganja-Gazakh region, to improve productivity and quality.

Effects of sowing techniques and fertilizer norms on the growth and development of fallow barley have been studied in gray-brown (chestnut) soils. During the research period, soil and plant samples were taken, analyzed, phenological observations and biometric measurements were performed from the 3rd part of the unit (beginning, middle and end) of the I and III replicates in the main development phases of the barley (colloidal, piping and trenching). The main quality indicators of the product were analyzed in the laboratory. The results of the experiment were confirmed by mathematical calculations. The results of the study are given in the following tables.

As can be seen in table 1, at the sowing method the height barley plant was 33.5-35.3 cm, at the flowering phase 52.5-54.3 cm, at the full maturity 58.6-60.5 cm, at the end of the vegetation period the number of productive stems is 1.8-2.0 units, the length of the spike is 6.7-6.9 cm, the number of grains in the spike is 32.1-33.1 and the mass of the grains in the spike is 1.71-1.75 grams, the mass of 1000 grains was 37.3-38.3 grams. In the farm variant (N<sub>60</sub>), these figures are significantly higher than the fertilizer variance, 35.8-38.1 cm high in pipe phase, 55.3-56.6 cm in flowering, 60.2-63.7 cm in full yield phases, the number of productive stems 1,9-2,2 pieces, the length of the spike is 6.8-7.0 cm, the number of grains in the spike is 34.8-35.2 and the mass of the drains in the spike is 1.75-1.80 grams, and the mass of 1000 grains 38.7-39.8 grams.

As a result of the combination of various mineral fertilizers the barley indicators were relatively higher than controls and economic options. Thus, during the pipe-up phase at the variant of 10 t manure/ha + N<sub>30</sub>P<sub>30</sub>K<sub>0</sub> the height of the plant was 40.8-43.5 cm, at the flowering phase 59.0-62.5 cm, 67.5-69.6 cm in full yield, number of productive stems 2, 3-2.5, the length of the spike is 7.0-7.3 cm, the number of grains in the spike is 37.5-38.8 and the weight of grain in the spike is 1.83-1.88 grams, the mass of 1000 grains is 41.2-42,5 grams, at the variant with 10 t manure/ha + N<sub>60</sub>P<sub>60</sub>K<sub>30</sub> respectively 45.2-

48.6 cm; 72.8-75.6 cm and 78.6-82.5 cm, the number of productive stems is 2.5-2.8, the length of the spike is 7.2-7.5 cm, the number of grains in the spike is 39.6-41,2 pieces and the weight of grain in the spike was 1.92-1.95 grams, and the weight of 1000 grains was 43.3-44.2 grams.

Table 1

The influence of fertilizers on the growth and development of barley in the furrow sowing method

s/s	Practice options	Height, cm			Number of productive stems, units	The length of the spike, cm	Number of grains in the spike, numbers	The mass of the grain in the spike, gr	Mass of 1000 grains, gr
		Piping	Flowering	Full maturation					
<b>2012</b>									
1	Control (without fertilizer)	35,3	54,3	60,5	2,0	6,9	33,1	1,75	38,3
2	N <sub>60</sub> P <sub>0</sub> K <sub>0</sub> (farm)	38,1	56,6	63,7	2,2	7,0	35,2	1,80	39,8
3	10 t/ha of manure + N <sub>30</sub> P <sub>30</sub> K <sub>0</sub>	43,5	62,5	69,6	2,5	7,3	38,8	1,88	42,5
4	10 t/ha of manure + N <sub>60</sub> P <sub>60</sub> K <sub>30</sub>	48,6	75,6	82,5	2,8	7,5	41,2	1,95	44,2
5	10 t/ha of manure + N <sub>90</sub> P <sub>90</sub> K <sub>60</sub>	53,3	88,6	95,8	3,2	8,5	43,8	2,08	46,8
6	10 t/ha of manure+N <sub>120</sub> P <sub>120</sub> K <sub>90</sub>	50,1	83,5	90,3	2,8	7,6	42,1	2,03	45,1
<b>2013</b>									
1	Control (without fertilizer)	33,5	52,5	58,6	1,8	6,7	32,1	1,71	37,3
2	N <sub>60</sub> P <sub>0</sub> K <sub>0</sub> (farm)	35,8	55,3	60,2	1,9	6,8	34,8	1,75	38,7
3	10 t/ha of manure + N <sub>30</sub> P <sub>30</sub> K <sub>0</sub>	40,8	59,0	67,5	2,3	7,0	37,5	1,83	41,2
4	10 t/ha of manure + N <sub>60</sub> P <sub>60</sub> K <sub>30</sub>	45,2	72,8	78,6	2,5	7,2	39,6	1,92	43,3
5	10 t/ha of manure + N <sub>90</sub> P <sub>90</sub> K <sub>60</sub>	49,6	85,3	92,6	2,8	8,0	42,3	2,01	45,2
6	10 t/ha of manure + N <sub>120</sub> P <sub>120</sub> K <sub>90</sub>	47,5	80,8	89,2	2,6	7,4	40,6	1,98	44,0

The highest indicator of barley was observed in the variant with 10 t manure / ha + N<sub>90</sub>P<sub>90</sub>K<sub>60</sub>. Thus, in the pumping phase the height of the plant was 49.6-53.3 cm, in flowering phase – 85.3-88.6 cm, in full yield phase –92.6-95.8 cm, number of productive stems 2.8-3.2, the length of the spike was 8.0-8.5 cm, the number of grains in the spike was 42.3-43.8, the weight of the grain in the spike was 2.01-2.08 grams and the mass of 1000 grains was 45.2-46.8 grams. As the mineral fertilizer norms (N<sub>120</sub>P<sub>120</sub>K<sub>90</sub>) increased, the barley have been relatively low comparatively to 10 tons of manure/ ha + N<sub>90</sub>P<sub>90</sub>K<sub>60</sub>. This can be explained by the fact that the given mineral fertilizer norms are excessive and are inherited by plants.

As can be seen from the table 2, in the usual sowing method, the height of the barley plant in the pipe phase was 26.5-30.3 cm, in the flowering - 45.6-50.3 cm, in full fodder - 50.3-56.5 cm, the number of productive stems at the end of the vegetation - 1.6-1.8, the length of the fiber - 6.3-6.6 cm, the number of grains in the spike - 29.0-31.5 units and the weight of grain in the spike was 1.65-1.70 grams, and the mass of 1000 grains - 34.8-36.5 grams. In the farm variant (N<sub>60</sub>), these figures are significantly higher than in control variants, while the length of the plant is 29.6-34.3 cm in the pipeline, 48.3-54.5 cm in the flow, 54.5-60.3 cm, the number of stems - 1.7-1.9, the length of the spike - 6.5-6.8 cm, the number of grains in the spike - 31.5-33.3 and the mass grains in the spike - 1.73-1.78 grams, and the mass of 1000 grains - 35.7-37.8 grams.

As a result of combined introduction of various norms of mineral fertilizers together with manure the studied indicators of autumn barley at the furrow sowing method was higher than at the control and farm variants. Thus, at the variant of 10 t of manure/hectare + N<sub>30</sub>P<sub>30</sub>K<sub>0</sub> the height of plant at the piping phase 33,5-38,6 cm, at the flowering phase - 52,5-56,8 cm, at the full maturity - 63,5-65,2 cm, the number of productive stems - 1,9-2,1 units, the length of spike - 6,8-7,2 cm, the number of grains in the spike - 34,3-36,8 units, the mass of grains in the spike - 1,81-1,85 grams, the mass of 1000 grains - 37,5-39,5 grams, at the variant of using 10 tonnes of manure/hectare + N<sub>120</sub>P<sub>120</sub> K<sub>90</sub> relatively the height of plant - 40,5-44,3 cm, 60,6-64,5 cm and 71,6-75,6 cm, yhe number of the productive stems - 2,1-2,3 units, the length of spike - 7,1-7,4 cm, the number of grains in the spike - 36,7-38,8 units, the mass of grains in the spike - 1,88-1,93 grams, the mass of 1000 grains - 39,6-41,6 grams. The highest indicators were observed in the variant of using 10 t manure / ha +

N<sub>120</sub>P<sub>120</sub>K<sub>90</sub>. Thus, in the pumping stag, the height of plant 45.2-50.5 cm, in flowering phase - 76.8-80.5 cm, in full maturity phase - 83.6-88.8 cm, the number of productive stems 2,6-2.9 units, the length of the spike is 7.3-7.9 cm, the number of grains in the spike is 39.6-41.5 units, the mass of grains in the spike is 1.91-2.03 grams and the mass of 1000 grains was 42.6-44.5 grams.

