CONTENTS

ACTIVITY AND ELECTROPHORETIC SPECTRA OF SOME ENZYMES IN THE SEEDS AND SPROUTS OF SOYBEAN IN PHYTOPATHOGENIC AFFECTION

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The present work reviews the effect of pathogens on activity and electrophoretic spectra of peroxidase, catalase and acid phosphatase in soybean and sprouts grown from them. The subject of research was the seeds of Sonata, Harmony and Dauria soybean breeds grown in the experimental ground of the Far Eastern State Agrarian University (in Gribskoe village, Amur region). In the period of study the seeds of soybean were infected with the agents of peronosporosis, purple cercosporosis, fusarium and bacteriosis. The extent of change in enzyme activity in infected seeds and sprouts grown from them was specific and depended on the breed of soybean and the type of an agent. However, in seeds of all tested breeds of soybean specific activity of peroxidase reduces under the influence of various infections whereas specific activity of catalase rises. It was revealed that fusarium agent is the most pathogenic.

Keywords: soybean, seeds, sprouts, peroxidase, catalase, acid phosphatase, electrophoretic spectra, phytopathogens

Crop diseases cause great harm, reducing harvest and its quality. In the Far East, where soybean has been cultivated for a long time and it occupies a large area, the pathogenic flora is very diverse. Soybeans are affected by fungal, viral and bacterial diseases [3].

Infected seeds have low germination and growing power, and are the primary sources of the spread of disease. Phytopathogens which are transmitted through seeds, are the first to enter sprouts and seedlings, causing either their death or inhibition of the growing processes and development of plants.

The most characteristic plants reaction to the disease manifests itself in the change of the enzyme activity controlling its metabolism, so biochemical parameters can be used to assess the condition of the plant. We have previously determined the activity of some enzymes in the soybean seeds affected by fungal and bacterial infection [10]. But electrophoretic spectra of enzymes were not studied. Physiological and biochemical processes in soybean sprouts grown from infected seeds were not enough studied. Therefore the aim of our investigation is to determine the effect of pathogens on the activity and electrophoretic spectrum of peroxidase, catalase and acid phosphatase in soybean seeds and sprouts grown from them.

Materials and methods of research

The subject of research carried out in 2009–2011, were the seeds of soybean of Sonata, Harmony and Dauria breeds grown in the experimental ground of the Far Eastern State Agrarian University (in village Gribskoe, Amur region). During the research most soybean seeds were infected with peronosporosis, fusarium and bacteriosis. In recent years purple cercosporosis, caused by the fungus *Cercospora kikuchii T. Matsu et Tomoyasu* has become widespread in soybean seeds of the Amur region.

Healthy seeds and sprouts grown from them were a control. Seeds were germinated in bibulous paper rolls in the laboratory. Seeds affected by fusarium decayed and did not germinate. The sprouts from seeds affected by peronosporosis and purple cercosporosis did not differ from healthy ones and showed no signs of disease. On the sprouts grown from the seeds affected by bacteriosis, signs of the disease were present.

Peroxidase activity was determined by Boyarkin method [2] using benzidine as a substrate. Catalase activity was determined by gasometric method which is based on defining the volume of oxygen eliminated after the addition of hydrogen peroxidase to the protein extract [5]. Determination of acid phosphatase activity was carried out by calorimetric method based on quantitative account of inorganic phosphorus produced by cleavage of organic phosphorus compounds under the action of this enzyme [5]. Protein determination was carried out by Lowry method [4]. Specific enzyme activity was expressed in units of activity per mg of protein.

Electrophoresis was carried out in polyacrylamide gel by Davis in the Safonovs modification [8]. Staining of zones with enzyme activity in gel was performed by corresponding histochemical methods.

Results of research and their discussion

Analysis of seeds showed that all the studied breeds of seeds have an infection that ranges from 2,40% (Harmony) to 3,92% (Dauria). Agents of peronosporosis and bacteriosis dominated on the seeds. Peronosporosis agent colonization ranged from 0,87% (Harmony) to 3,06% (Dauria). The worst bacteriosis affection was observed in Harmony breed (0,76%).

The results of investigation showed that the specific activity of the studied enzymes differs in healthy soybean seeds from that one in the infected soybean seeds. Change of the enzyme activity in the infected plant tissues indicates homeostasis abnormality [9].

In soybean seeds infected with bacterial and fungal infections, the specific activity of peroxidase is lower than in healthy ones (table 1).

According to the literature data [1, 7], a decrease of peroxidase activity is associated with changes in the level of redox processes of the infected seeds, the infection causes a decrease in metabolic activity and respiration intensity.

It should be noted that the peroxidase activity in the seeds of all breeds, affected by peronosporosis, decreases slightly. To the greatest extent the enzyme activity decreases in seeds infected with fusarium (in 2,3–4,7 times). Since peroxidase can serve as a criteria for assessing the sowing qualities of seeds, low enzyme activity shows a decline in the growing power and germination of seeds [6].

Infection of soybean seeds is accompanied by the loss of some of the multiple molecular forms of peroxidase or a change in their mobility. In healthy seeds of Sonata and Harmony breeds 5 forms, in Dauria – 6 forms of peroxidase are found. Significant changes in the synthesis of molecular forms are observed in seeds affected by bacteriosis and fusarium. In protein extracted from the seeds affected by fusarium the least amount of forms with peroxidase activity was detected. It is due to synthesis inhibition of the molecular forms with low and medium electrophoretic mobility. In seeds affected by peronosporosis the number of forms does not change, but their mobility increases, especially in Dauria breed (fig. 1, A).

From the data presented in table 1, it is clear that soybean sprouts peroxidase activity varies with regard to a control (healthy seeds sprouts). Apparently, under the influence of pathogens metabolism of not only infected seeds but of sprouts grown from them was damaged. Difference in reaction of sprouts of different soybean breeds to infection was observed. Increase in peroxidase activity in 1.3 times with regard to the control occurs in sprouts of Sonata breed, grown from the seeds infected with peronosporosis. In all sprouts of Dauria breed grown from infected seeds peroxidase activity is lower than in the control group. In Harmony breed sprouts peroxidase activity changes slightly under the influence of infection. According to the literature data stable enzymatic system is peculiar to resistant plants [9]. In sprouts of all breeds grown from the seeds affected by bacteriosis, enzyme activity decreases.

At an early stage sprouts grown from healthy seeds of different breeds of soybean two forms of peroxidase were revealed (fig. 2. A).

The number of molecular forms in sprouts of Sonata breed, grown from the seeds affected by peronosporosis does not differ from the control. In Harmony breed additional zone with Rf 0.57 in electrophoretic spectrum was detected. Healthy sprouts of a susceptible to peronosporosis Dauria breed grown from the seeds affected by peronosporosis, contain minor molecular forms with medium electrophoretic mobility. In the sprouts of all soybean breeds examined with the signs of bacteriosis, the number of molecular forms increases despite the decrease of peroxidase activity. Apparently, this is a result of conformational changes of the enzyme molecule.

In contrast to peroxidase activity of catalase in the seeds of Sonata breed affected by peronosporosis, fusarium and purple cercosporosis is in 1,6–2,4 times higher than in healthy ones. In the seeds of Harmony breed catalase activity increases in 1,5–1,8 times during the infection by bacteriosis, peronosporosis and fusarium and remains at the level of healthy ones in the seeds affected by purple cercosporosis. Infecting of Dauria breed seeds with peronosporosis and fusarium results in increase of catalase activity ~ 2 times (table 2).

Table 1

The specific activity of peroxidase in seeds (units/mg of protein), and soybean sprouts (units/mg of protein x 10^{-2})

Breed	Control	Diseases of the soybean			
		peronosporosis	purple cercosporosis	fusarium	bacteriosis
Seeds					
Sonata	105 ± 13	96 ± 14	75 ± 2	46 ± 1	87 ± 15
Harmony	114 ± 21	107 ± 21	61 ± 2	29 ± 2	95 ± 11
Dauria	127 ± 4	115 ± 29	89 ± 4	27 ± 1	106 ± 11
Sprouts					
Sonata	34 ± 7	44 ± 3	33 ± 2	–	29 ± 1
Harmony	18 ± 2	21 ± 3	18 ± 1	–	14 ± 2
Dauria	12 ± 2	8 ± 0,5	7 ± 1	–	6 ± 1

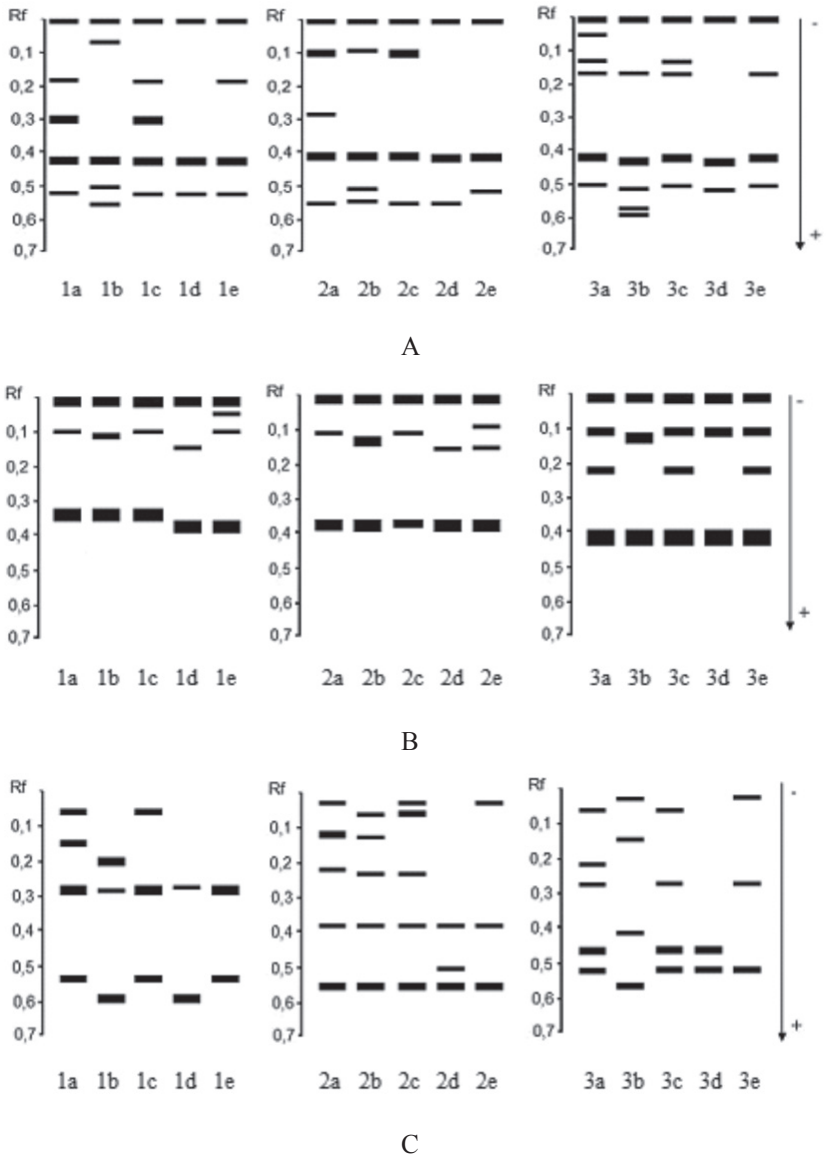
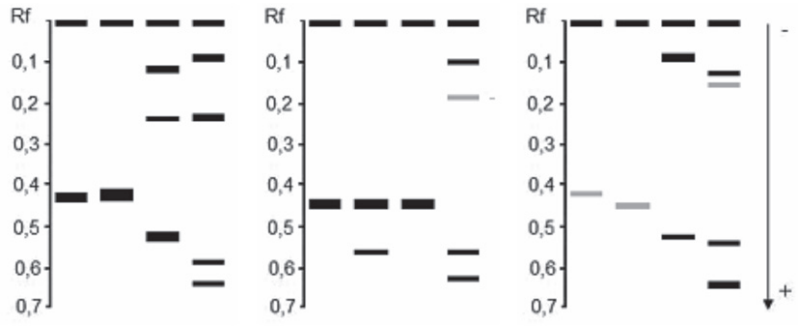


Fig. 1. Electrophoretic peroxidase spectra (A), catalase (B), acid phosphatase (C) in the seeds of soybean breeds: 1 – Sonata, 2 – Harmony 3 – Dauria; a – healthy, affected: b – peronosporosis, c – purple cercosporosis, d – fusarium, e – bacteriosis

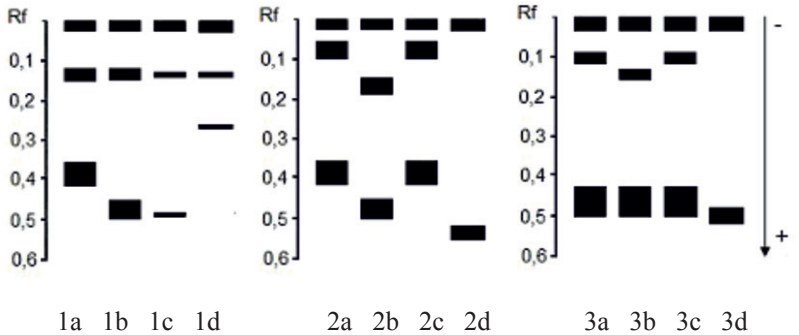
Table 2

Specific activity of catalase in seeds (units/mg of protein x 10^{-4}), and soybean sprouts (units/mg of protein x 10^{-3})

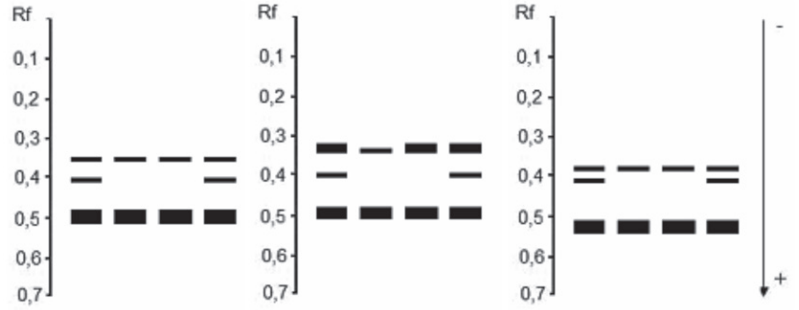
Breed	Control	Diseases of the soybean			
		peronosporosis	purple cercosporosis	fusarium	bacteriosis
Seeds					
Sonata	54 ± 2	89 ± 3	127 ± 13	130 ± 34	125 ± 6
Harmony	62 ± 2	110 ± 15	70 ± 10	110 ± 12	95 ± 8
Dauria	49 ± 1	90 ± 8	69 ± 8	96 ± 19	68 ± 3
Sprouts					
Sonata	84 ± 5	119 ± 7	78 ± 5	–	76 ± 5
Harmony	75 ± 3	85 ± 3	68 ± 3	–	57 ± 2
Dauria	80 ± 3	90 ± 2	75 ± 3	–	69 ± 2



A



B



C

Fig. 2. Electrophoretic peroxidase spectra (A), catalase (B), acid phosphatase (C) in sprouts of soybean breeds: 1 – Sonata, 2 – Harmony 3 – Dauria; a – healthy, of infected seeds: b – peronosporosis, c – purple cercosporosis, d – bacteriosis

Despite the increase in catalase activity in seeds, affected by fungal infection, the number of multiple molecular forms remains at the control level or reduces, and only in bacterial infection occurrence of additional forms with Rf 0.07 and 0.09 in Sonata and Harmony breeds, respectively was marked (fig. 1. B).

Catalase activity in soybean sprouts grown from affected seeds depends on the type of the infectious agent (table 2). In the seeds affected by peronosporosis and in sprouts grown from them, the highest catalase activity is marked. In sprouts affected by bacteriosis activity decline is observed, the number of molecular forms decreases (fig. 2. B).

Table 3

The specific activity of acid phosphatase in seeds (units/mg of protein x 10^{-6}), and soybean sprouts (units/mg of protein x 10^{-5})

Breed	Control	Diseases of the soybean			
		peronosporosis	purple cercosporosis	fusarium	bacteriosis
Seeds					
Sonata	17 ± 0,5	22 ± 1	14 ± 1	5 ± 0,3	15 ± 0,5
Harmony	23 ± 4	31 ± 2	17 ± 1	8 ± 0,3	15 ± 0,5
Dauria	20 ± 2	27 ± 1	19 ± 4	7 ± 0,2	16 ± 3
Sprouts					
Sonata	15 ± 2	9 ± 0,3	12 ± 4	–	11 ± 6
Harmony	7 ± 0,1	4 ± 0,1	8 ± 0,2	–	7 ± 0,1
Dauria	11 ± 3	5 ± 0,1	12 ± 3	–	12 ± 2

Acid phosphatase activity in the infected seeds both increases and decreases in comparison with the control (table 3). Significant reduction of the enzyme activity (~ 3 times) was found in soybean seeds affected by fusarium.

Electrophoretic studies have shown that a different number of acid phosphatase forms was found in infected seeds as compared with the healthy ones (fig. 1. C). The seeds infected with fusarium and bacteriosis agents contain the fewest enzyme forms. Qualitative and quantitative changes in enzyme activity is likely to be connected with malfunction of carbohydrate and lipid metabolism, which occurs under the influence of infection.

In sprouts of Sonata,Harmony and Dauria breeds, grown from the seeds affected by purple cercosporosis and bacteriosis, acid phosphatase activity remains at the level of control. Significant reduction of acid phosphatase activity (in 1,7–2,1 times) is observed in soybean sprouts grown from the seeds infected with peronosporosis (table 3).

In healthy sprouts of all examined breeds 3 molecular forms of acid phosphatase were revealed. The same number was found in sprouts affected by bacteriosis. In sprouts grown from the seeds infected with peronosporosis and purple cercosporosis zone with Rf 0.41 disappears (fig. 2, C).

Conclusion

Thus, quantitative and qualitative changes of enzymes in the affected seeds and sprouts, grown from them, depended on the soybean breed and the type of infectious agents. However, the general trend in enzyme activity was detected: the specific activity of peroxidase in seeds of all soybean breeds studied decreases under the influence of different infection while specific activity of catalase rises. Fusarium infection of the seeds results in a sharp decrease of acid phosphatase activity. Bacteriosis agent action reduces catalase and peroxidase activity in sprouts of soybean, but the heterogeneity of peroxidases increases and of catalase decreases, and does not affect the acid phosphatase spectrum.

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THE PROBLEMS AND PROSPECTS OF REGIONAL AIC

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Agribusiness Complex of Kazakhstan has a perspective future. According to many items we can be one of the world's largest manufacturers in agricultural export products. Especially in the production of organic food. The brand made in Kazakhstan should become the standard of such products. We need to provide transiting from raw production to the production of high-quality, processed products. Only then will we be able to compete in international markets [1].

According to the program "Development of AIC-2020" will be provided the increase of exports of food products by 40% by 2021 through the diversification of agricultural production [2].

However, It is requires an effective state agribusiness management at all levels in order to achieve the goals which are set by of the Leader of the Nation and by the Agro programs requires, as it is known, the state and the individual sectors of national economies are being developed irregularly. Studies show that the process of development or backwardness in this case is not random but it is determined, above all, by the quality of governance. In other words, the development of the economy, including agriculture, mainly is the result of improved governance [3].

The purpose of governance in agriculture is to create conditions for the development and realization of the creative potential of citizens, businesses and the efficient functioning of the national economy organizations. In particular, the development of agriculture depends on how reasonable would be the relationship between the state and economic forces industry. If the state solves this problem qualitatively, then it means that not less than 80% of enterprises and organizations of the agro-industrial complex works effectively.

If the current developed countries in the past adhered to the idea of minimizing the role of the state in the economy, they would not have reached such a high socio-economic results. It would not be allowed by private monopolies. The processes of democratization and economic progress, protection of property rights, in the result of that these countries have received such a development, they became possible due to the active role of the state.

Success of socio-economic transformation in agribusiness is determined by how they serve the interests of the peasants. Moreover, national and foreign experience shows that every effective reform takes an effect from the first year of implementation.

In general, the lack of development of agrarian and industrial complex of the economy is due to the fact that the system of state governing in industries is based on administrative, administrative-repressive or repressive-economic management practices. The current reform is based on repressive-economic methods.

The laws which are under the development of economy are divided into general (typical of all industries and stages of development of the society) and private. The first of them operate in all socio-economic formations and states, ie without taking into account the level of development, national and other features of the countries. The latter is less significant and reflect only the established traditions and national features.

From our point of view, the general laws, which in the coming years will determine the socio-economic development of the agro-industrial complex of Kazakhstan are as following:

1. Democratization of the economy on purpose of public socialization:

– private property guarantees the development of the economy only in conditions of creating a competitive environment (in economic and social terms the monopoly form of private property is less effective than governmental, i.e, socialistic forms);

– the economy is being developed as the dispersal of ownership in the hands of a large part of the population, i.e. the transition from a monopoly to a democratic form of it;

– the presence and real activity of antimonopoly committees is – one of the conditions for economic growth;

– the transformation of ownership in the world acts according to the scheme: the big monopolies the growing number of small owners of small business entities – the growing number of small owners (shareholders) of the large-size entitles – the growing number of large-size national enterprises (in which an important role belongs to the corporate spirit);

– in all developed countries tendency of system development of workers participation in the enterprises management. Employers go to this for three reasons: by state pressure; by workers request; due to the economic and social feasibility of the process;

– life has proved the economic and social feasibility of Democratization relation "capital-labor" by enhancing the role and job appraisal. And above all, this is manifested in the growth of the share of wages in the structure of production costs;

– in the most developed countries a number of national enterprises have been growing, where labor productivity is higher rather than in the others;

– in the developed countries in the AIC The cooperative ownership forms and labor organizations gets the greatest development.

2. Improving the regulatory role of the state in the economy:

– in the developed countries the public authorities manifest a significant financial support to the AIC. In particular, in the EU the level of state aid to agriculture is 38%. The highest support is provided by Switzerland to the agricultural sector – 76%, Japan – 72%, Finland – 72%. This is not a usual sense help, but it is a way to regulate the cross-industry proportions with taking into account the industry branches (crisis happens if not to take into account);

– the efficiency of economic management system is determined by the quality of state administration functioning (in particular, the methods by which the state controls the economy).

3. Increase the controlling role of the state:

– state budget and the country's capacity directly depends on the degree of control by public authorities of financial and economic and other activities of enterprises and citizens (the role of the tax police in the developed countries is much higher than in the lagging countries) [4];

– the law observance by citizens and enterprises are more efficiently and systematically realized in the developed countries, and which can not be achieved without strong control.

4. Increase of social and environmental role of the state:

– concern for civil rights of the population, particularly the workers, is one of the most important functions of the state. Its qualitative execution gives social and economic effects. This explains why the incipient trend in the world as limiting the rights of employers by workers' dismiss, by the establishment of minimum acceptable time-based pricing for their recruitment, etc;

– an increasing number of countries are beginning to realize the importance and effectiveness of the solution of social problems (financing and construction of social facilities, stimulate the population growth, protecting the disabled people, the unemployed, caring about students, etc.);

– an increasing number of countries are beginning to realize the importance and effectiveness of care of nature (the creation and protection of national parks, the tasks of maintenance of ecological purity of the soil, water, air).

5. Enhancing the role of local self-government (territorial administration democratization):

– an important component of state administration is the democratization of the tax system by increasing the share of tax revenues at the disposal of local elected authorities;

– the development of local self-government is one of the most important conditions for economic and social development of the area;

– local self-government in developed countries is considered to be the foundation of democracy system.

6. Increasing the role of intellectual property:

– democratization of relations "capital-labor" promotes the recognition of the crucial role of intelligence in the socio-economic development of society (recognition of "mind priority over the power");

– recognition of the critical role of intellectual property contributes to the socio-economic activity to the most capable part of the population. Therefore, in many countries, intellectual property is recognized as a particularly active and effective form of capital, may participate in the formation of the authorized capital of the enterprise;

– human capital is becoming increasingly recognized (valuation ratio of human capital and material and financial resources, is gradually changing in favor of the former).

7. The development of innovation-oriented economic systems (the orientation of the economy on the best achievements of NTP, including through the establishment of enterprises and agribusiness organizations are constantly active services on the introduction of new economic and industrial technologies and other achievements of science and practice, with the status of the leading divisions):

– development and application of scientific and technical progress achievements is one of the key conditions for the competitiveness of enterprises, industries and states;

– the state and enterprises which are leaders in the field of scientific and technical progress, are in a better economic position than lagging ones (as they receive dividends from higher productivity, higher quality consumer goods, sales of large volumes of finished products rather than raw materials and so on);

– developed countries provide funding the most progressive trends in this area due to the high efficiency of scientific and technical elaborations, on favorable terms;

– one of the main reasons for the relatively rapid development of the economy of several countries (Japan, South Korea, Taiwan and others) is to activate the role of the state in the field of information gathering, promotion and stimulation of introduction of achievements of scientific and technical progress.

To consider the whole complex of problems associated with the AIC system of government in the region in the one article is practically impossible. Therefore, in some aspects, we decided to just briefly highlight a number of important measures in improving the agribusiness management, the implementation of which, in the opinion, will improve the efficiency of the rural economy.

Implementation Measures:

1. It is necessary to legislate the right of agriculture and food represent the interests of small shareholders (shareholders) trust management of agricultural enterprises through the mechanism. This will enhance the protection of shareholders' rights, enhance the management authority, will lay the groundwork for the introduction of the industry

cost accounting, significantly activates the activity of the state administration of AIC. It is thought that this approach could become an alternative to providing the predominance of state ownership in AIC over private. In the agricultural sector, in our view, state ownership should apply only to seed, tribal and other specialized companies and organizations.