Table 2

The influence of fertilizers on the growth and development of barley in the usual sowing method

s/s	Practice options	Height, cm			Number of productive stems, units	The length of the spike, cm	Number of grains in the spike, numbers	The mass of the grain in the spike, gr	Mass of 1000 grains, gr
		Piping	Flowering	Full maturation					
<b>2012</b>									
1	Control (without fertilizer)	30,3	50,3	56,5	1,8	6,6	31,5	1,70	36,5
2	N <sub>60</sub> P <sub>0</sub> K <sub>0</sub> (farm)	34,3	54,5	60,3	1,9	6,8	33,3	1,78	37,8
3	10 t/ha of manure + N <sub>30</sub> P <sub>30</sub> K <sub>0</sub>	38,6	56,8	63,5	2,1	7,2	36,8	1,85	39,5
4	10 t/ha of manure + N <sub>60</sub> P <sub>60</sub> K <sub>30</sub>	44,3	64,5	71,6	2,3	7,4	38,7	1,93	41,6
5	10 t/ha of manure + N <sub>90</sub> P <sub>90</sub> K <sub>60</sub>	47,6	75,5	80,8	2,6	7,6	40,1	1,98	43,6
6	10 t/ha of manure+N <sub>120</sub> P <sub>120</sub> K <sub>90</sub>	50,5	80,5	83,8	2,8	7,8	41,5	2,01	44,5
<b>2013</b>									
1	Control (without fertilizer)	26,5	45,6	50,3	1,6	6,3	29,0	1,65	34,8
2	N <sub>60</sub> P <sub>0</sub> K <sub>0</sub> (farm)	29,6	48,3	54,5	1,7	6,5	31,5	1,79	35,7
3	10 t/ha of manure + N <sub>30</sub> P <sub>30</sub> K <sub>0</sub>	33,5	52,5	65,2	1,9	6,8	34,3	1,81	37,5
4	10 t/ha of manure + N <sub>60</sub> P <sub>60</sub> K <sub>30</sub>	40,5	60,6	75,6	2,1	7,1	36,7	1,88	39,6
5	10 t/ha of manure + N <sub>90</sub> P <sub>90</sub> K <sub>60</sub>	43,6	70,2	84,7	2,4	7,3	38,5	1,94	41,8
6	10 t/ha of manure + N <sub>120</sub> P <sub>120</sub> K <sub>90</sub>	45,2	76,8	88,6	2,6	7,5	39,6	1,96	42,6

## CONCLUSIONS

Thus, the application of mineral fertilizers with manure affects the growth and development of the autumn barley plant. When comparing both two sowing methods we can see that the highest indicators at the furrow sowing method at the variant of using 10 tons of manure/hectare + N<sub>90</sub>P<sub>90</sub>K<sub>60</sub> when as a result of combined influence of fertilizers the height of plant at the end of the vegetation period was 34,0-35,3 cm, the number of productive stems - 1,0-1,2 units, the length of the spike – 1,3-1,6 cm, the number of grains in the spike - 10,2-10,7 units and the mass of grains in the spike 0,30-0,33 grams and the mass of 1000 grains - 7,9-8,5 grams and these indicators were higher than in the control variant. At the usual sowing method at the variant of using 10 tons of manure/hectare + N<sub>120</sub>P<sub>120</sub>K<sub>90</sub> the height of plant at the end of vegetation period was 31,1-33,3 cm, the number of productive stems - 1,0-1,1 units, the length of the spike – 1,0-1,3 cm, the number of grains in the spike - 10,0-10,6 units and the mass of grains in the spike - 0,26-0,33 grams and the mass of 1000 grains - 7,8-8,0 grams. As a result of introduction mineral fertilizers together with the manure there were it was revealed that, the correlative relations between the structure indicators and the grain yield (cent/hectare) changed lawfully by years and variants.

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## SYNTHESIS AND BACTERICIDAL PROPERTIES SULFUR-CONTAINING 1,2-TRANS-GLYCOSIDES

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### ABSTRACT

The reactions of acetylated derivatives of allyl glycosides with phenylsulphenyl chloride in the presence of benzoyl peroxide catalyst were studied in the first. New sulfur-containing 1,2-trans-glycosides have been synthesized:  $\beta$ -O-(2-chloro-3-phenylthiopropyl)-2,3,4,6-tetra-O-acetyl-D-mannopyranose (3),  $\beta$ -O-(2-chloro-3-phenylthiopropyl)-2,3,4-tri-O-acetyl-L-rhamnopyranose (4),  $\beta$ -O-(2-chloro-3-phenylthiopropyl)-2,3,6,2',3',4',6'-hepta-O-acetylmaltose (7)  $\beta$ -O-(2-chloro-3-phenylthiopropyl)-2,3,6,2',3',4',6'-hepta-O-acetylcellobiose (8). Also 1,2-trans glycosides were prepared for the first time by condensation of acetylchlorohydrates with thiazolyl-containing heterocyclic amines. New sulfur-containing derivatives were synthesized: 1-N-(4-methyl-thiazolylethylamino)-5-O-(2,3,4,6-tetra-O-acetyl- $\beta$ -D-mannopyranosyl)-4,4,8,8-tetramethyl-2,3,6,7-dibenzo-9-oxabicyclo-(3,3,1) nonane (16) and 1-N-(4-methylthiazolylethylamino)-5-O-(2,3,4,6-tetra-O-acetyl- $\beta$ -L-rhamnopyranosyl)-4,4,8,8-tetra-methyl-2,3,6,7-dibenzo-9-oxabicyclo-(3,3,1)-nonane (17). After deacetylation (3,4,7,8), the bactericidal properties of compounds synthesized by us have been studied (9,10,11,12). The structure of synthesized compounds is confirmed by physicochemical methods of analysis.

**Keywords:** Allylglycosides, Phenylsulphenylchloride, Benzoylperoxide, Bactericidal characteristics, Hepta-O-acetylcellobiose, Hepta-O-acetylmaltose.

### აბსტრაქტი

ჩვენ მიერ შესწავლილია ალილგლიკოზიდების აცეტილირებული წარმოებულების რეაქციები ფენილსულფენილქლორიდთან ბენზოპეროქსიდის კატალიზატორის თანაობისას. სინთეზირებულია ახალი გოგირდშემცველი 1,2-ტრანს-გლიკოზიდები:  $\beta$ -O-(2-ქლორ-3-ფენილთიოპროპილ)-2,3,4,6-ტეტრა-O-აცეტილ -D-მანოპირანოზა (3),  $\beta$ -O-(2-ქლორ-3-ფენილთიოპროპილ)-2,3,4,-ტრი-O-აცეტილ-L-რამნოპირანოზა (4),  $\beta$ -O-(2-ქლორ-3-ფენილთიოპროპილ)-2,3,6,2',3',4',6'-ჰეპტა-O-აცეტილმალტოზა (7) და  $\beta$ -O-(2-ქლორ-3-ფენილთიოპროპილ)-2,3,6,2',3',4',6'-ჰეპტა-O-აცეტილცელობიოზა (8). ასევე, აცეტილქლორ-გლიკოზიდების კონდენსაციით თიაზოლის შემცველ ჰეტეროციკლურ ამინებთან პირველად იქნა მიღებული 1,2-ტრანს-გლიკოზიდები. სინთეზირებულ იქნა ახალი გოგირდშემცველი წარმოებულები: 1-N-(4-მეთილთიაზოლიეთილამინ)-5-O-(2,3,4,6-ტეტრა-O-აცეტილ- $\beta$ -D-მანოპირანოზილ)-4,4,8,8-ტეტრამეთილ-2,3,6,7-დიბენზო-9-ოქსაბიციკლო-(3,3,1)-ნონან (16) და 1-N-(4-მეთილთიაზოლიეთილამინ)-5-O-(2,3,4,6-ტეტრა-O-აცეტილ- $\beta$ -L-რამნოპირანოზილ)-4,4,8,8-ტეტრა-მეთილ-2,3,6,7-დიბენზო-9-ოქსაბიციკლო-(3,3,1)-ნონან (17). (3,4,7,8) დეზააციტილირების შემდეგ შესწავლილია ჩვენ მიერ სინთეზირებული ნაერთების (9,10,11,12) ბაქტერიციდული თვისებები. სინთეზირებულ ნაერთთა აგებულება დადგენილ იქნა ანალიზის ფიზიკურ-ქიმიური მეთოდებით.

**საკვანძო სიტყვები:** ალილგლიკოზიდები, ბენზოპეროქსიდი, ბაქტერიციდული მახასიათებლები, ჰეპტა-O-აცეტილცელობიოზა, ჰეპტა-O-აცეტილმალტოზა.

### INTRODUCTION

Recently, there has been broad prospects for the use of organic compounds containing sulfur, silicon, selenium, arsenic and other heteroatoms in agriculture, medicine and industry. It is known that organosulfur compounds serve to prevent the formation and growth of tumors (different forms of leukemia, Ehrlich tumors, sarcoma -180, etc.) [1,2]. At present, various organic and inorganic sulfur-containing compounds have been tested that have bactericidal and fungicidal properties and are successfully applied against a number of pathogenic microorganisms participating in biodegradation [3,4]. The biocidal

properties of sulfur-containing organic compounds have been comparatively little studied.

As is known, sulfur is a part of sulfur-containing amino acids - cysteine, cystine; irreplaceable amino acid-methionine, biological active substances (histamine, biotin, lipoic acid), etc. In medical practice, the use of sulfur is based on its ability to interact with organic substances of the body with the formation of sulfides and pantothenic acid, on the basis of which antimicrobial and antiparasitic effects depend [5-10].