2. The system of incentives agriculture and food management personnel expediently "tie" to the regional AIC performance results. In this order to divide it into 2 parts: salary from the budget and the income on the basis of the financial year of AIC.

3. At the stage of stabilization agribusiness economy is necessary to allocate control functions of agriculture and to create on its basis of the State Audit Office (GKRU) beyond the control of said control.

4. Activities of the Agriculture Department administration of region should be based on the approved budget, adjusted to each unit. This will help to identify more clearly the priorities and pay more attention to them, to allocate more resources to them. In general, the practice will teach the management professionals rational spending budget to use human resources.

5. It is necessary to improve the mechanism of management of an agriculture budget of the region by linking it with the results of enterprises and agribusiness organizations.

6. In the statutes (regulations, founding treaty) enterprises and agribusiness companies must enter the section, reflecting the system of relations between them and the departments of Agriculture and Food of the district and the region. This section should reflect the powers of these departments, as well as the responsibility of enterprises and organizations for failure to comply with its provisions. This will create more favorable conditions for the activities of management professionals.

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MORPHOLOGICAL ANALYSIS OF TISSUE RESPONSE TO IMPLANTS OF DIFFERENT METAL ALLOYS

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In the section of our activity we were to study and compare integration dynamics of different alloys implants insertion (stainless steel, titanium BT 01, titanium BT 01 with plasma titanium coating) when they were replanted into rabbits mandibular bone defects. Nine Chinchilla rabbits, ♂, weight 2005 ± 15 gr. had an operation. Tissue material from experimental influenced region from 3 observation groups was examined. Concerning titanium sheets (2nd and 3rd groups) we confirmed that titanium has high biocompatibility. Its replanting into the bone didn't cause (as in experiments with stainless steel 1st group) prolonged inflammatory responses during 1-6 months terms. Fast connective tissue capsule formation was observed in implants. The tissue structures contact process with titanium in 2nd and 3rd groups had osteofibrosis integration type. Studying of the tissue substance showed that titanium sheets with plasma titanium coating had rore frank osteointegration process.

Keywords: implant, bone tissue, osteointegration

Placing endosteal implants in highly resorbed alveolar ridges is hardly possible due to the risk of mandibular nerve damaging or maxillary sinus floor perforation. The last one may lead to sinusitis and sinus fistula formation [1, 4]. By advanced bone resorption in posterior maxilla sinus augmentation is recommended – it increases the volume of the bone while lifting the sinus floor level. As any other treatment option, this one also has its indications and contraindications. In severely resorbed mandible osteoplasty or nerve repositioning can be carried out. However, as it is known from experience, ridge reconstruction by such a pathology is undesirable or impossible because of postoperative complications. High muscle attachments in severely resorbed mandible displace graft material during function. An often complication related to nerve repositioning is permanent disturbance of sensibility in the zone innervated by *n. alveolaris inferior*. This fact undermines the reasonability of this method of treatment.

In the above mentioned situations placing customized subperiosteal implants is viewed to be the best treatment option.

Experimental researches launched in the early 50ˢ focused on studying tissue response to endosteal implants. Pasqualini U. was one of the first to conduct a series of experiments on dogs. He used implants made of acrylic resin, porcelain, gold and binary alloys. He discovered an earlier unknown bone response pattern – a close contact between the implant and the bone without any connective tissue interface, preserved as well after functional load apply.

Attempts to find the most bone-friendly material continued. The first symposium on alloplastic implants was held in Padua in 1955. It was there A. Hammer and G. Pallazi, relying on their own morphological investigations, advocated the absence of any negative response to implants made of Co-Cr alloy.

A. Bodine studied tissue response to a subperiosteal implant being in function for several years in dog maxilla. He reported the results of this morphological study at the conference in Dallas (USA) in 1956. His conclusion was: "The tissue in contact with implant parts under periosteum was a typical connective tissue."

Exploring bone response to implants made of different alloys is one of keys to advance with materials for dental implants.

The aim of our project was to monitor and compare the dynamics of the integration process for different implants placed in rabbit mandibles (stainless steel, titanium alloy VT-01 and titanium alloy VT-01 with plasma-sprayed particulate titanium coating).

Following criteria were used in order to evaluate bone response to implantation:

– state of the original bone in the implant site

– dynamics of connective tissue interface-formation and -maturation

– bone-formation and maturation

– speed and completeness of original bone restructuring

– quality of implant integration

Materials and methods of research

Implantation, followed by morphological analysis of the samples was performed on 3 groups:

1 – stainless steel plates implanted in rabbit mandibles,

2 – titanium alloy VT-01 plates implanted in rabbit mandibles,

3 – titanium alloy VT-01 plates with plasma-sprayed particulate titanium coating implanted in rabbit mandibles.

Results of research and their discussion

Implantation of stainless steel plates

1-month results. Implants were removed before histological analysis. Therefore histological photos reveal vacuum instead of implants.

A thick layer of connective tissue was usually present at the interface between the bone and the implant (fig. 1).

Connective tissue interposed between implants and bone was recognized to be highly cellular loose connective tissue. Original bone subjected to moderate resorption. As a rule, bone trabeculae deposited on the original bone from outside had immature matrix of osteoid character (fig. 1).

3-months results. A layer of loose connective tissue was still present at the bone-to-implant interface, having this time more collagen fibers. It separated the implant from newly formed bone trabeculae, which had either osteoid or coarse matrix type (fig. 2). Collagen fibers predominated in this fiber-rich matrix; the latter was also highly cellular due to high content of fibroblasts together with polyblasts and macrophages (fig. 3).

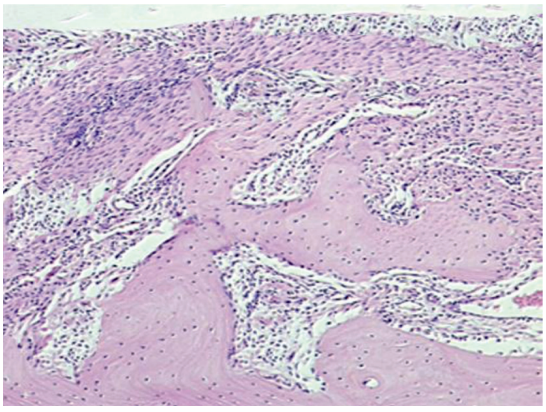

Fig. 1. Microphotograph X 200 Implantation of a stainless steel plate, 1-month results. A broad connective tissue interface between the bone (slight resorption) and the implant. Apposition of bone trabeculae onto the original bone

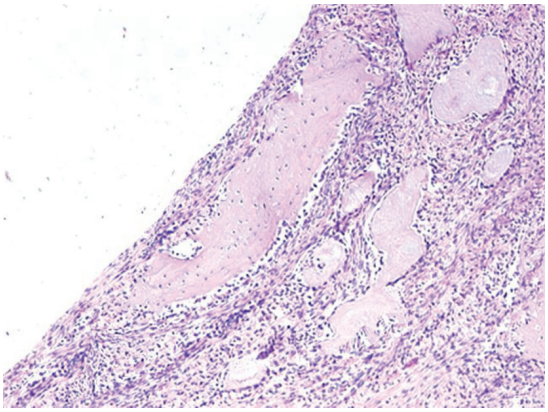

Fig. 2. Microphotograph X 100 Implantation of a stainless steel plate, 3-months results. A thin connective tissue interposed between newly formed trabeculae and the implant. The original bone has become compact. Huge osteoclasts can be quite often seen in the structure

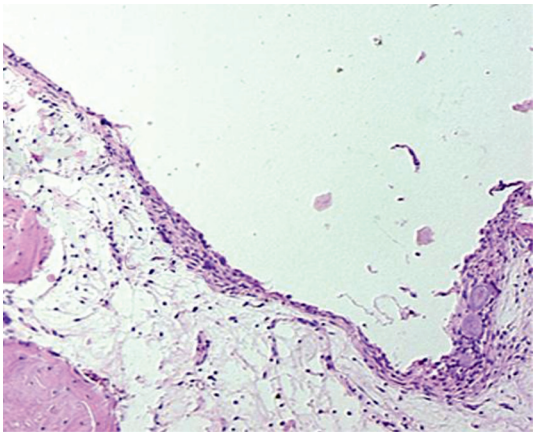

Fig. 3. Microphotograph X 200 Implantation of a stainless steel plate, 3-months results. A diffused lympho-macrophage infiltrate with some separate huge polynuclear cells in the connective tissue layer

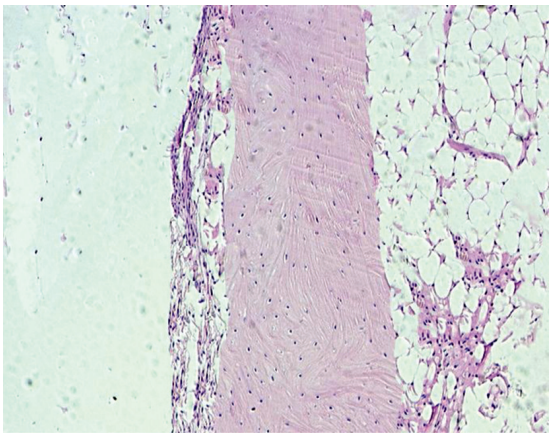

Fig. 4. Microphotograph X 100 Implantation of a stainless steel plate, 6-months results. A thin connective tissue film surrounded by loose connective tissue and original bone structures

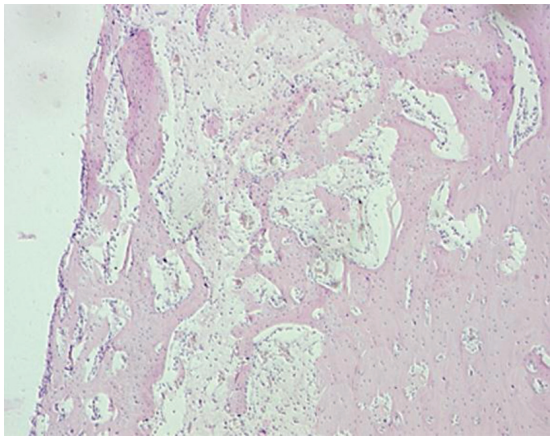

Fig. 5. Microphotograph X 50 Implantation of a titanium plate, 1-month results. A thin connective tissue layer surrounds the implant. Active apposition of new trabeculae onto the original bone

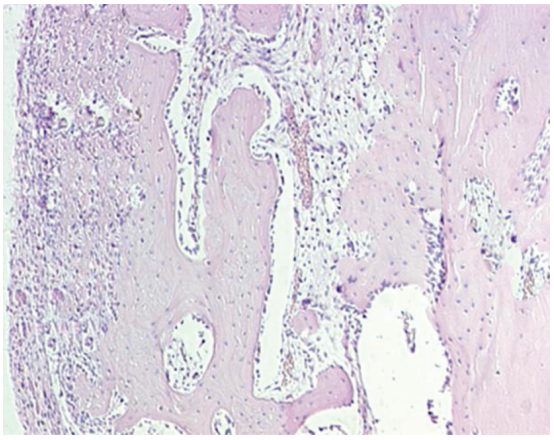

Fig. 6. Microphotograph X 100 Implantation of a titanium plate, 1-month results. High cellularity of a fairly broad connective tissue layer as a result of diffused infiltration with lymphocytes and macrophages. Active bone formation on the surface of the original bone. The latter is undergoing reactive rarefication

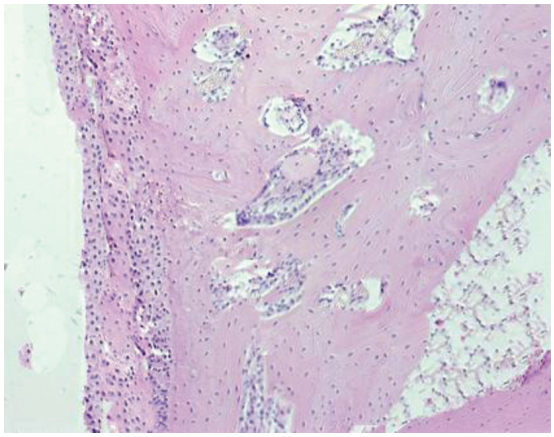

Fig. 7. Microphotograph X 100 Implantation of a titanium plate, 6-months results. Bone adjacent to the implant is becoming compact. It is separated from the implant only by a row of connective tissue cells

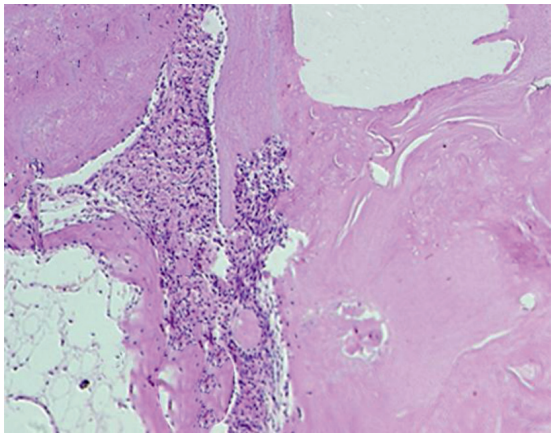

Fig. 8. Microphotograph X 200 Implantation of a titanium plate, 6-months results. The presence of separate thin fibrils and flat fibroblast-like cells is revealed

The original bone outside the forming bone structure tended to show rarefication. Active bone remodeling, followed by resorption of mature bone and new bone formation fostered pronounced bone "rejuvenation" in some parts.