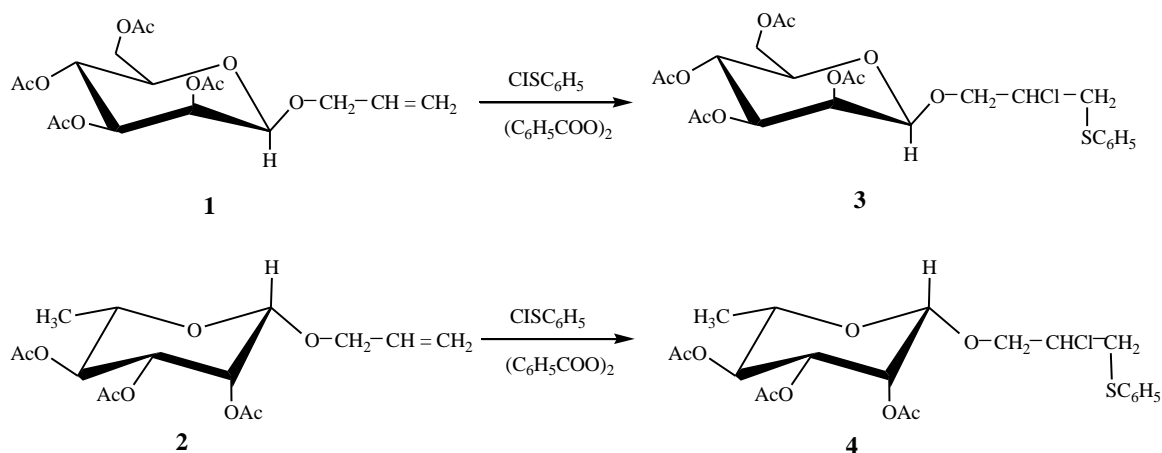
The use of glycosides for the modification of biologically active organic sulfur compounds can change, on the one hand, their biological and physiological effects, and on the other - to reduce their toxicity.

In a number of studies previously performed [11-19], we studied condensation reactions and synthesized 1,2-*trans*-glycosides. In the continuation of these studies, we synthesized new sulfur-containing derivatives of 1,2-*trans*-glycosides and investigated their bactericidal action.

## RESULTS AND DISCUSSION

In this work, the synthesis of sulfur-containing 1,2-*trans*-glycosides was carried out for the first time. Chlorosulfenylation of 1-O-allyl-2,3,4,6-tetra-O-acetyl- $\beta$ -D-mannopyranose (1) and 1-O-allyl-2,3,4,6-tetra-O-(2), new types of 1,2-*trans*-glycosides have been synthesized:  $\beta$ -O-(2-chloro-3-phenylthiopropyl)-2,3,4,6-tetra-O-acetyl-D-mannopyranose (3) and  $\beta$ -O-(2-chloro-3-phenyl-thiopropyl) -2,3,4,6-tetra-O-acetyl-L-rhamnopyranose (4) (Scheme 1):

**Scheme 1.**



Allyl derivatives of disaccharides of maltose and cellobiose were synthesized in a similar way: 1-O-allyl-hepta-O-acetyl-maltose (5) and 1-O-allyl-hepta-O-acetyl-cellobiose (7).

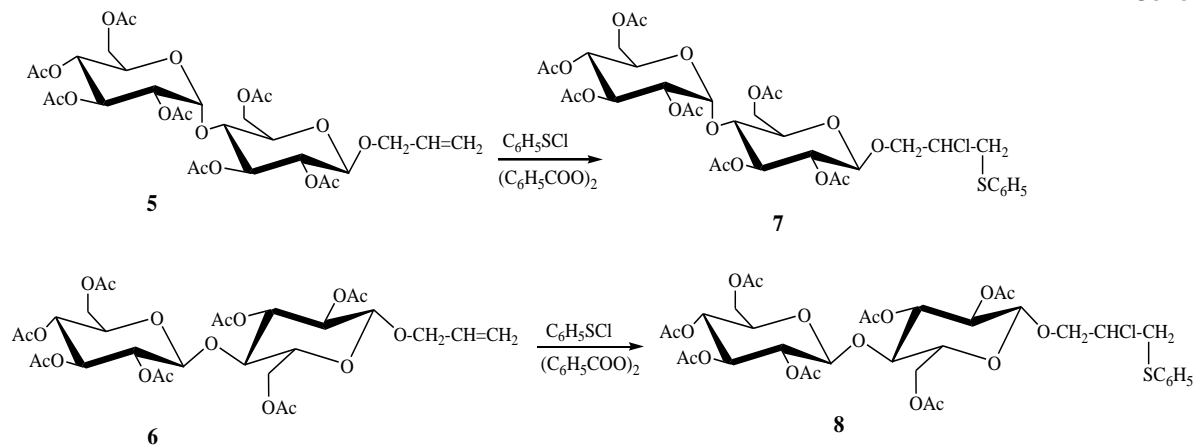
Chlorosulfenylation of allyl derivatives of (5) and (6) with phenylsulfonyl chloride in the presence of benzoyl peroxide catalyst, synthesized 1-O-(2-chloro-3-phenylthiopropyl) -2,3,6,2', 3', 4', 6'-hepta- O-acetyl maltose (7) and 1-O-(2-chloro-3-phenylthiopropyl)-2,3,6,2', 3', 4', 6'-hepta- O-acetyl-cellobiose (8), respectively (Scheme 2).

The reaction was carried out in dry chloroform, at a temperature of 35-45° C, in molar ratios of the reacting substances of 1:1, in the presence of a benzoyl peroxide catalyst  $(C_6H_5COO)_2$ , and we used benzoylperoxide as the catalyst for the first time.

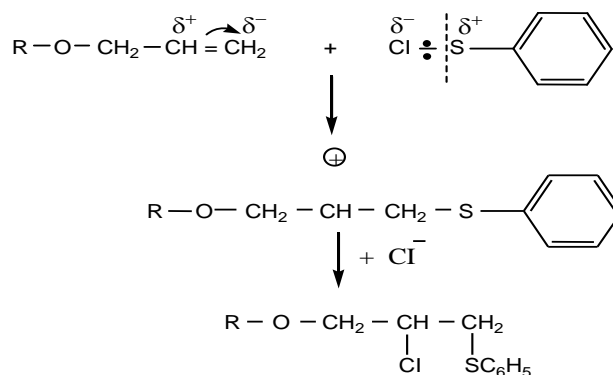
As a result, 1,2-*trans*-glycosides (3,4,7,8) were generally obtained, although the presence of 1,2-*cis* isomer was also detected in small amounts. The *cis-trans* isomers were separated on a column (benzene-chloroform system 3:2, silicagel L 50/100). Chromatographically pure products were obtained.

The reaction mechanism can be explained as follows: the addition reaction on the double bond is electrophilic, and on this basis, the electrophilic reagent  $(C_6H_5S^+)$  attacks the double bond. As is known, the electrophilic attack is characterized by a molecule containing an aromatic nucleus. At this time, the formation of carbocation occurs, and the nucleophilic attack of chlorine ion gives the corresponding products (3,4,7,8) (Scheme 3).

Scheme 2.

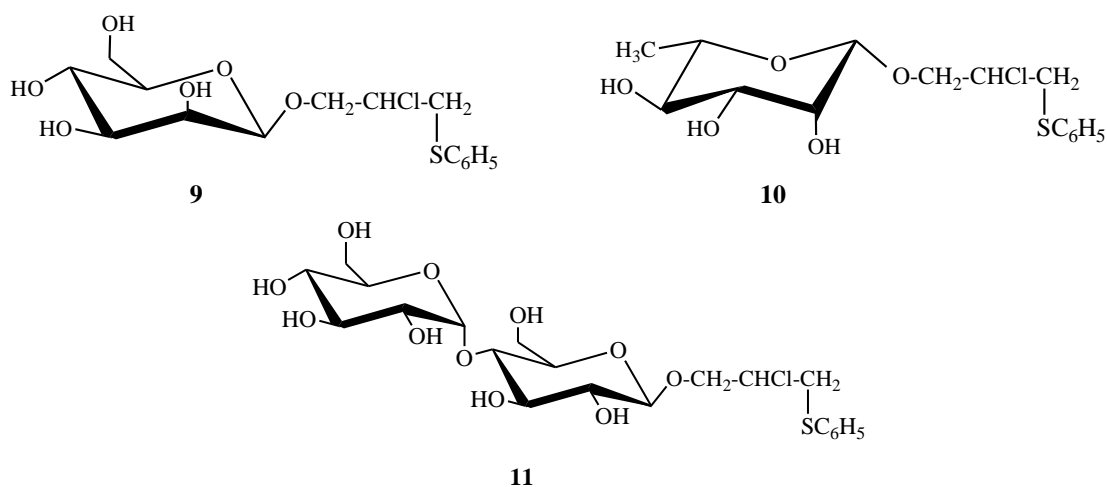


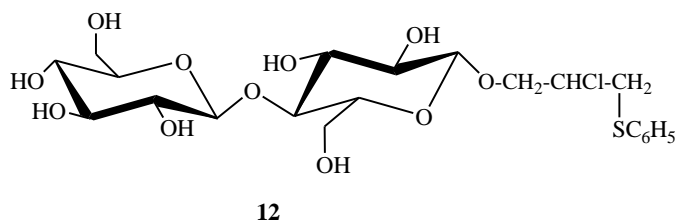
Scheme 3.