Connective tissue interface was extremely thin in some areas. It was sometimes infiltrated with lymphocytes, macrophages and huge polynuclear cells.

On the whole, the newly formed bone was much better differentiated than the one in the 1 month-study. However, there were areas at the bone-to-implant interface with huge polynuclear osteoclasts. This fact, together with high cellularity of the tissue, testified to pathogenic influence of implant material.

6-months results. A thin film of connective tissue was found in the periimplant space. Under it one could see areas of loose connective tissue or structures of original bone (fig. 4).

Connective tissue adjacent to the implant had some loose areas infiltrated with short collagen bundles alternating with reticular fibers. An increase in small blood vessels could also be noted here and there.

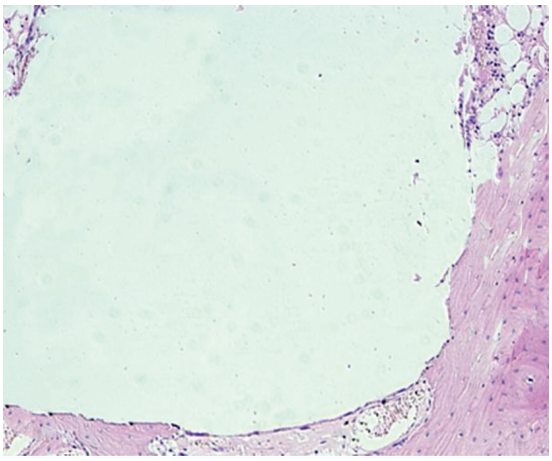

Fig. 9. Microphotograph X 50 Implantation of a titanium plate, 6-months results. Bone adjacent to the implant is becoming compact. It seems to have a direct contact with the implant in some parts

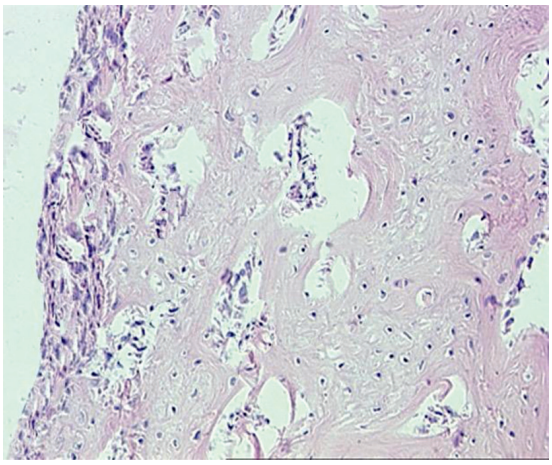

Fig. 10. Microphotograph X 100 Implantation of a titanium plate with plasma-sprayed particulate titanium coating, 1-month results. Implant is surrounded by a layer of highly cellular fibrocellular connective tissue. Active bone formation on the surface of the original bone

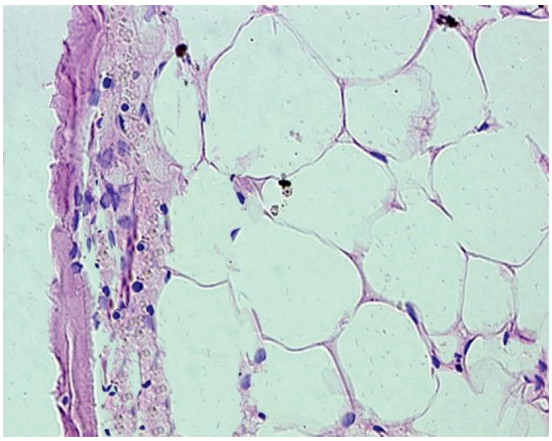

Fig. 11. Microphotograph X 400 Implantation of a titanium plate with plasma-sprayed particulate titanium coating, 3-months results. An area of adipose tissue in the original bone. It is separated from the implant by a thin fibrous layer. Osteoid formation in the latter (arrows)

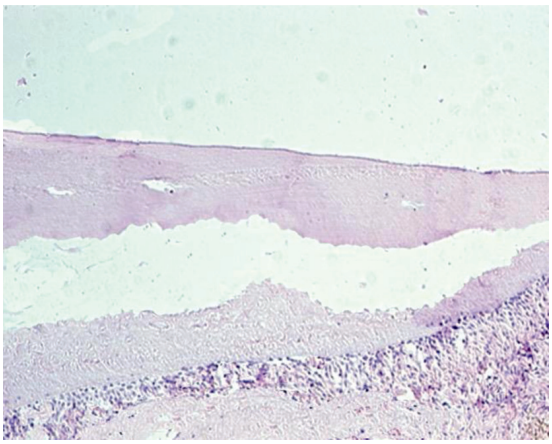

Fig. 12. Microphotograph X 100 Implantation of a titanium plate with plasma-sprayed particulate titanium coating, 6-month results. Full osteointegration. A barely noticeable notched form of the bone surface adjacent to the implant

Connective tissue interface from the implant side was vastly infiltrated with lymphocytes and macrophages including some single huge polynuclear cells. The original bone was in some parts dense and completely matured by that time.

Implantation of titanium alloy VT-01 plates

1-month results. A thin layer of connective tissue was present at the bone-to-implant interface. We observed intensive trabeculae formation on the surface of the original bone (fig. 5). High cellularity of the connective tissue layer owed to lympho-macrophage infiltration (fig. 6).

3-months results. A thin connective tissue film was still present at the bone-to-implant interface. We registered osteoid formation and homogeneous structure of intercellular matrix in several parts.

A broad net of newly formed trabeculae could be observed outside the connective

tissue interface. Intertrabeculae spaces were filled with loose connective tissue rich in thin blood vessels. Huge polynuclear cells could be found near some of the trabeculae. The bone adjacent to the implant was undergoing the process of compactisation.

6-months results. The bone structure immediately adjacent to the implant was either porous or compact (fig. 7–9). The layer of connective tissue interposed between implants and bone was very thin limited sometimes to a bare row of connective tissue cells (fig. 7–9). It could even give an impression of a direct bone-to-implant contact without interposition of connective tissue. Detailed study of histological preparations revealed, however, the presence of separate thin fibrils and flat fibroblast-like cells.

Implantation of titanium alloy VT-01 plates with plasma-sprayed particulate titanium coating

1-month results. A highly cellular layer of fibrocellular connective tissue separated the bone from the implant. We observed intensive trabeculae formation on the surface of the original bone (fig. 10).

3-months results. A thin connective tissue film with plenty of collagen fibers bordered the implant. Intercellular matrix had sometimes homogeneous structure with apposition of osteoid (fig. 11). Thus, osteointegration could already be traced beginning from a 3-months period.

6-months results. The 6-months results indicate full osteointegration of the implants. Notched form of the bone adjacent to the implant witnessed high congruence of bone and implant surfaces (fig. 12).

Conclusions

The study showed that implantation of stainless steel plates into the rabbit mandibula led to formation of a connective tissue capsule around implants. 3- and then 6-months results demonstrated maturation of its fibril network and its collagenisation. Periimplant regions experienced chronic inflammatory process that impeded tissue maturation in close contact to implants, as well as osseointegration. The last statement can also be confirmed by the presence of a connective tissue interface during the whole period of experiment.

As for implantation of titanium plates (groups 2 and 3), we came to the conclusion that titanium possesses high biocompatibility. In contrast to group 1, where implantation of stainless steel plates caused prolonged inflammation in a 1–6 months period, here we saw rapid maturation of fibrous capsule around implants.

Furthermore, the periimplant area in groups 2 and 3 clearly indicated active osteogenesis with more rapid maturation of bone structure during remodeling. The contact of titanium implants with the bone brought to fibroosseous integration. It should be noted that the process of osteogenesis was much more active in group 2 compared to group 1. 6 months after implantation the contact with the bone was so close (group 2) that it imitated full osteointegration. Only a hardly visible row of fibroblast-like cells evidenced the involvement of connective tissue into the process.

We suppose that osteointegration was most active in group 3. Areas of direct bone-to-implant contact could already be observed at 3 months following implantation. 6 months after implantation they became prevalent – the fact which validates osteointegration.

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FLORA OF SEMIDESERT AND DESERT AREA OF WESTERN-KAZAKHSTAN REGION

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Vegetative surface of Western Kazakhstan is defined by a great diversity. It is related to variety of the very conditions of plants' existence, multiplicity of soil-climate areas and sub-areas. On the whole, vegetation of the research area can be referred to two zone types: in the North – to desert-steppe (semidesert) type, and in the South – to desert type.

Absinthial associations mostly dominate in vegetative surface of semidesert. White Artemisia is widely spread and possesses many feeding qualities, especially in combination with bluegrass, summer cypress, and wheat grass [4]. At the same time, Selina, Agriophyllum, blady grass usually grow at the surface of quicksand, and sand Artemisia, Siberian bluegrass, red Artemisia, feather grass, tarsa, calligonum, etc. grow at more fixated surfaces. In kettles among sands, where ground waters are located close to surface, insignificant tangles of trees and bushes can be found, especially Tamarisk. There are usually no trees in low areas between ridge sands; plain areas are covered with Artemisia and mixed herb vegetation, such as izen, shagyr, ebelek, terexen. Just as in sand, spots of swampy and sometimes even dry alkali soils, wastes, and naked takyr can be found in clay deserts. They are the most sterile locations in the desert, often have no vegetation at all, and only small separate areas of them are covered with juicy glasswort (sarzasan, fat glasswort, saltpetrous grass, seepweed, pettrosymonia) [1]. Calligonum associations have the greatest nutritional value for cattle.

Desert communities have a weak density of surface level, here suffrutescent such as Artemisia Lercha, black Artemisia dominate here, and in sands – Artemisia of Chernyayev (sand Artemisia).

Travosta of desert area saline soils is represented by associations of biyugun, grey Artemisia, and white Artemisia. Covered surface in communities of biyurgun varies from 30% to 60%.

In Zhalgan region there are vast massives of scattered sands that are at one of initial stages of overgrowing and are being covered with rare bushes of blady grass or more or less dense bushes of chagyr. Efficiency of such pastures equals approximately 3–3,5 center of hay hectare [3].

Artenisia-less deserts are the most widespres, and it is related to a high level of soil alkaline. They are associated with flat areas with loamy brown soils as well as soils of light mechanical composition, as well as sands [2, 3]. Aside from Artemisia here we can find anabasis, ebelek, sheep fescue, desert blady grass, branched sedge, hair-like and Sareptsk feather grass, etc., and during spring rather many of ephemers emerge. This fact defines spring-autumn use of these pastures, and mostly young branches are consumed, they form 40% of total bush mass. Sand Artemisia deserts usually develop at uneven sands. Psammophillous grass and grain usually participate in them, they can be also combined with bushes (tamarisk, leafless calligonum) and baldy grass bushes in sand dune areas and Artenisia-less, erkerk-Artenisia-less, ephero-Artenisia-less communities at sand and subsand soils at plains, uneven, and small-bump sands [2, 3].

Thus, for all studied regions (Bokeyordinskiy, Zhangalinskiy, Karatobinskiy) kind composition of vegetation is the same, only stages of sand overgrowing with grass and wood-bush vegetation can vary. In lowlands, where depth of ground waters reaches 4 m, tree standings can be found, they are usually formed of oleaster, cottonwood, pine trees, and other breeds, and this fact, of course, plays a significant part in forest industry of the studied regions.

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MORPHOMETRIC SIGNS OF THE LEAF PLATE OF POPLAR (POPULUS NIGRA L.), MARPLE (ACER PSEUDOPLATANUS L.), LIME-TREE (TILIA PLATYPHYLLOS SCOP.) IN THE CITY OF ROME (ITALY)

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Italy is a typical Mediterranean country located in the central part of Southern Europe. It spreads from a forest temperate zone (in the north) to a subtorrid zone (in the south). It is located on the Apennine Peninsula which is surrounded with water

on three sides. The great influence on formation of natural phenomena of Italy, especially its climate, exerts the sea [2].

A variety of climate is determined by longitudinal extent. In the north of Italy, on the Padansky plain, climate is transitional from subtorrid to temperate. There is hot summer and cold foggy winter. Climate of an island part of Italy is mediterranean, 2/3 of a years there is hot and dry summer, and winter is warm and soft [1, 2].

The capital, and also the biggest city of Italy is Rome. Its population exceeds two and a half million people [2]. Lazio is an administrative area in Italy. The capital is the city of Rome. 54 % of the territory is hilly area, 26,1 % (Apennines) are mountains, 19,9 % are plains. The climate is soft, the average temperature of January is + 9–10 °C, July of 24–25 °C. The largest river is Tiber. It has an exit to the Tyrrhenian Sea. Cultural landscapes prevail there. Woods occupy only 20 % of the territory, mainly in mountains and on hills, plains are almost treeless. Along roads and coasts of the rivers plantings of poplars, willows, white acacias prevail [3].

Populus nigra L. is a plant of Willow family, type of the sort Poplar. It is a melliferous, tannic, efiromaslichny, dyeing, officinal, woody, ornamental plant, which is cultivated in gardening. It grows in flood plains of the rivers on the wet alluvial sandy, sand-pebble, sandy salty soils. As a part of inundated woods it carries out important role in water preserving, water regulating, bank protection, kolmatiruyushchy and sanitary and hygienic functions. The poplar black is treated as mikrotermofita that is a cold-resistant plant adapted to existence in the conditions of long severe winter which it endures at rest, showing high winter resistance. It is a hygrophilous inundated plant. It is considered as the most widespread species of the wood plants applied in gardening of settlements and recultivation. It is due to the fact that it is very winter resistant, grows quickly, is ecologically ductile, shows in the conditions of a city high heat – smoke-and gas resistance [7].

Acer pseudoplatanus L. is a tree, a type of the sort Maple. It is remarkable for resistance to wind, city pollution and salt. This is the reason to be cultivated in cities, on the sea coast and along the roads strewed with salt in winter. This plant prefers to grow in warm places, it is shade-requiring and melliferous.

Tilia platyphyllos SCOP. is a deciduous tree of the sort Malvaceae, Linden Family. The large-leaved linden is remarkable for longevity and high adaptation to city conditions. It practically does not suffer from diseases and pests, is not damaged by frosts, is drought-resistant and is very simple in looking after. It is widely applied in landscape architecture and gardening. It is a melliferous herb. The plant is soil nutritious because its leaves contain a large amount of calcium and after defoliation they enrich the soil with nutrients.

In July 2015 selection of leaves was made. For definition of morphological features, used for assessment of stability of development of plantings, samples of leaves (by 20–30 pieces) from one tree were selected. Methods of treatment and collecting materials by V.M. Zakharov and coauthors were used [4].

According to the accepted methods measurements of right and left halves of leaves of a birch by 5 signs were taken: the first sign is width of the left and right halves of a leaf (while measuring the leaf plate is folded up, we combine the top with the bottom of a leaf and unbend a leaf. On the formed fold the distance from the border of the central vein to the leaf edge is measured); the 2nd sign is length of a vein of the second order from the leaf bottom; the 3rd sign is distance between the bottoms of the first and second veins of the second order; the 4th sign is distance between the ends of these veins; the 5th sign is a corner between the main vein and the second from the leaf bottom vein of the second order.

The integral index of stability of development of a poplar black on the territory of Rome makes 0,093. The least index of size of asymmetry 0,052 is revealed by the 5th sign (a corner between the main vein and the second from the leaf bottom vein of the second order). The greatest index of size of asymmetry 0,157 is revealed on the 4th sign (distance between the ends of the first and second veins of the second order) (table 1).

The integral index of stability of development of a maple white on the territory of Rome makes 0,065. The least index of size of asymmetry 0,043 is revealed on 1 and on 3 signs (width of the left and right halves of a leaf and distance between the bottom of the first and second veins of the second order). The greatest index of size of asymmetry 0,090 is revealed on the 5th sign (a corner between the main vein and the second from the leaf bottom vein of the second order) (table 2).

Table 1

Morphometric signs of a leaf plate of *Populus nigra* L. on the territory area of Pyramida

Number of a sign					Asymmetry size
1	2	3	4	5	
0,064	0,056	0,137	0,157	0,052	0,093

Table 2

Morphometric signs of a leaf plate of *Acer pseudoplatanus* L. on the territory of Via Galvani

Number of a sign					Asymmetry size
1	2	3	4	5	
0,043	0,088	0,043	0,061	0,090	0,065

Table 3

Morphometric signs of a leaf plate of *Acer pseudoplatanus* L. on the territory of Via Marmorata

Number of a sign					Asymmetry size
1	2	3	4	5	
0,074	0,041	0,056	0,168	0,035	0,075

Table 4

Morphometric signs of a leaf plate *Tilia platyphyllos* SCOP. on the territory of Via Marmorata

Number of a sign					Asymmetry size
1	2	3	4	5	
0,032	0,029	0,262	0,107	0,139	0,114

The integral index of stability of development of a maple white on the territory of Rome makes 0,075. The least index of size of asymmetry 0,035 is revealed on the 5th sign (a corner between the main vein and the second from the leaf bottom vein of the second order). The greatest index of size of asymmetry 0,168 is revealed on the 4th sign (distance between the ends of the first and second veins of the second order) (table 3).

The integral index of stability of development of a large-leaved linden on the territory of Rome makes 0,114. The least index of size of asymmetry 0,029 is revealed on the 2nd sign (length of a vein of the second order from the leaf bottom). The greatest index of size of asymmetry 0,262 is revealed on the 3rd sign (distance between the bottom of the first and second veins of the second order) (table 4).

To sum up, the assessment of stability of development of wood plants on the basis of definition of morphological features of leaves the adaptive reactions bound to change the size of asymmetry of leaf plates of different types of wood plants were revealed [5, 6, 8].

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Short Reports

AEGAGROPILA LINNAEI IN LAKES AND ARAHLEY AREY (EASTERN TRANSBAIKALIA)

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There is a certain disjunction in range of different hydrobionts between Europe and Asia, for example, *Cyprinus carpio* L. For macroseaweeds a significant gap in range is registered for *Aegagropila linnaei* Kütz [10]. Later in their article C. Boedeker и B.F. Sviridenko [9] point out a kind for North of Caucasus (lake Schuchie at the level of 388m above the sea) that partially fills the range gap. According to C. Boedeker and co-authors [10, p. 9] "the disjunct distribution between Japan and Europe could be the result of extinction on the Asian continent east of the Urals... The Siberian landmass was never glaciated during the Weichselian (Würm) glaciations due to its dry continental climate... Accordingly, Siberia was lacking widespread refugial habitats for *A. linnaei*, possibly leading to extinction in this area, in contrast to glaciated Europe which had abundant refugia in the south and west of the ice sheet and in the form of extensive ice-dammed lakes [12; 14]".

Separate publications that refer to history of relief formation and setting of downfall accumulation in beds of Siberian, study conditions of emergence for a cascade of enormous ice cap lakes with discharge along water-dividing spillways from Yakutiya (bed of river Lena) to the West into water area of Black sea and further to Atlantic during all periods of glaciation in the second half of Neo-Pleistocene [2]. According to Groswald and Kotlyakov [1], total area of these Siberian water bodies could reach up to 3 million km^2. At the territory of over-Baikal a vast over-Baikal ice cap water body was formed during the period of maximum Samarovskoye glaciation in result of iceberg borrage in origin of river Angara when the floating ice cap occupied a significant part of Baikal water area [7]. This ice cap water body emerged 150 thousand years earlier than ice cap water water bodies of Europe. In its maximum level of 1020 m (stabilized – 880–900 m) lake water area far exceeded the boundaries of Eastern over-Baikal area to the South and East. The dump from this water body took its way in direction of the Pacific. In periods of paleolake level drop below the mark of 1000 m it was divided into two water storages – Selengiskaya [5; 6] and Nerchinskaya Dauriya [3; 8]. The former refers to Baikal range of dump, the latter – to water area of Amur river system. Dump of over-Baikal paleolake waters to the East provoked introduction of Amur river system into the area of closed lake basins of over-Baikal and Northern territories of Mongolia and China. During the further glaciations (Tazovskoye, Muruktinskoye, Sartanskoye) ice cap water bodies of regional significance were formed only in the North of over-Baikal territory (paleolakes Vitimskoye, Olekminskoye, Charskoye) [3].

The greatest interest in terms of studying biogeography of *A. linnaei* is drawn for by modern water bodies deeper than 10 m, located in height range of 900–1020 m. To such water bodies we can refer lakes Arey and Arakhley, located in saddles of continental water division. In our opinion, they are what remains of a vast over-Baikal ice cap water body (picture) that existed in the age of maximum Samarovskoye glaciation (picture 1) when a vast glacier surface emerged at the territory of by-Baikal and over-Baikal territory [3; 11]. Nowadays the lakes are described by the following parameters: lake Arey has the area of 4,6 km^2, depth of 13,5 m and mirror level of 996,2 m, it is adjunct to the wide saddle of water division that divides Enisey and Amur districts of dump between Yablonoviy and Malkhanskiy ridge. Lake Arakhley has the area of 58,5 km^2, its maximum depth equals 19,5 m, it is the largest lake in Ivano-Arakhley system of Lena-Enisey water division. During high water periods the lake gives origin to brook Kholoy that runs down to lake Shashkinskoye.

In lakes Arakhley and Arey we discovered *Cladophora aegagropila* (L.) Rabenh [4; 13] that is synonymous to *A. linnaei*. It is known that is widely spread in lakes and rivers of moderate latitudes of Northern hemisphere. Aquarium analysis revealed that optimal parameters are pH 6–7, temperature 18–20 °C. Under water temperature above 22 °C *A. linnaei* begins to grow rapidly and in 2–3 months dissolves into separate parts that give birth to a new green ball in certain time.

Discovering *A. linnaei* in lakes Arakhley and Arey allows us not only to partially fill in disjunction in the range, but also determine ways of introducing the kind into the territory of Europe, Kazakhstan, and Japan. Formation of ice cap water bodies in Europe and Asia, differences in dump direction from over-Baikal ice cap water body requires additional research that will allow us to define place of *A. linnaei* emergence, period and ways of its settlement throughout the territories of Palearctic.

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THE EFFECT OF GRAZING ON THE VEGETATION COVER ON THE STEPPES IN TUVA (RUSSIA)

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Steppe area, occupying only 8% of the land, provide 80% of humanity grain cereals, meat and other livestock products. Today, 90% of the area of the steppes turned into agrocenoses and semi-natural pasture, and preserved the virgin steppe are natural pasture land for grazing wild and domestic animals (Titlyanova et al., 2002).

The steppes of Central Asia belong to the steppes of Tuva, was the last person on Earth large steppe habitat, preserving steppe species and ecosystem diversity. These steppes supported human culture for thousands of years and during this period has undergone dramatic climate and social changes. In the past this area was little populated and low productivity of the herbaceous layer is quite security-shaft livestock products local people, leading a nomadic life. On native customs strictly regulate the nature of grazing – its timing, cycles, and duration. Due to the constantly recurring rest periods the state of steppe pastures was good. Currently, however, significant areas of the steppe are under heavy grazing pressure, which can lead to their degradation.

The purpose of the study – to reveal the character of changes of vegetation of the steppe pastures in the intermountain depressions in Tuva, depending from the stage of pasture digression.

The object of study – steppe vegetation grassland of pastures of the intermountain depressions of Tuva. Materials for investigation were collected during 1996–2016.

Study of the grazing influence to species composition of plant communities, the structure of phytocenoses, the productivity of the steppes and their dynamics under the influence of changing grazing regime relevant in theoretical terms in terms of biodiversity conservation, and in practical terms from the point of view of conservation of natural renewable resources.

The detection of patterns enables to determine the period of grazing of the steppes, to develop methods for the regulation of pasture load and activities to keep them in optimum condition, you will serve as the basis of strategy of management of the steppe ecosystems for their rational use, and the global strategy for plant conservation.

Materials and methods of research. The study was carried in geographical region of Central Asia – in the intermountain depressions of Tuva, that located in the southern part of Tuva on the boundary with Mongolia. In Tuva were investigated dry steppes with different grazing impact (Table).

Annual precipitation in Tuva steppes varies from 150 to 170 mm. The seasonal distribution of precipitation is rather constant: 70–80% of the annual total falls during the warm half of the year. The yearly mean temperature at Erzin is – 4,5 °C. The coldest month is January with a mean temperature of – 33 °C. July is the warmest month with 22.0 °C. The growing season, i.e. the period over which the daily mean temperature remains above + 10 °, lasts 130–140 days and the period with temperature above 0 °C – 180–190 days. The potential evapotranspiration for the growing season is about four – five times higher that the annual precipitation due to the high wind speed and a lot of very hot days with t° above 30 °C. The steppes of Tuva belong to the ultracontinental grassland type.

Description of the site investigated

Region	Coordinates	Altitude, m	Ecosystem type	Ann. prec (mm)	Ann. temp.(°C)
Tuva	49°40′N 95°03′E	1100	Dry steppes	150–170	– 4,5

Results of research and their discussion. Tuva (Russia) steppes belong to Central Asia (C.A.) subregion of steppe region of Eurasia. In C.A. steppe communities feather-grasses from section *Leiostipa* (*S. krylovii, S. baicalensis, S. grandis*) dominate and on the West of the subregion *S. capillata* and *S. sareptana* prevail. Desert steppes are dominated by lowfeather-grasses from section Smirnova (*S. gobica, S. glareosa, S. klemenzii*). Among small-bunch grasses in true and dry steppes dominate *Cleistogenes squarrosa*, *C. songorica, Agropyron cristatum, Koeleria cristata, K. macrantha, K. altaica, Poa attenuata, P. botryoides*. Species of *Festuca* (*F. lenensis, F. kryloviana, F. valesiaca*) are found only in the mountain steppes.