To detect the bactericidal properties of the 1,2-*trans*-glycosides we synthesized (3,4,7,8), after deacetylation,  $\beta$ -O-(2-chloro-3-phenylthiopropyl)-D-mannopyranose (9),  $\beta$ -O-(2-chloro-3-phenylthiopropyl)-L-rhamnopyranose (10), 1-O-(2-chloro-3-phenylthiopropyl)-maltoses (11) and 1-O-(2-chloro-3-phenylthiopropyl)-cellobiose (12) (Scheme 4). Their influence on the growth and development of some microorganisms was tested.

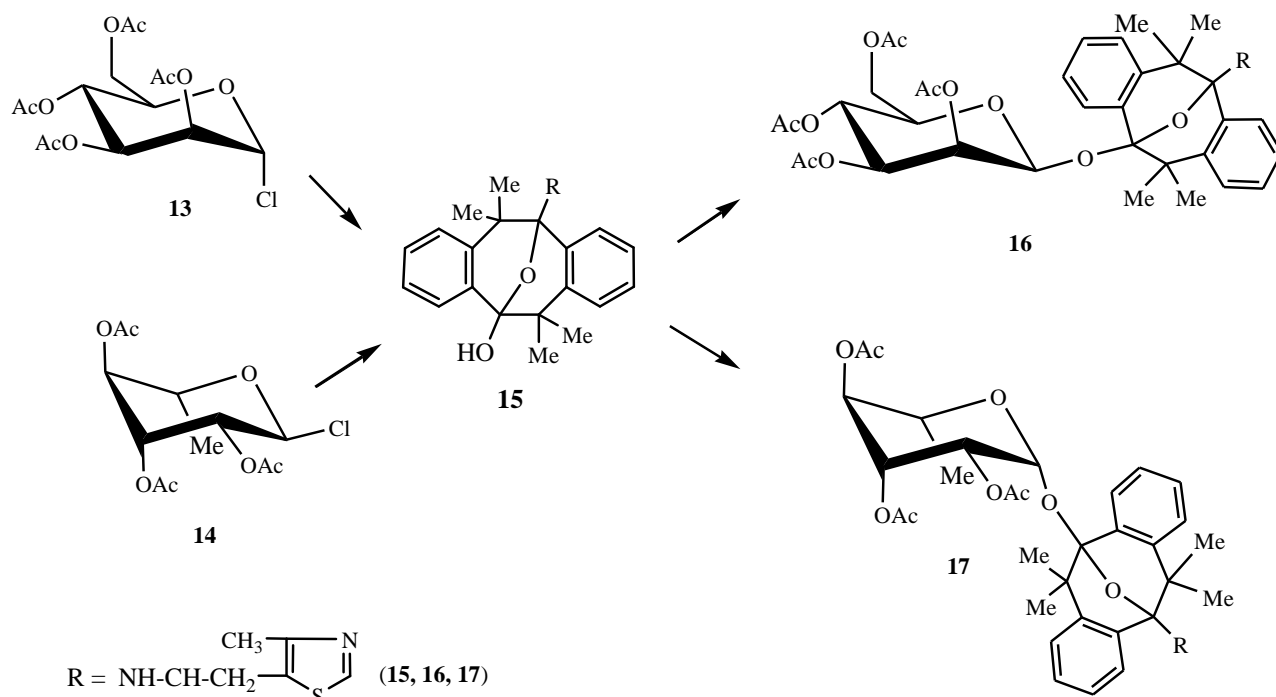
Scheme 4.





In this work, the synthesis of 4-methylthiazolyl 1,2-*trans*-glycosides, where the starting compound was 1-chloro-2,3,4,6-tetra-O-acetyl- $\alpha$ -D-mannopyranose (13) and 1-chloro-2,3,4,6-tetra-O-acetyl- $\alpha$ -L-rhamnopyranose (14). As is known, glycosyl halides play an important role in the chemistry of carbohydrates and serve as the starting compounds for the synthesis of a variety of sugar derivatives along the glycosidic center [20]. A study of recent years has shown that in biological and pharmacological studies, the synthesis of low-toxicity compounds becomes topical. Therefore, it is of interest to use carbohydrates to modify some heterocyclic compounds, which can lead to a significant change in the nature of the action of the drugs [21]. By condensation of the acylhalogen glycosides (13) and (14) with 4,4,8,8-tetramethyl-2,3,6,7-dibenzo-9-oxabicyclo-(3,3,1)-nonane-1-N-(4-methylthiazolylethylamino)-5-ol (15), 1-N-(4-methylthiazolylethylamino)-5-O-(2,3,4,6-tetra-O-acetyl- $\beta$ -D-mannopyranosyl) was synthesized 4,4,8,8-tetramethyl-2,3,6,7-dibenzo-9-oxabicyclo-(3,3,1)-nonane (16) and 1-N-(4-methylthiazolylethylamino)-5-O-(2,3,4,6-tetra-O-acetyl- $\beta$ -L-rhamnopyranosyl)-4,4,8,8-tetramethyl-2,3,6,7-dibenzo-9-oxabicyclo-(3,3,1)-nonane (17) (Scheme 5).

**Scheme 5.**

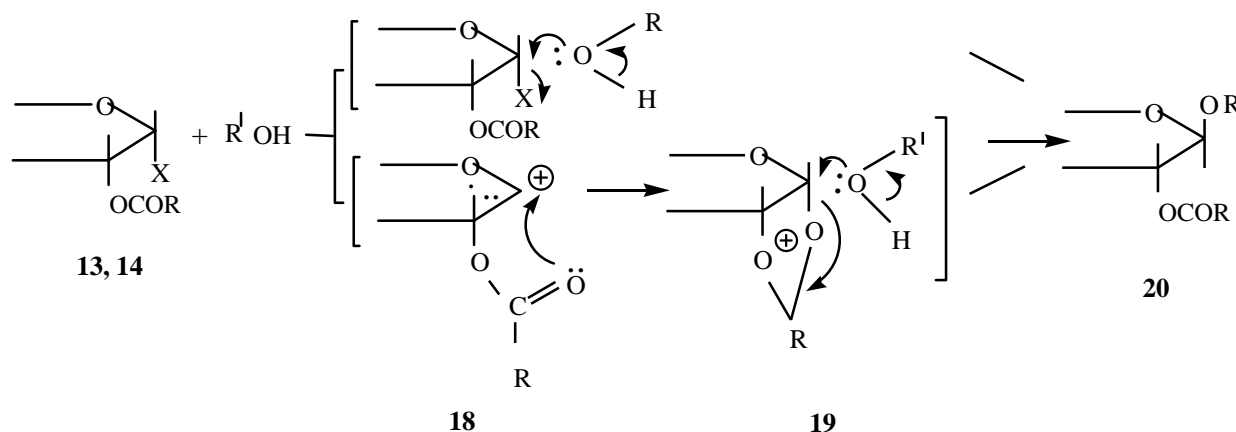


The reaction was carried out at a temperature of 30-35° C in the presence of a catalyst - freshly prepared silver carbonate in an ether solution. The reaction was monitored by thin layer chromatography. Reactions lasted mainly 12-14 hours. As a result, 1,2-*trans*-glycosides (16,17) were generally obtained, although the presence of 1,2-*cis* isomer was also detected in small amounts. The *cis-trans* isomers were separated on a column.

The mechanism of obtaining 1,2-*trans*-glycosides from  $\alpha$ -chloro derivatives (13,14) of sugars can be explained thus: the halogen atom in acylhalogenoses easily undergoes nucleophilic substitution. Nucleophilic substitution at the glycoside center can proceed both according to the S<sub>N</sub>1 mechanism and the S<sub>N</sub>2 mechanism. In accordance with the regularities of the stereochemistry of these reactions, partial or complete racemization with a glycoside center or the inversion of a configuration can occur simultaneously with replacement. Nucleophilic substitution in the derivatives of cyclic forms of sugars proceeds with the participation of a neighboring acyloxy group. Condensation with reversed configuration at C1

leads to 1,2-*trans*-glycosides. The resulting glycosyl cation (18) is immediately stabilized by the intramolecular nucleophilic attack of the ester group at C2 to form a cyclic ion (19). The attack of alcohol on the glycoside center of this ion leads to 1,2-*trans*-glycosides (20). The reaction proceeds without the isolation of anomeric mixtures (stereospecifically), due to stereochemical control through the participation of a neighboring acyloxygroup (Scheme 6):

Scheme 6.