Semishrubs from section Artemisia (*A. frigida, A. xerophytica, A. caespitosa*) are common to a wide variety of steppes. Under grazing impact *A. frigida* abundance usually increases. Steppe shrubs from genus Caragana (*C. microphylla, C. pygmaea, C. stenophylla*) occur in true and dry steppes, *C. leucophloea* – mainly in semidesert and desert steppes. Peculiar feature of Central Asia plant cover is the abundance of herb-bunch steppes dominated by *Filifolium sibiricum* and rhizome-grass steppes dominated by *Leymus chinensis*.

In Tuva winter pastures were supplied with pump-houses to provide a livestock with water. After collective farm disruption these pump-houses were demolished and pastures were left without water. Many winter pastures were abandoned and herdsman have driven their flocks into river valleys. Many summer pastures transformed into full year ones with heavy grazing impact. Change of stocking rate leads to degradational or restorational succession which can be observed and investigated then and there.

Steppe grazing pastures in different natural zones in Tuva lead to different results. So, the steppe vegetation is in different stages of the pasture digression, which depend on the volume of pastures′use, the duration you pass and pasture load, type of cattle, environmental conditions. The proportion of severely degraded pastures is constantly increasing. Economic well-being of shepherds depends on the rational use of steppe pastures, which is impossible without the study of patterns of change in vegetation influenced by grazing and conservation of traditional animal husbandry. So, in the intermontane depressions of Tuva is dominated by *Stipa krylovii*, *Koeleria cristata* dry steppes which for a long time under the influence of the pasture load. The total reserves of the vegetable ingredients of these steppes does not exceed 3500 g/m^2. Light grazing leads to the development of the fineturf communities that are resistant to grazing. Total reserves of plant matter closer to 2800 g/m^2. When removing the pasture load, after 15 years of reservation, plot the change of vegetation in *Stipa krylovii* steppe. Total reserves of plant substances increase to 3500 g/m^2. Dead aboveground plant phytomass substance exceeds 1,5–2 times. Underground vegetable matter also increases significantly, and the proportion of live roots of dead exceeds 1,5 times. Overgrazing also leads to a change in vegetation cover. Submitted steppe *Artemisia frigida, Potentilla acaulus* associations with low total reserves of vegetable substances. In the underground sector is dominated by dead undecomposed fraction. When over-grazing of the locations of the old herders lots where vegetation cover is destroyed almost completely, there is a radical change of vegetation. Revegetation of a long time are directed towards the education of the community of weed species that are not in natural cover.

Conclusion

Analysis of the data shows that the state of the vegetation associated with social and economic development of the country. Tuva belongs to the old agricultural areas, as in ancient times (III century BC) the territory was inhabited by pastoral tribes, concentrated mainly in intermountain basins to the river valleys, the most favorable for development of cattle breeding and agriculture.

Extremely alarming is the fact that the area of degraded lands in Tuva is growing steadily, therefore, should establish the optimal ratio between the number of cattle and area of pastures.

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ANTI-CORRUPTION POLICY IN THE RUSSIAN FEDERATION

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In this article the author examines one of the most relevant problems of modern Russian society – corruption, the methods and mechanisms of fighting corruption and the role of anti-corruption education in the system of corruption offenses prevention, analyzes the importance of anti-corruption education in the training of state and municipal employees. We present a number of ways for improving anti-corruption education.

Keywords: corruption, anti-corruption activities, anti-corruption education, sense of justice, rule of law

This topic is one of the most serious, since corruption is a widespread phenomenon, undermining not only the authority of state bodies, but also threatening decay of society as a whole.

An important area of formation of anti-corruption behavior of citizens is anti-corruption education, which should include the distribution of ideas of intolerance to corruption manifestations among the various sectors of population, bringing the benefits of good behavior that affects the well-being of every citizen of Russia. To ensure positive outcome such education must be systematic. Therefore, in addition to general education, it is important to conduct informational and educational activities with specific content for specific target audiences.

Anti-corruption education should include not only knowledge of the normative legal acts of the Russian Federation and foreign states, but also allow students to independently evaluate the level of the negative effects of corrupt practices applied to the state and society. This aspect will allow to implement in practice the foundations of law and order.

Particular attention should be paid to the constituent elements of corruption and corrupt practices.

In accordance with the provisions of the Federal Law from December 25, 2008 № 273-FZ "On Fighting Corruption" [3], a corruption is understood as malpractice, giving and taking bribes, abuse of power, commercial bribery or other illegal use of a natural person of his official provisions contrary to the legitimate interests of society and the state in order to obtain benefits in the form of money, valuables, other property or property services, other property rights for themselves or for third parties, or illegal provision of such benefits to a specified person by other individuals, as well as the commission of these acts on behalf of or for the benefit of the legal person.

Thus, corrupt activities include various types of offenses. Accordingly, the anti-corruption education should be sufficiently diverse and include not only the knowledge of the legal and regulatory framework governing the responsibility for offenses in this category.

First of all, one need to pay attention to the formation and development of legal thinking and legal awareness among state and municipal employees, as this category present the immediate area of corruption risks.

The peculiarity of corruption in Russia, first of all, is the legal culture, legal consciousness of society, the mentality and distaste for authority that evolved over a long period of time.

Also negative impact bring absence of social control, accessibility and transparency of information, especially the instability of the economy (of raw nature), social injustice, trampling on moral principles and values, etc.

Here, attention should be paid to the experience of the Nordic countries (Finland, Sweden, Norway, Switzerland, the Netherlands, Austria, and others.) with a low level of corruption.

These foreign countries are characterized by high levels of economy, highly educated society, promotion of basic human rights, gender equality, openness of information, etc.

N.V. Bykovskaja notes that the main feature of anti-corruption concept of Scandinavian countries is management, which is reflected in the action of certain mechanisms, processes and institutions through which citizens can exercise their rights, freedoms and legitimate interests. In the above mentioned countries there exist a so-called concept of "good governance", which is expressed in ensuring the citizens' participation in decision-making, freedom of association and speech, integrity and impartiality of the control structures, revenue transparency, decisions, actions, strategic vision problems, timely response to the needs of citizens, balance of interests, equity, efficiency and effectiveness of all decisions, accountability of the various structures of the public authorities. "Good governance" is strongly connected with

the developed system of ethical values, which should be observed by government officials and ordinary citizens [1].

Thus, we can conclude the feasibility of development in Russia, as part of anti-corruption education in the system of training of state and municipal employees – legal awareness, enhancement of importance of the moral and ethical principles, social activity education and the creation of conditions to ensure the openness of information.

It is necessary to introduce special subjects, the contents of which will reflect the fundamentals of professional conduct, the code of ethics of state and municipal employee. For example, deontology – the science of the profession. Special course designed on the basis of this discipline, will include the rules and principles of conduct of professional entities.

It is also necessary to pay attention to the substantive part of the training of state and municipal employees, in terms of training and development of normative legal acts and regulations meeting the requirements of anti-corruption expertise.

In this case we are talking about the training of specialists in the field of rule-making, taking into account the features of anti-corruption expertise, which will continue to develop capacity of public authorities and local self-government.

Thus, given the current relevance and necessity to conduct anti-corruption expertise of normative legal acts, special course for training a also needed.

These measures will form the legal thinking and prepare students for practical work.

Based on the above stated, it can be concluded that the anti-corruption expertise of normative legal acts requires a lot of expertise in the field of fighting corruption, as well as in law, linguistics. Therefore, the development and the inclusion of these special courses in the training of state and municipal employees, will allow in the future the most efficiently identify corruption-factors, as well as to assess corruption capacity of certain provisions of laws and regulations, will contribute to the formation of special methods and means to combat corruption offenses.

It is also necessary to pay attention to the formation of anti-corruption legal awareness among students.

Anti-corruption consciousness has specific features that distinguish it from other kinds of legal senses of justice, specifically for this type of justice is typical: clear understanding of intolerant attitudes and commitment to anti-corruption as a phenomenon, knowledge of legal mechanisms to counter corrupt practices and the foundations of the state anti-corruption policy.

In accordance with the division of legal consciousness on the types, depending on the level it is proposed to identify different kinds of anti-corruption sense of justice, namely, anti-corruption everyday consciousness and anti-corruption professional legal conscience, characterized by a number of features due to the specifics of activities.

Anti-corruption legal conscience is formed under influenced of the system of factors, directly or indirectly affecting it.

Anti-corruption legal conscience is formed by two groups of factors: general and special.

General factors – objective (family, communication circle; economic, political, social and legal attitudes prevalent in the society (public opinion); legal education (in the broader sense); state-legal system of the country; economic and social situation in the country; education, profession, place of residence, etc.) and subjective (social and legal activity of the individual; its ideological aspects (namely the social and legal orientation on religion, notions of justice, consciousness of rights and duties of a man, of permissions and prohibitions) etc.).

Special factor is anti-corruption education, which is focused on formation of anti-corruption conscience and influencing it through the implementation of a system of anti-corruption education at different levels. [2]

Thus, the necessary condition for the formation of students' anti-corruption legal conscience is the introduction into the study programs of special courses, the development of special disciplines on anti-corruption expertise of legal acts, the introduction of special courses on the basics of professional conduct and activities of state and municipal employees.

And here, the anti-corruption education acts as a separate area of the state anti-corruption policy that will allow to fully use preventive measures in the fight against corruption.

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THE FORMATION OF VIEW IN HISTORY AND TYPOLOGY OF AZERBAIJANI REALISM

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The article is clarifying interesting scientific results of realism's history and typology which is the main creative method of Azerbaijani literature in the past two centuries. It should be noted that an artistic expression of this method in Azerbaijani literature has got a specific character. Despite of similarities with realism in the European and Russian literatures, the typological features of national realism, which based on certain traditions, is a matter of interest as well. The classification of realism in the 70th of 20th century was a subject of discussions during the conferences had been held in Baku (in 1975), in Almaty (in 1975), in Kazan (in 1978). During these conferences has been attempted to generalize the historical experience of realism in the literature of the different Turkish nations. In this respect, the author paid special attention to conference on subject of "The problem of realism in the literature of Soviet Eastern Nations" which had been held in Baku, 1972.

Keywords: literary criticism, realism, romanticism, artistic-esthetic thought, public artistic environment, subject of investigation

Realism as the artistic creative method has taken significant positions in the world and European literature in the last two centuries. To lean on objective aspects of the real manner and the certain system of the shapes has strengthened the attitude of realism in the last centuries. The realism has tightened its positions in Azerbaijani literature especially since 19th century. Entering into the evolution stage by the creative of A. Bakixanov, I. Gutgashinli, M.Sh. Vazeh, our enlightening and realist literature is reaching its peak of perfection with the artistic heritage of M.F. Akhunzade, N. Vazirov, A. Hagversiyev, N. Narimanov in the second part of 20th century. Realism, by the creation of its own traditions, kept up its existence, improved its formation and created its own style and the system of the shapes. The creation of national realism and its development history was always a subject of the investigation of literary critics. Such a systematical approach to realism is stipulated with the sensitive attitude, specific characters of the whole stage of national literary historic process, rich creative behavior, and literary esthetic researches.

We dare say that the history and typology of realism that formulates the main creative method of our literature in the two centuries is bringing about interesting scientific results. Because of that this creative, method has got its own specific character and literary expression in Azerbaijani literature. Despite of the certain similarities Akhunzade and mutual features of national realism with the realism of European and Russian literature, its own typological and traditional features are the matter of interest as well. It should be noted that the first systematical traditional idea and thoughts about Azerbaijani realism had been said by M.F. Akhunzade which is the founder of the conception on national enlightening realist critics. The researcher clarifies that the matter of realism is approximately a basis of Akhunzade's art theory and contain most of the different subjects. The research of artistic and esthetic heritage proves that he was a realist and enlightener both in artistic creative and by his artistic vision. He stipulated the principles of that method on the basis of the unique conception (1, 60).