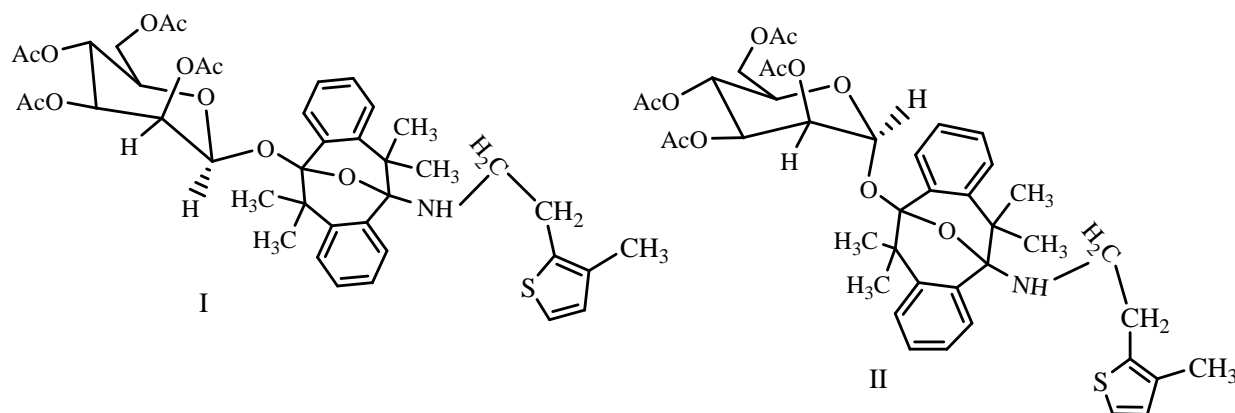


To theoretically substantiate the direction of the reactions, the condensation of 1-chloro-2,3,4,6-tetra-O-acetyl- $\alpha$ -D-mannopyranose (13) and 1-chloro-2,3,4,6-tetra-O-acetyl- $\alpha$ -L-rhamnopyranoses (14) with 4,4,8,8-tetramethyl-2,3,6,7-dibenzo-9-oxabicyclo-(3,3,1)-nonane-1-N-(4-methyl-thiazolylethylamino)-5-ol (15), we performed quantum chemical calculations.

The calculations were performed using CS MOPAC 2000 version 1.11. Before each computation by the method AM1 (Austin Model 1), the optimization of the connection was carried out-energy minimization, both by molecular mechanics (MM) method and quantum chemical method [22].

As a model reaction, condensation of 1-chloro-2,3,4,6-tetra-O-acetyl- $\alpha$ -D-mannopyranose (13) with 4,4,8,8-tetramethyl-2,3,6,7-dibenzo-9-oxabicyclo-(3,3,1)-nonane-1-N-(4-methylthiazolyl-ethylamino)-5-ol (15). Two possible ways of the reaction are considered: to form 1,2-*trans*-glucoside (structure I) and to form 1,2-*cis*-glucoside (structure II) (Scheme 7).

Scheme 7.



Calculation of the heat of formation of reaction products showed that the thermodynamically advantageous structure is the product of structure I with  $\Delta N = -922.77$  kJ/mol, and  $\Delta H_{\text{reak}} = -10.84$  kJ/mol (product of the II structure  $\Delta N = -844.88$  kJ/mol, and  $\Delta H_{\text{reak}} = -7.27$ ), which is confirmed by  $^1\text{H}$  NMR spectroscopy. In the  $^1\text{H}$ -NMR spectra of the resulting compounds 16 and 17, the signals of the anomeric proton H-1 bound to C-1 are located in the region  $\delta = 4.45$ -5.60 and



the splitting as a result of interaction with hydrogen atoms at C-2 into two lines with a spin constant spin interaction  $J_{1,2} = 8.0$  Hz. This value is characteristic for the axial-axial arrangement of interacting atoms (1,2-*trans*-glycosides).

The structure of the synthesized compounds was confirmed by data from elemental, polarimetric, IR, <sup>13</sup>C NMR and <sup>1</sup>H-NMR spectrometric analysis.

## EXPERIMENTAL PART

The purity and individuality of the products were determined by thin layer chromatography, as well as by the determination of physical constants. The IR spectra of the samples were obtained on a UR-20 spectrometer in KBr tablets. The purity of the compounds obtained and the  $R_f$  values were determined on Silufol UV-254 using solvent systems: methanol-chloroform, 1: 5 (system a), benzene-chloroform, 3:2 (system b) and toluene-chloroform, 2:1 (system c). <sup>13</sup>C NMR spectra were recorded on a Bruker AM-300 (75.5 and 300 MHz) spectrometer in deuteriochloroform, and <sup>1</sup>H-NMR spectra were recorded on a Bruker WM-250 spectrometer (250 MHz, CDCl<sub>3</sub>), and the internal standard Me<sub>3</sub>Si. Optical rotation was measured on a universal saccharimeter SU-3 at 20 ± 22° C.

Acetylated O-allyl glycosides were synthesized as described [9]. Synthesis of 1-chloro-2,3,4,6-tetra-O-acetyl- $\alpha$ -D-manno-(L-rhamno)pyranose (13,14) is described in [18], and heterocyclic amine (15) - was prepared by the procedure [19].

**$\beta$ -O-(2-chloro-3-phenylthiopropyl)-2,3,4,6-tetra-O-acetyl-D-mannopyranose (3).** A mixture of phenylsulfonyl chloride (1.46 g, 0.01 mol) in dry chloroform (15 ml) and benzoyl peroxide (0.1 g) was treated with a solution of 1-O-allyl-2,3,4,6-tetra-O-acetyl- $\beta$ -D-mannopyranose 1) (3.88 g, 0.01 mol) in dry chloroform (30 ml). The reaction was carried out under N<sub>2</sub> with constant stirring for 3 h (35-44° C). The mixture was cooled and separated into a column (system a, silicagel L 50/100) to obtain a chromatographically pure product (3) (3.34 g, 62.8%); mp. 126-127.0° C;  $[\alpha]_D^{20} + 18.20$  (c 0.52, CHCl<sub>3</sub>);  $R_f$  0.61(system a). Found: S, 6.34; C<sub>23</sub>H<sub>29</sub>O<sub>10</sub>SCI. Calculated, %: S 6.00.

In the IR spectrum, there were no characteristic absorption bands for allyl groups at 1643-1700 cm<sup>-1</sup>. The absorption bands were observed at ( $\nu$ , cm<sup>-1</sup>): 539.594 (C-S); 3070 (C-X<sub>arom</sub>); 686.739 (C-Cl); 2928 (CH<sub>2</sub>); 2853 (CH<sub>3</sub>), 1715 (C = O).

<sup>13</sup>C NMR ( $\delta$ , ppm): 14.202 (RO-CH<sub>2</sub>-CHCl-CH<sub>2</sub>-); 24.58 (RO-CH<sub>2</sub>-CHCl-CH<sub>2</sub>-); 70.42 (RO-CH<sub>2</sub>-CHCl-CH<sub>2</sub>-); 22.215-30.083 (RO-CO-CH<sub>3</sub>); 31.972-37.445(-CH<sub>2</sub>); 77.743; 77.103; 76.470; 62.6 (C<sub>2-5</sub>); 60.9 (C-6); 127.160-137.0.31 (C<sub>6</sub>H<sub>5</sub>); 177.7 (RO-CO-CH<sub>3</sub>).

**1-O-(2-chloro-3-phenylthiopropyl)-2,3,4,6-tetra-O-acetyl- $\beta$ , L-rhamnopyranose (4)** was prepared analogously by the addition of phenyl sulfonyl chloride (1.46 g, 0.01 mol) in 1-O-allyl-2,3,4,6-tetra-O-acetyl- $\beta$ -L-rhamnopyranose (3.62 g, 0.01 mol) into a benzoyl peroxide catalyst (0.1 g). The reaction was carried out under N<sub>2</sub> with constant stirring for 3.5 hours (30-40° C; Yield 2.9 g (54.5%); m.p.117-118° C;  $[\alpha]_D^{20} + 11.20$  (c 0.63, CHCl<sub>3</sub>);  $R_f$  0.71 (system a). Found: S, 5.71; C<sub>23</sub>H<sub>29</sub>O<sub>10</sub>SCI. Calculated %: S 6.00.

IR ( $\nu$ , cm<sup>-1</sup>): 541.590 (C-S); 3063 (C-N<sub>ar</sub>); 680, 743 (C-Cl); 2964.50 (CH<sub>2</sub>); 2858.4 (CH<sub>3</sub>); 1725 (C = O); 1120, 1030 (C-O-C).

<sup>13</sup>C NMR ( $\delta$ , ppm): 16.166 (RO-CH<sub>2</sub>-CHCl-CH<sub>2</sub>-); 18.25 (RO-CH<sub>2</sub>-CHCl-CH<sub>2</sub>-); 70.43 (RO-CH<sub>2</sub>-CHCl-CH<sub>2</sub>-); 19.302-25.002 (RO-CO-CH<sub>3</sub>); 94.6 (C-1); 72.403, 73.865, 72.9, 73.1 (C<sub>2-5</sub>); 18.4 (C-6); 126.153-134.213 (C<sub>6</sub>H<sub>5</sub>); 175.6 (RO-CO-CH<sub>3</sub>).