Mr. M.F. Akhunzade focused and clarified in his critical articles the unity of form and content in the artistic literature, typology of realism, realities of life and literature, the system of shapes in realism and the problems between author and literary study. The realism has not lost the interest in its essence and artistic expression in the different literatures for further artistic stages. The regional features of national literatures, mutual and typological qualities of realism have always been in the center of the focus in critic and literature study in the period of Soviet Union. Because of that, as t the only creative method during soviet, the life of socialist realism and its influence in its in the different literatures was under unknown conditions, and therefore the essence, specification and typology of the realism in the soviet critic and literature study was the matter of discussions and series of scientific conferences and meetings had been held accordingly. The critics of Azerbaijan such as A. Nazim, A. Hajiyev, Y. Garayev widely explained in their works the problems of literature study such as a creation, evolution and classification of the national realism. Namely, YasharGaryev's creative in this field should be especially

underlined. The researcher, which is focusing on typological classification of the realism, attempts herein to determine one unique principle for those classifications. It was made as the conclusion that any typological classification is not based on aspect of poor outlook but certain esthetic principles. It is impossible to determine the stage of national realism without it. So, the critic denied the advantage of an outlook of the masters which are Marxist esthetics and he has preferred conceptual esthetic values instead of the political and ideological principles while approving of any creative method. On the other hand, anticipating the continuation of the realism relations in the future and transformation of it into the new attitude, the critic has written as follows: "Indeed, it is impossible to identify the normative, standard and stereotype meaning of the realism cause of its new features that come out each time and century". But, in any cases the features that express the certain history and the description of life in terms of dialectic development are always considered as the structure of its essence. The history of realism considers the character of thinking, public's approve of the object, psychological analysis, making an event as historical perspective and the public dialectic relation between an individual and condition. Modern scientific and theoretical idea appears in order to find out the realism namely in the style of characters, conflict, language, expression, total theoretical esthetic principles and finally in the unique system of them (2, 21–22).

The literary critics of Western Europe and theorists of Marxism has an ideological and political disputes namely in this field along the years. If the esthetics of Marxism mostly has been preferred a realist artistic thought in the literary historic process, so the specialists of Western Europe literature have been denying an artistic conception of the socialist realism that comes over the other types of literary creative. Such kind of disputes among the different political systems already entered the stage of humanitarian science, namely the stage of artistic thought.

The theorists of Marxism have always highly welcomed the historic achievement, traditions and artistic personalities of realism. Meanwhile, they denied the description of the different creative methods and evaluated the reflection theory of Lenin and Marxist training about party membership of the literature as a wall without base. An Austrian literary critic Mr. Ernest Fischer took more radical position, he did not like the position of those that to call a product of artistic thought as "a progressive", "a reactionary" and said: "the writer should take an opposite position against society and political regime, and always must tell the truth". When an ideology of life's reality is under the dislodging, the original artistic works come out then. Because of it, the soviet literary critics had many scientific disputes and discussions around the problems of realism and called a series of conferences accordingly. The history, theory and typological features became the general subjects of the discussion.

Complex and wide investigation of the realism problems within range of unique artistic and esthetic principles began since 70th of 20th century in all-Union arena. A series of scientific sessions and conferences had been held in 60–70th in accordance with these problems and many investigation works were appeared during that period.

Until that time a realism, namely a historic evolution and the specification of world literature in Marxist esthetic, the forms of appearance in the national literature and an individual identity of realism in the artistic heritage of the different writers more and less were investigated. Since that time the investigations in this field became wider so that the problems demanded a theoretical and systematical scientific approach of literary study. Thus, in 1970, the Tatar literary critic Mr. I. Nurullin suggested in the magazine "Voprosyliteratury" (№ 4) to investigate the creation and typology of the realism in the literature of Eastern nations by the context of all-Turkish literature and its theoretical thought. Mr. I Nurillin said the following interesting and disputable opinions about the historic formation of realism in the territories of Middle Asia, Caucasus and other regions that inhabited by the Turkish nations: "Mr. Gasimzade claims the creation of the critical realism in literature of Azerbaijan and even related it to the first part of 19th century." It is impossible to doubt his rightness because he dines the conception that the bases of feudal and serfdom relations are not under the critic in the literature of that period (3, 22).

Mr. YasharGarayevrebuted this opinion of I. Nurullin in the book "Realism: art and truth" for the reason that this critical evaluation does not cover all achievement of realism investigations in Azerbaijani literature in the period that article had been written. Whereas, it is possible to examine the general principles of the conception and "enlightening realism" subject supported by the author since 1968 in the literature study of Azerbaijan as well (3, 22).

These opinions of I. Nurillincan can be rebutted that he takes as the main aspect the criticizing of the bases of feudal serfdom relations

in order to determine and compare the realism, and he does not take into account the role of artistic technologies and national artistic systems in this process.

It is clear that one of the problems that caused of serous activity of the soviet literature study was realism. It is not accidental that since 60th many conferences and scientific works have been dedicated to this problem.

The stages' classification of realism had been discussed widely in the conferences held in Baku (1972), In Tashkent (1975), in Almaty (1975), and in Kazan (1978) during the 70th of 20th century, and the historic experience of realism has been generalized in the literature of the different Turkish nations. In this respect, the conference held in Baku in 1972 which was dedicated to the "problem of realism in literature of Soviet Eastern Nations" should especially underlined and to be discussed. Despite that the development tendency of realism had the sufficient investigations by the western and Russian literature, meanwhile without taking into account the conference held in 1969, some aspects of this matter left apart of the investigations in the literatures of eastern nations thetypological features of realism have not been a subject of the discussions in the literature of soviet eastern nations.

If the first reason for the increased attention to the several scientific and theoretical issues of our literature is an exemption of the artistic thought product out of the political and ideological groups, so the second one is a will of modern approach to the classic artistic heritage out of the political and ideological groups, so the second one is a will of modern approach to the classic artistic heritage by the results of the increased esthetic and educational role of artistic literature in the modern period. Becoming of artistic literature as a strongest factor for the formation of human consciousness in terms of art, an elimination of the literature study science based on Marxist and Leninist methodology and the opportunities that successfully settle the theoretical issues of art and literature, these all require a formation of a new vision into the history of realism.

The investigation of realism has been conducted in the different directions which is one of the main issues of the literature. So far, the development way of realism in the world literature, its relation to the national literature, the individual expression forms of realism in the creative of the different writers and etc. had been studied in the result of those investigations. However, as the investigations are becoming wider, so the new issues regarding the history and the theory of realism come out. And the settlement of them is one of the actual issues of modern literatures. So far, the development way of realism in the European literature has been a main direction of investigations. But, realism in the Eastern literature was out of investigations until 60–80th. Since 50th some steps had been made towards the scientific determination of the issue and the new works had been produced in the literature of eastern nations that related to the features and development way of the realism.

The Eastern literature has been considered as a collection of the different literatures of the different nations by the ancient history that defer from each other in terms of the historic condition and the national character. The development way of realism in these literatures had a specific way unlike of European ones. However, they have not been isolated out of the literary process worldwide. Unambiguously, the all literary critics have accepted an idea that European literatures have got an influence on Eastern literatures and vise versa. Therefore, while study of the global realism is important to take into account an artistic experience of Eastern literatures. It is impossible to determine the historic experience of realism without it.

During the Soviet Union an issue of realism in the Eastern literatures had been considered and understood as the realism in literatures of Soviet Eastern nations. The common features of literatures of Soviet Eastern nations make the common and mutual peculiarities as a priority in order to settle this issue. The literatures of Soviet nations such as Uzbek, Kazakhs, Azerbaijanis, Turkmen, Tatars, Kirgiz, Bashkir and etc. are including the similar and common features in terms of public, economic and cultural life. The investigation and study of them allows to identify several objective laws in the development of realism.

The Scientific Board "the objective laws of world literature" under ANAS and Institute of Literature after Nizami had held a scientific conference in October of 1972 in order to investigate the creation process of realism in the literature of Turkish soviet nations, to identify the objective laws in development of realism and to determine their typical and similar features. The famous literary critics from Moscow, Tashkent, Almaty, Ashgabat, Dushanbe, Kazan, Ufa and Tbilisi took part in this conference as well.

The various discussions on Eastern realism had been held during 1957–1962 years. The collection of materials of those events had been published in 1964 in Moscow under the name

of "the development problems of realism of the Eastern literature". The subject of discussions and materials accordingly had been dedicated to the realism in the literature of foreign eastern countries. Since the conference in 1969 in Baku which was about the realism in the literature of Azerbaijan, the interest in realism and theoretical level of the conducted investigations had been increased, and many articles and books were produced accordingly. The all-Union conference on "problems of realism in the literature of Soviet Eastern nations" held in Baku brought about the completion of all related events under the implementation, generalization of the different idea and opinions, idenfication of future perspectives in this field.

Making an opening speech in this conference the vise-president of SSR AS Mr. M.A. Dadashov has pointed that the nations of Eastern Soviet have got a rich and an ancient literature. The speaker said: despite of the several interesting works produced in the recent years in accordance with the realism of those literatures, the investigations are not sufficient in that important field. It is time to determine the meaning of the conceptions such as "Realism" and "Romatism" and meanwhile to eliminate the tangle ideas about them. The proportionality of realism with romantic and other creative methods, typology of realism's national forms, impact of mutual relations of literatures on realism and the investigations of the issues regarding the style and genre of realist literature should be under the special attention. It would be better if one of the upcoming conferences to be dedicated to the history of socialist realism and theoretical problems in the literatures of Soviet eastern nations". The trends of class positions in the artistic literature once again appeared in this conference which demonstrated itself along the years in the Soviet literature study. Thus, the doctor of philological sciences Mr. A. Hajiyev shares on the typology problems of realism in the soviet eastern literature he noted that the truthfulness is unlike of realism and realistic truth has got its own features. The speaker noted that there are three stages of type of historic realistic creative and determined them as follows: feudal-democratic realism (that subject brought about hot debates during the conference), bourgeois – democratic realism and socialist realism. Due to the speaker the feudal-democratic realism became larger in the Central Asia and mostly used in the satirical poem. To his mind, an idea direction of realism of 19–20th century had been an enlightening and critical one from beginning to the end. And it would be better to call this period as "bourgeois democratic realism".

Mr. A. Hajiyev's approach to realism in terms of classification in our literaturehad been evaluated as follows: "It is important to accept these reforms which became a subject of the debates for the reason that an author approaches to the theoretical system of realism from the classification point of view and attempts to explain the natural and objective historical way of artistic process from the position of political and ideological principles of Marxist esthetics." No doubt, because of it, the creative, namely the classification method of Hajiyev had been criticized and denied by our literature study for further decades. The feature out of his opinions that impossible to accept is the identification of the artistic creative method, romanticism and realism with the artistic creative style, satiric and literary kind, with lyrics. Meanwhile, he got wrong a method with an artistic description. The subjects such as "feudal – democratic realism", "bourgeois – democratic realism" used by the author had not proved fairly (2, 216).

The scientific position of Mr. Mr. Ibrahimov which is the academician of Azerbaijani SSR AS brought about a big interest as well. Thus, he notified in the report of "realism in Azerbaijanahig poem" that the folklore, being an expression of nation's artistic thought is connected to the real life. The realism mostly is appeared in Ashig's poetry which is connected to the people's life and style. Ashig poetry had an impact on literature of Middle ages because of its close relations with the people. Namely, that poetry strengthened the democratic and realist trends accordingly. Ashig's poetry had been developed in the results of mutual relations with people's creative on the one hand and with the written literature on the other.

Ashig's poetry is a democratic poetry in terms of artistic form and styles. It always reflected the real condition of the nation's language and shapes.

Therefore, the realistic descriptions and scenes have been always appearing in the poetry: "The realism of Ashig's poetry has always based on people's life, language and artistic mentality, and has been developed in this way". The lyrics of famous ashigs such as Gurbani, Asgig Abbas, Sari Ashig and the saga "Koroglu" mostly focused on realism. In the further period we may come across with the attributes of realism in the poetry of Sayyad-Novada, especially of AshigAlasgar, ChobanAfgan and the others. The realism of Ashig's poetry became stronger and complete in the 19–20th centuries (3).

Mr. M. Ibrahimoc's opinions cannot be accepted for the reason that he relates Ashig's creative to realism, and it disapproves that realism appeared in the certain time.

If seriously to take into account this conception, we may relate our romantic poetry to the realistic art work then, but it will not able to settle the problem.

The literary critic Mrs. H. Smirnova (from Almaty) shares on issues about the realistic traditions of Kazakh folklore she has notified that in the second part of 19th centuries and and in the early of 20th the traditional folklore, the genre of Ahsig's poetry. Historic epos and songs have owned the realistic features.

Mr. U. Abdullayev (from Ashgabat) notified that the realism has been existed side by side with fantasy and mythology in the folk art and literature of Turkmen along the years. In the period before the realism had not been forms as one of the artistic methods in Turkmen literature. The real character of this method appeared in the works of following poets of the second part of 19th century. However, materialist, mythological and idealist idea were mixed up with each other in the mentality of the author of that period.

During the conference Mr. M. Dusysenov (from Almaty) brought about to the attention of the participants that the literature of Kazakhs included not only folkloresamples but also individual folklore works of the certain authors. Du to him, the dynamic description of the creature and an initiative in order to create typical characters was in the stronger position in the works of oral producers while a domesticity had a strong position in the folklore of Kazakh. It might be said that the didactics demonstrated itself mostly for Kazakh's folklore and oral literature. To deny the positive significance of the didacticism in the apparent conditions would be unfair. In any cases, an initial formation of realism in the Khazak's literature took place generally in the scale of didacticism.