**1-O-(2-chloro-3-phenylthiopropyl)-2,3,6,2',3',4',6'-hepta-O-acetyl- $\beta$ , D-cellobiose (8).** A mixture of phenylsulfonyl chloride (1.46 g, 0.01 mol) in dry chloroform (15 ml) and benzoyl peroxide (0.1 g) was treated with a solution of 1-O-allyl-2,3,6,2',3',4',6'-hepta-O-acetyl- $\beta$ -D-maltose (5) (6.76 g, 0.01 mole) in dry chloroform (40 ml). The reaction was carried out with N<sub>2</sub> with constant stirring for 4 hours (30-45°). The mixture was cooled and separated on a column (system c, silicagel L 50/100) to give chromatographically pure product 6 (4.89 g, 59.7%); m.p.121-122.50° C;  $[\alpha]_D^{20} + 15.70$  (c 0.51, CHCl<sub>3</sub>);  $R_f$  0.66 (system a). Found: S, 6.34; C<sub>23</sub>H<sub>29</sub>O<sub>10</sub>SCI. Calculated, %: S 6.00.

In the IR spectrum, there were no bands at 1642-1661 cm<sup>-1</sup>, characteristic of allyl groups. The characteristic bands were observed at 1060, 1146 cm<sup>-1</sup> (C-O-C); 543, 602 (C-S); 692, 737 (C-Cl); 2925 (CH<sub>2</sub>); 2851 (CH<sub>3</sub>); 1722 (C = O).

<sup>13</sup>C NMR ( $\delta$ , ppm): 168.7-175.8 (7RO-CO-CH<sub>3</sub>); 60.980 (R-O-CH<sub>2</sub>-); 100.8 (C-1); 92.0 (C-1');

61.8 (C-6); 61.4(C-6'); 77.5, 76.65, 71.05, 70.8, 67.8, 66.8(C<sub>2-5</sub>, C<sub>2'-5'</sub>); 29.724-29.384(-CH<sub>2</sub>-); 127.2-137.085 (C<sub>6</sub>H<sub>5</sub>).

**General procedure of deacetylation.** A suspension of 0.001 mole of Compound 3,4,7,8 in 20-40 ml of absolute methanol was heated in a water bath with 4.5-10 ml of 0.1 N sodium methoxide solution and the resulting solution was left overnight. Filtered, the filtrate was concentrated on a water jet pump, and absolute ether was added to the remaining mass until the crystals were isolated. Filtered, recrystallized from hexane. 9, 10, 11 and 12 were obtained.

**1-N-(4-methylthiazolyethylamino)-5-O-(2,3,4,6-tetra-O-acetyl-β-D-mannopyranosyl)-4,4,8,8-tetramethyl-2, 3,6,7-dibenzo-9-oxabicyclo-(3,3,1)-nonane (16).** To a mixture of 0.733 g (0.002 mol) of 1-chloro-2,3,4,6-tetra-O-acetyl-α-D-mannopyranose (13) in 50 ml of dry ether and 1.08 g (0.0025 mol) of compound (15) 0.11 g of freshly prepared silver carbonate was added. The reaction was carried out in a nitrogen atmosphere with constant stirring for 12 hours (30-35° C). After filtration and evaporation of the filtrate, the remaining syrup was dissolved in chloroform, treated with activated carbon and again evaporated in vacuo. After separation on a column (system C, silicagel L 50/100), a chromatographic pure product (16) was obtained, yielding 1.00 g (65.5%); R<sub>f</sub> 0.63 (system a); M.p. 152-153.1°; [α]<sub>D</sub><sup>18</sup> +30.5° (c 0.52, CHCl<sub>3</sub>); Found: C 62.05, H 7.15, N 3.2, S 3.95; C<sub>40</sub>H<sub>48</sub>O<sub>11</sub>N<sub>2</sub>S. Calculated, %: C 62.82, H 6.28, N 3.8, S 4.18.

IR spectrum (ν, cm<sup>-1</sup>): 1370-1390 (gem-dimethyl group), 1050-1180 (C-O-C); 2910 (NH); 1725 (C = O); 680 (C-S-C); 2977, 1340 (CH<sub>3</sub>); 580-620 (C-H<sub>arom</sub>).

<sup>1</sup>H-NMR (δ, ppm J/Hz), Me<sub>3</sub>Si: 4.46 (1H, dd, J<sub>1,2</sub> = 8.0, H-1); 5.0 (1H, dd, J<sub>2,1</sub> = 8.0, J<sub>2,3</sub> = 9.5, H-2); 3.71 (1H, dd, J<sub>3,2</sub> = 9.5, J<sub>3,4</sub> = 3.0, H-3); 5.21 (1H, dd, J<sub>4,3</sub> = 3.0, J<sub>4,5</sub> = 9.5, H-4); 3.87 (1H, ddd, J<sub>5,4</sub> = 9.5, J<sub>5,6</sub> = 5.0, J<sub>5,6'</sub> = 2.5, H-5) 4.14 (1H, H-6'; dd, J<sub>6',6''</sub> = 12, J<sub>6',5</sub> = 2.5, CH<sub>2</sub>O-COCH<sub>3</sub>); 4.20 (1H, H-6'', dd, J<sub>6'',6'</sub> = 12, J<sub>6'',5</sub> = 5.0, CH<sub>2</sub>O-COCH<sub>3</sub>); 2.21, 2.10, 1.98, 1.93 (12H, m, 4CO-CH<sub>3</sub>); 9.98 (1H, CH, thiazoline), 7.14-7.5 (8H, m, protons of the aromatic ring), 3.2-2.2 (4H, m, NH-CH<sub>2</sub>-CH<sub>2</sub>), 3.34 (1H, s, NH), 1.44 and 1.46 (12H, dimethyl groups, 4CH<sub>3</sub>).

<sup>13</sup>C NMR (δ, ppm): CDCl<sub>3</sub>: 95.4 (C-1); 78.6 (C-2); 75.8 (C-3); 72.4 (C-4); 70.2 (C-5); 63.0 (C-6); 167-171.5 (4COCH<sub>3</sub>); 12.2-21.4 (4COCH<sub>3</sub>); 46.52 and 44.74 (2C(CH<sub>3</sub>)<sub>2</sub>); 24.34 and 24.12 (2C(CH<sub>3</sub>)<sub>2</sub> heme-dimethyl group); 156.8, 138.4, 59.8, 45.3, 153.1, 133.5, 64.2, 45.20 (C<sub>1-8</sub> cyclooctal ring), 124,38; 120,27; 133,92; 113,86 (C<sub>1-4'</sub> benzene nucleus I), 120,61; 129.68, 119.04, 125.73 (C<sub>1-4''</sub> benzene nucleus II); 49.6 (NH-CH<sub>2</sub>-); 32.7 (NH-CH<sub>2</sub>-CH<sub>2</sub>-); 161.6 и 163.64 (-C=C-); 70.2 (-N=CH-).

**1-N-(4-methylthiazolyethylamino)-5-O-(2,3,4,6-tetra-O-acetyl-β-D-rhamnopyranosyl)-4,4,8,8-tetramethyl-2,3, 6,7-dibenzo-9-oxabicyclo-(3,3,1)-nonane (17).** Similarly, by condensing 0.733 g (0.002 mole) of 1-chloro-2,3,4,6-tetra-O-acetyl-α-D-galactopyranose (14) in 50 ml of dry ether and 1.08 g (0.0025 mol) of the compound (15) in the presence of 0.11 g of freshly prepared silver carbonate, the compound (17) was synthesized in a nitrogen atmosphere with constant stirring for 14 hours (30-35 ° C). After separation on a column (system c, silica gel L 50/100), a chromatographically pure product was obtained in 1.00 g (64.51%) yield: R<sub>f</sub> 0.64 (system a); M.p. 152-153.5 °C; [α]<sub>D</sub><sup>18</sup> +31.6° (c 0.52 CHCl<sub>3</sub>); Found, %: C 62.45, H 6.15, N 3.34, S 3.95; C<sub>40</sub>H<sub>48</sub>O<sub>11</sub>N<sub>2</sub>S. calculated, %: C 62.82, H 6.28, N 3.66, S 4.18.

IR spectrum (ν, cm<sup>-1</sup>): 1370-1380 (gem-dimethyl group), 1040-1120 (C-O-C); 2923 (NH); 1715 (C=O); 720 (C-S-C); 2854, 1627 (CH<sub>3</sub>); 580-600 (C-H<sub>arom</sub>).

<sup>1</sup>H-NMR (δ, ppm J/Hz), Me<sub>3</sub>Si: 5.60 (1H, dd, J<sub>1,2</sub> = 8.0 H-1); 5.28 (1H, dd, J<sub>2,1</sub> = 8.0, J<sub>2,3</sub> = 9.5 H-2); 4.95 (1H, dd, J<sub>3,2</sub> = 9.5, J<sub>3,4</sub> = 3.0 H-3); 5.30 (1H, dd, J<sub>4,3</sub> = 3.0, J<sub>4,5</sub> = 9.5 H-4); 3.94 (1H, ddd, J<sub>5,4</sub> = 9.5, J<sub>5,6</sub> = 5.0, J<sub>5,6'</sub> = 2.5 H-5); 4.12 (1H, H-6'; dd, J<sub>6',6''</sub> = 12, J<sub>6',5</sub> = 2.5, CH<sub>2</sub>O-COCH<sub>3</sub>); 4.20 (1H, H-6'', dd, J<sub>6'',6'</sub> = 12, J<sub>6'',5</sub> = 5.0 CH<sub>2</sub>O-COCH<sub>3</sub>); 2.08, 2.10, 1.98, 1.93 (12H, m, 4CO-CH<sub>3</sub>); 8.90 (1H, c, CH thiazoline); 7.1-7.4 (8H, m, protons of the aromatic ring); 3.0-2.3 (4H, m, NH-CH<sub>2</sub>-CH<sub>2</sub>); 3.32 (1H, c, NH); 1.44 and 1.45 (12H, c, dimethyl groups), 4CH<sub>3</sub>); 2.05 (CH<sub>3</sub>).

<sup>13</sup>C NMR (δ, ppm): CDCl<sub>3</sub>: 105.2 (C-1); 78.2 (C-2); 79.1 (C-3); 74.5 (C-4); 68.7 (C-5); 62.0 (C-6); 165.2-170.4 (4COCH<sub>3</sub>); 16.4-22.6 (4COCH<sub>3</sub>); 46.52 and 44.74 (2C(CH<sub>3</sub>)<sub>2</sub>); 24.34 and 24.13 (2C(CH<sub>3</sub>)<sub>2</sub> (heme-dimethyl group); 150.7, 124.1, 62.0, 49.3, 148.7, 130.1, 61.0, 46.8 (C<sub>1-8</sub> cyclooctal ring); 125.2, 121.0, 127.2, 108.4 (C<sub>1-4'</sub> benzene nucleus I); 118.8, 122.4, 116.05, 120.21 (C<sub>1-4''</sub> benzene nucleus II); 41.2 (NH-CH<sub>2</sub>-); 18.6 (NH-CH<sub>2</sub>-CH<sub>2</sub>-); 159.7 и 160.3 (-C=C-); 66.7 (-N=CH-); 18.6 (CH<sub>3</sub>).

## EXPERIMENTAL BIOLOGICAL PART

The bactericidal activity of the synthesized compounds was determined by the method of wells using the following microorganisms: Xantomonas compestris (causes white-headed cabbage bacteriosis), Actinomycesgriseus, Actinomyces

streptomycini.

For cultivation of bacteria, Burkholter medium was used (potato broth - 1 l, peptone - 5 g, Na<sub>2</sub>HPO<sub>4</sub> - 2 g, NaCl - 2 g, glucose - 6 g, lemon-acid broth - 1 g, asparagine - 1 g, agar - 20 g, distilled water - 1 L, for actinomycetes - medium Krasilnikova (KNO<sub>3</sub> - 1 g, K<sub>2</sub>HPO<sub>4</sub> - 0.5 g, HgSO<sub>4</sub> - 0.5 g, NaCl -0.5 g, FeSO<sub>4</sub> (traces), CaCO<sub>3</sub> - 1 g, starch - 20 g.) After 6-day incubation for actinomycetes and a 2-day period for the bacteria, the sterile zones around the wells were examined and the solvent was ethyl alcohol-chloroform (1:1).

Synthesized compounds show a selective influence on the growth and development of various microorganisms. Thus, with c = 1.0 g/l, compounds 9 and 11 have a high activity against *Actinomyces griseus* (oppression zones of 7.0 and 10.0 mm, respectively).

Moderate activity with respect to *Actinomyces streptomycini* was found in compounds 9, 10, 11, 12 (zone of oppression 4.0 mm). With regard to the phytopathogenic bacterium *Xantomonas compestris*, only compound 9 was active, although the activity is low (the zone of oppression is 2 mm).

It has been found that Compounds 9 and 11, having a high activity, in their molecule, in addition to the phenyl group and chlorine (like the other compounds) contain mannose and α-glucose, which, in our opinion, 9 and 11 differs from other compounds.

**Table 1.**

**Effect of 1,2-trans-glycosides (9-12) on the growth and development of microorganisms**

Test microorganisms	9		10		11		12		Control
	Zone of oppression of microorganisms, mm at c, g/l								C <sub>2</sub> H <sub>5</sub> OH-CHCl <sub>3</sub> 1 : 1
	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1	
<i>Actinomyces griseus</i>	10.0	7.0	3.0	2.0	7.0	4.0	3.0	1.0	0.5
<i>Actinomyces streptomycini</i>	4.0	2.5	4.0	1.5	3.5	2.5	4.0	1.5	0.4
<i>Xantomonas compestris</i>	2.0	0.0	0.5	0	1.0	0.5	0	0	0.1

The results of the study make it possible to identify biologically active groups in the investigated compounds and to establish some correlation between the structure and biocidal activity, which is promising for a purposeful search for new compounds with a preliminary prediction of their biological properties.

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## GEORGIAN TOURISM INDUSTRY – SPECIFICATIONS OF DEVELOPMENT, PROBLEMS, PROSPECTIVE

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### ABSTRACT

Tourism development is one of the priority directions of the Georgian economy, since this sector significantly ensures the socio-economic growth of the country, hence, raising the level of living of the population.

Therefore, in the modern stage, it is vitally necessary to implement state policy in the country, which will facilitate solving problems in the field of tourism and sustainable development of the sector. These are the issues discussed in the work – “Georgian Tourism Industry – Specifications of Development, Problems, Prospective”. The article notes that despite the many political and socio-economic problems accumulated in the country, travelers and tourists flows intensively, which is a positive result of the development of the sector. However, unfortunately, the negative impact of humanity on the nature is strengthened, which is evident in most types of tourism.

The article indicates the possibility of avoiding negative ecological processes with reasonable management of anthropogenic negative impact. These requirements are most fully answered by ecological tourism - controlled form of the natural tourism.

The research proves that the mass scale of tourism causes not only a negative ecological impact on nature, in addition, it can not answer the challenges facing the country - the sustainable development of the country and the increase in income from tourism, increasing the importance of the sector.

As a result of the survey, it is confirmed that for the substantial increase of income received from the tourism service of Georgia is necessary to change the structure of the visitors arriving in the country; In particular, to increase the number of tourists with high paying potential at the expense of decreasing share of mass tourists.

To do this, it is necessary to develop and implement such activities, which will make Georgia's natural and cultural resources as world-class tourist products and creates the possibility of making unique impressions. It will facilitate attracting high-paying contingent from EU countries, North America and Asia.

The number of tourists with such potential would reduce the risk factors associated with environment and finances and ensure the increase of the state treasury, as well as ensured the socio-economic development of the country and the importance of the sector. The complex of the event is proposed the practical implementation of which promotes tourism business development to improve macroeconomic, institutional, social and legal environment; The necessity of development of tourism business development strategy and action plan is proven.

**Keywords:** Georgia; Tourism; Industry; Protected areas; High Payment Skills

### RESUME

Theoretical-methodological basis of research is the fundamental provisions of economic theory, the works of foreign and Georgian scientists in the field of tourism, which are based on the spirit of Western economic thinking and research.

The paper uses legislative and normative acts adopted in relation to tourism development in the country, Government Resolutions, Higher Education Institutions and Research Centers and International Conference Materials, as well as information obtained through the internet network.

Quantitative and qualitative analyzes of the economic events and statistical analysis methods are used in the processing of the research.

Various aspects of the selected community have demanded to focus on determining the goals and objectives. Taking into

consideration the level of development of the country's tourism industry in various aspects, the purpose of the study research was to analyze the features of the abovementioned sectors in interconnection with the protected areas.

Special attention was paid to the growth of mass tourism development and studying anthropogenic processes on the possibility of avoiding its negative ecological impact, as well as its reasonable management, as well as on environmental tourism development issues, which is based on the comprehending of the nature, the gratitude of the country, the sustainable development of the country and regions, etc.

In addition, the goal of the research was to identify the shortcomings and problems of the essential character in the field, which prevented further development and growth of tourism industry.

To achieve this goal, specific recommendations and conclusions of overcoming were elaborated. Based on this, the following tasks were identified:

- Justification of the characteristics and significance of the role of tourism industry in the world and the country's economic development;
- Determining the hazardous factors of accelerated development of tourism in the country and setting up specific ways of overcoming it.

The main findings of the research are the development of the tourism industry and the increasing the main characteristics and putting forward the key problems on the modern stage of country development. Development of tourism of the whole country and economic prosperity greatly depend on solving of these problems. The news received in the research can be as follows:

- The modern state of tourism industry development has been studied including given natural-recreational resources, as well as economic-statistical analysis of the usage of protected natural areas;
- Theoretical-methodological basis for acceleration of tourism development has been worked out. The main ways and directions for its development have been established, conclusions and proposals have been developed.

Analysis of the economic-statistical material presented shows that the volume of revenue received from ecotourism is modest in spite of the greatest potential in the country and can not respond to existing challenges - overcoming poverty, creating new working places, raising socio-economic welfare of the population, and so forth.

To get high volume revenue from tourism services of the country's protected areas here, and in other areas of Georgia (where there is a potential), the world-class skiing, mountainous, adventure, recreational treatment, marine and other directions of tourism which have less negative impact on the living environment.

It has also been established that these measures are not sufficient for solving existing problems.

As foreign experience has proven, the most realistic way to increase revenue from tourism services is to change the structure of visitors in the country. In particular, to increase the number of tourists with high paying potential at the expense of decreasing share of mass tourists. To do this, it is necessary to develop and implement such activities, which will make Georgia's natural and cultural resources as world-class tourist products and creates the possibility of making unique impressions. It will facilitate attracting high-paying contingent from EU countries, North America and Asia.

As a result of the amount spent by visitors of this category, the contribution of tourism to the growth and development of the Georgian economy will increase. More attention will be paid to Georgia's natural and cultural resources as world-class tourist products and turn it into the possibility of making unique impressions, as well as paying more attention to the visitor's high ability to pay and diversity rather than the number of visitors. The amount of such contingency would reduce the risks associated with environment and finances, it would increase the income, increase economy and increase socio-economic well-being of the population.

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## AN UNUSUAL CASE OF A PREVIOUSLY HEALTHY CHILD WITH ACUTE TONSILLITIS DUE TO *P. AERUGINOSA* INFECTION

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### ABSTRACT

*Pseudomonas aeruginosa* is an opportunistic bacterium that usually affects immune compromised patients, causing infections whose signals and symptoms are related to the affected organ. *Pseudomonas* Exotoxin A (PE) is the most toxic virulence factor of the pathogenic bacterium *Pseudomonas aeruginosa*. Diphtheria and *Pseudomonas* A toxins inactivate the translocating enzyme, elongation factor 2 [EF-2], by catalyzing the transfer of the adenosine diphosphate ribose moiety (ADPR) from NAD onto EF-2. Despite the fact that the reaction catalyzed by toxin A is indistinguishable from that catalyzed by diphtheria toxin s-t3 these two toxins are not identical. Diphtheria toxin and *Pseudomonas* A toxin lack immunological cross reactivity. The patient presented in this article was 11 months old boy. The purpose of this article is to report the case of a patient affected by *Pseudomonas aeruginosa* infection (tonsillitis) in the early childhood and to describe its similarity with diphtheria.

**Keywords:** *Pseudomonas aeruginosa*, exotoxin, infection, diphtheria.

### INTRODUCTION

The genus *Pseudomonas* comprehends gram-negative microorganisms with more than 100 species. The most frequent species is *the Pseudomonas aeruginosa*, which is responsible for 70% of infections of this genus. It is an invasive and opportunistic microorganism, since it causes infections in human beings whose defenses are altered. Immunocompromised, recently operated and burned patients in hospitals are susceptible hosts of this kind of infection (1). However, this bacillus can also be found in the skin, throat and intestinal flora of healthy individuals (2). The most frequently isolated organisms with patients of tonsillitis *Staphylococcus aureus* (70%) which was found to be the principal causative agent across all ages. *Streptococcus pyogenes* and *Pseudomonas aeruginosa* accounted for 14% and 2% respectively and were most frequently isolated in children from 0-6 years.

In the majority of the infections caused by *Pseudomonas aeruginosa*, the signals and symptoms unspecific and are related to the affected organ. *Pseudomonas* Exotoxin A (PE) is the most toxic virulence factor of the pathogenic bacterium *Pseudomonas aeruginosa*. Collier RJ and etc reported structure-activity relationship in diphtheria toxin and exotoxin A from *Pseudomonas aeruginosa*. Diphtheria toxin and exotoxin A from *Pseudomonas aeruginosa* (*Pseudomonas* toxin) block protein synthesis in sensitive animal cells by virtually identical mechanisms. Both toxins are proenzymes that, after activation, catalyze attachment of the adenosine diphosphate ribose (ADP-ribose) moiety of NAD to elongation factor 2 (EF-2) by covalent linkage. EF-2 is thereby inactivated. In the case of diphtheria toxin (60,000 daltons) the ADP-ribosylation of EF-2 is catalyzed by a 21,000-dalton peptide (fragment A) released after mild tryptic digestion and reduction of the toxin. In the case of the *Pseudomonas* toxin, the ADP-ribosylation reaction may be catalyzed either by the intact 66,000-dalton chain after reduction, or by a 26,000-dalton peptide released after mild proteolysis.

Despite the fact that the reaction catalyzed by toxin A is indistinguishable from that catalyzed by diphtheria toxin s-t3 these two toxins are not identical. Diphtheria toxin and *Pseudomonas* A toxin lack immunological cross reactivity.

This pathogen penetrates the affected skin or mucosa, invades them locally and produces systemic infection. It can also cause necrotizing pneumonia through contaminated respiratory equipment, necrotizing external otitis in elderly diabetic patients; ocular infection after surgical procedures or wounds; urinary tract infections through the insertion of catheters or irrigation solutions; meningitis after neurosurgery or endocarditis after surgery or catheter usage (3). Furthermore, infected wounds and burns produce a greenish-blue exudate which is fluorescent under ultraviolet light and may present a characteristic odor of grapefruit.

Once the bacterium has passed through the affected area, it can penetrate the bloodstream causing septicemia. In this case, it is classical the presence of skin hemorrhagic necrosis characterized by round erythematous lesions, denominated ecthyma gangrenosum, which can be occurred in 15% of *Pseudomonas aeruginosa* septicemia(4).

Although *Pseudomonas aeruginosa*'s infection frequently affects the urinary tract, respiratory system, skin and mucosa, causing damage to the affected organ. *Pseudomonas* (P.) *aeruginosa* in the head and neck region of an immunocompetent patient is mainly seen in ear infections, and sometimes in sinusitis. *P. aeruginosa* is an occasional finding in tonsil smears as part of normal microbial flora, which rarely cause pathogenicity in tonsils. We report an unusual case of a previously healthy child with tonsillitis due to *P. aeruginosa* infection.

## CASE REPORT

An 11 month old boy was admitted to the TSMU G.Zhvania Pediatric Academic clinic intensive care department with a critical health condition, Tbilisi, Georgia 10 July 2018 year. Before admission he had 5 days history of persistent fever 39°C-40°C and received antipyretic drugs at home. On a second day his pediatrician prescribed augmentin suspension for acute tonsillitis. Because of clinical deterioration he was hospitalized in V.Bochorishvili sepsis and infection pathology clinic with difficulty of breathing and trouble swallowing, hypersalivation, refused to take food and to drink water. He was adynamic and lethargy. Yellowish white plaque coated tonsils. Besides, it also rised still palate. General blood analysis revealed pancytopenia. He was consulted by hematologist, neurologist and otorinolaringologist. Lumbar puncture was done to rule out neuroinfections. By decision of physicians one day after the child was sent to the specialized G.Zhvania pediatric academic clinic of Tbilisi state medical university. Following analyses were done to made differential diagnoses between diphtheria and blood pathology: blood and throat swab bacteriology, general blood and urinalises, CRP, procalcitonine in blood were 10µg/l, that pointed toward progression of infection to sepsis. Bacteriologically *Pseudomonas aeruginosa* was isolated from throat swab and it was evaluated against piperacilline+tazobactam, amikacin, gentamycin, ceftazidime, cefepime, ciprofloxacin, levofloxacin, meropenem, imipenem, colistin (EUCAST guidelines 2018)(Picture1). The patient went through an antibiotic therapy with meropenem during 14 days 20mg/kg X3 iv. Because of severe intoxication prednisolone was added to the treatment regimen 2 mg/kg. Correction of anemia was done by transfusion of 150 ml red blood cells. Hematologic disease was ruled out by the sternal puncture. EBV test results: VCA IgM:0.5, VCA IgM:+. Heterophile ab IgM:0.5, Heterophile an:+. VCA IgG:1, VCA IgG:+. EBNA IgG:1, EBNA IgG:+ EBV test was positive. After 10 days of incubation blood was sterile.

Some white lesions had been observed in the tonsils and repetitive throat swab was done on 17.07.18 and only the presence of *Candida albicans* was verified. Oral fluconazole was administered. The patient clinical condition was significantly improved and infectious disease physician replaced meropenem with cefepime 50mg/kg X2 iv, but general blood analysis were worsed and meropenem was continued (totaly 14 days). Clinical parameters were improved: T36,4, P117', R29', spO2m98%. The patient was physically active in a good mood, laboratory results suggested positive dynamics. The patient stayed during 17 days in our clinic. He was discharged from clinic when otorinolaringologist, physician of infectious disease and his pediatrician noticed the total recovery of him.

**Discussion:** Two classes of extremely toxic proteins kill eukaryotic cells by covalently modifying unique structural features of components that are essential for protein synthesis. Intoxication by these proteins results from the entry of a catalytic fragment into the cytoplasm. One class is typified by diphtheria toxin and *Pseudomonas* exotoxin A. The catalytic component of these toxins ADP-ribosylates and inactivates elongation factor 2 which is an essential participant in protein synthesis. This modification occurs at a unique post-translational histidine derivative, diphthamide, that is present in the ribosomal binding site of the elongation factor. The two toxins differ in their molecular organization but appear to possess identical reaction mechanisms and very similar active sites. This case illustrates the successful treatment of severe tonsillitis, which were achieved by permanent bacteriological monitoring of throat swab and this case highlights clinical similarity with diphtheria, that probably is related with exotoxin A production by *Pseudomonas aeruginosa*.

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