Mr. H. Otdayev (from Ashgabat)notified in his report about realism "Turkmen poets and realism" that the people's poets play a significant role in the development of the realism and socialist realism, and meanwhile he notes that BayramShair, DurdiGilinj and Ata Saleh are the founders of new Turkmen soviet poetry. He claimed that a method of socialist realism was appeared just in their poetry at the first time. The progressive features of the literature of pre-revolutionary period and the innovations appeared in the results of socialism came together organically in their creative. The people's poets, by owning a method of socialist realism, have been based on realistic features of eastern literature and investigated its content deeply. However, this position is needed to be specified as well. Because, herein the theory of "elements" has been taken as a priority and artistic esthetic aspects have been forgotten.

Mr. A. Chayimetov (from Tashkent) has investigated the realism in the creative of AlshirNavai. He said: "Mr. A. Navai has always leaned on the experience of Uzbek, Iranian, Tajik, Azerbaijani and Saudi Arabia literatures in order to express his humanist ideas and opinions, "and approached to their artistic styles creatively. If Navai applies the romantic color and expression in order to describe the positive events and the facts, so in case of life's negativities he uses mostly the realistic reflection of the original creature. Superiority of romanticism in the artistic and poetic descriptions of Navai does not damage a role of him in approving of the realist principles in Uzbek's literature (3). Due to the speaker an interest of the poet in realism is mostly felt in his satiric, didactic works and process: "Certainly, Navai is never set a goal for himself to describe a typical character and environment". However, he made a lot for the formation and development of realist method in Uzbek literature. The poets such as Babur, Faraqi, Makhmur, Mugimi have learned a lot from him" (3).

Mr. M. Guluzade (from Baku) supported an idea that during 12–16th centuries the main and the leading method of Azerbaijani literature was a unique romanticism of middle ages. The reason was a great talent of the poets and apparent historic conditions of romanticism. Thus, the public and religious rules of that period did not meet the great ideas of poets. The speaker noted that Nizami created the shapes of ideal heroes such as Farhad, Mahinbanu, Shirin, Bahram Gur and Isgandar because of artistic environment. And mostly the works of Nizami and Fizuli demonstrates the scenes of life realities and the characters of the human being. Especially, the poems "Biz ve Rami" by Mr. Furgani and "Farhadname" by ArifArdabilli included the means of realist description and expression".

Mr. M. Guluzade has been understood the realism as a truthfulness. So that, it has been caused an application of that creative method in the romantic poetry of middle ages and meanwhile In Ashig's creative. If to take into account this matter, it is not so hard to find out therealism in the works of classic poets. We have got a classic heritage, many popular tales, sagas and etc. in our Ashig's literature that

reflects realism in terms of real reflection of life realities and contains itself the rich realistic features. But, it is impossible to ascribe those works to the method of realistic creative based on above mentioned "elements" and "details".

Mr. A. Dadashzade has put forward an idea that the truthfulness, the sensitive reflection of the heroes' feelings and the humanism still is not a realism. The history and the methodology of realistic mentality requires more serious definiteness and precision. However, no doubt that approving of realistic method and realistic mentality caused by the objective development of the world literature. The realistic traditions in Azerbaijani literature became stronger in 17th, especially in 18th century. The geographical and time concreteness had been increased, the real images and dramatic stories of the period attracted more attention. The literary critic based on poems of M.V. Vidadi, Aga Masihi, Sh.Shrivani in order to motivate his own ideas. Due to Dadashzade, the conditional and romantic anxieties of our language specific to middle ages poetry is getting down in this period and it is replaced by the mundane motives. People's poetry and national language have owned the reputation in the classic poetry. The poems of Vagif are especially great of importance in this respect. Vagif is a realist because of his approach to life happenings. The realism of 18th century is a descriptive and spontaneous, and he played a big role in the development of complete realism.

The associated member of Tajikistan SSR AS Mr. Brakinski, leaning on rich artistic materials he noted that satiric, romantic. Symbolical realistic features have been coexisted even in the ancient literature, namely in the legends and myths of Shumer-Akkad, Iran and etc. In the further period, namely in the development period of Arabian, Persian and Turkish language those features have not lost its power. So, as one of the method, it was proved its presence in the Eastern nations' literature of 19th century. Sharif (form Moscow) widely spoke about the creation and development way of realism in the literature of Caucasus. He noted that the roots of realism is lead to 18th century, namely ased on creative of Guramishvili, Orbeliani, Sayad-Nova and Vagif. The realism had not formed in all three literatures in the middle of 19th century. He pointed out a special role of Russian and European literature for increasing interest of realism.

The doctor of philological sciences Mr. K. Talibzade spoke about the investigations of realism in Azerbaijani literature. He generalized the disputes on history and development stages of the realism's formation, which was an artistic method in Azerbaijan.

The most interesting reports of the conference especially were about the identification and application process of similar features of joint objective laws in terms of typological view which appeared in the process of formation and development of realism in the literature of Soviet Eastern nations.

The theoretical and esthetic principles of realism were not only a matter of discussions. Meanwhile, romanticism, its principles, ideological, political and artistic aspects in the artistic heritage of the different Eastern nations had been discussed, too.

The mutual development of realism and romanticism of 19th century became a scientific object of investigations in the result of the certain facts and artistic similarities during the reports of Mr. M.S. Jafarov and Mr. N. Nigmatullin (Kazakh).

At the same time, the scientific classification of stages and the types of realism by Mr. Nirillininm Mr.Ch. Ismakov (from Kazan) and Mr. Garayev had been made namely for the approving of the similar development ways of realism in both literatures. The following opinions of Nurillinin on typology and classification of realism attracted much more attention: Above all, we should come to an agreement in order to express the subjects such as "realism and critical realism" in their original meanings, and meanwhile we should clarify the context in accordance with these conceptions. The realism is a creative type that includes itself some several methods of realism such as enlightening realism, critical realism and socialist realism" (4, 4).

Due to the I. Nurullinin that any real description still cannot be realism as well as each realism cannot be a critical realism. The critical realism is a kind of realism that does not reveal the individuals, so it criticizes the bases of the public rules and weakens the basis of unjust structure.

While the investigations of scientific theoretical bases of realism Mr. I. Nurullinin said as follows: "The critical realism in the Tatar literature had been created on the bases of traditions of realism that already developed before the public and ideological conditions of revolution in 1905".

But, without these traditions the critical realism cannot prove itself fully in the Uzbek, Kazakh, Turkmen, Kirgiz literatures in the end of 19th century and also in the early of 20th (4, 32).

The realism and its development stages in the literature of Eastern nations have been based on scientific thesis of Mr.I. Nigmatulin as well. He considered that Tatar literature came to critical realism directly from enlightening realism by ignoring the romantic stage (end of 19th century and early of 20th). The critical realismwas appeared simultaneously with romanticism in Tatar literature. The Attitudes to realism, romanticism, and other creative methods were different during the national independence. National statehood ideology and the new principles of humanitarian mentalitymade this issue more actual. Taking into account above mentioned conception the stages of realism and its typological features should be investigated once again.

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PHRASEOLOGICAL UNITS CONNECTED WITH THE TRADITIONS AND CEREMONIES OF THE CULT OF FIRE

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Each people have the picture of the world as language is not only means of thinking and communication, it is also reflection of culture and spirit of all ethnos. Therefore special value has research of the cult phrase logical units created on the basis of an ethnic cultural heritage and national knowledge from the ethnic linguistic point of view. In any people, the "cult" concept in system of the spiritual and cultural concept takes the important value. The spiritual culture is a view of people of world around, religious knowledge, character, believing, and ability to learn through other concepts. By itself a cult words according to the abstract description is very difficult. The lexeme of the word "cult" is grouped in wide group of such concepts as, "to trust, to pray, to admire, to respect". The cult is part of traditional religion and religious beliefs.

Keywords: Cult of the Fire, concept, phrase logical units, worshipping, symbolic-cognitive properties

Cult of the fire is considered to be the most important one among all other cults. Most Turkish people evaluated the fire, respected and worshipped it. The fire is called "ot (от)" in Kyrgyz, Uigur, Karakalpak, Karachai-Balkar languages; "Ut (Ут)" in Uzbek, Tatar languages; "Od (Од)" – in Azerbaijan language. Fire has been an important factor, occupying almost all aspects of life.

The wide usage of fire for domestic, technical, religious and other secular purposes shows is ready availability i.e.

Scientific novelty of research work. The word "Fire" is highly appreciated, and it is seen from the phrase *"ot-ana"*; this word is equivalent to the word "kudai"- god. The woman god of fire in Khakas language is called *"ot atan"*, and it is explained in the dictionary by Butanayev as "pochtitelnoe obrascheniye k bogine ognya (an honourable address to the woman god of fire)" [1]. Having the same meaning there are more phrases like "от ине"- *"ot ine"*, "от инезі" – *"ot inezi"* which mean in Kazakh "mother of the fire, the host of the fire". The word combination "ot iesi (от иеси) – the host of fire" is left from the times of matriarchy.

According to the Kazakhs traditions **God of Fire** *"Ot ine – Ot ene"*, could supply with light and warmth. It was believed that it could protect the family from all evils, bring wealth and happiness. The Khakas thought that fire had some kind of relation to the family members. It helped the host of the family that's why it was also called as *"Zhurttin iesi, zhurttin kuzetshisi, adamdi saktaushi, maldi korgaushi"*.

Theoretical importance of research work. The Kazakhs also worshipped and appreciated it like their neighbors – the Turkish people. Fire worshipping had been handed down since ancient times. It is considered to be the basis of Zoroastrism. The fire is merciful god as one part of the sun on the earth. At the background of fire worshipping lies sun worshipping. Ancient people understood the benefit of the sunlight and warmth and as a symbol of the sun they made a fire on the earth. The people who lived in northern parts of the planet valued the fire more than anybody else, as winter came here earlier and the weather was too cold. That's why they constantly kept the fire as a symbol of the sun to get warmer. Hence, they celebrated the fire holiday not in summer but in winter.

In the main book of Zoroastrism religion "Avesta" the god of fire is described as merciful, supporting, goodwill and considered to be the greatest among all other gods. "Yasna" is the biggest part in the book of "Avesta". There is a prayer glorifying the fire at the beginning of the Zoroastrism religion development, the god of fire was the basement of it and it was the first step in the formation of the religion [2]. Some instances relating to the fire in the book of ''Avesta" are traced in Kazakh beliefs as well. For instance, there are songs sung during the wedding fire worshipping:

Ottai ystyk dostyk ber,
Zhubyn zhazbai uzak ber
Zholdaryn zharyk, zharkyn et,
Ot-ana zharylka!

saying these lines the Kazakhs beg the fire mother to protect the young couple. Consequently, asking for help and begging the fire is the tradition of the Kazakh people coming down from ancient times and it is still kept alive.

It was identified that the fire place of the *"eternal fire"* is situated in central Asia,

Khoresm. All the scientists who were investigating khoresm and central asia on the whole assumed that was where the fire was born. S.P. Tolstov said that the saint fire of Zoroastrism started at this place and he writes in his work: "in ancient times there was exactly here, as academician V.V.Struve justly stated, the main center of the sak-massaget tribes settlement who were persistent adversaries of ancient conquerors kir and dariay [3].

At the places of Khorezm there were found some fireplaces of local people called Alaukhana. There was also a temple "Dashly – 3" in the XVII century b.c. All three temples were like circles, without ceilings having nine domes. Ancient people came here to pray to the fire [4]. Topyrakkala situated on the territory of Khorezm was the oldest castle. There are fire houses for sermons. The palace of Khorezm kings is situated in Kara kalpak Biruny region. It is surrounded by the walls of towers. From the right-side wall gates there is a street till the sermon fire houses.

In ancient times Khorezm had a holiday called Adzhgar. A.Biruni says that this holiday was celebrated when there began agricultural works in this area and it was when akhmed ibn mukhammed took part in completing the calendar in 959. Adzhgar means "wood" and ''flame'' [5]. It is connected with the Kazakh word "ot zhagar – firing". Y.G. Gulyamov in his work about the history of watering Khorezm lands wrote: "in ancient times there was a calendar of rivers flooding in Khorezm and it had some types as the first one, which is "Kok kamysh tashuvi – flood of blue reed", – it was when the blue reed was growing. Approximately it was on the 20th of march.

The second one is "Ak balyk – tashuvi" – "The flood of white fish", the time of white fish which went along the river Amudaria from the Aral sea in April and spawned. The third one is "Yulduz – tashavi" – "the flood of stars" – taking place in the middle of may, the fourth is "Kyrk – chilgav tashavi" – "the flood of 40 days heat", took place from the second half of june till the first half of august and lasted for forty days [6]. It is similar to "40 days of heat" in Kazakh language. This means that this concept existed long times ago as well. S.P.Tolstov said: "the complex in Tashkent helped to find out the key, elements of the sak culture who inhabited the down region of the Syrdaria river in the first half of 1000 bc. The town of slaughtered sheep is a fabulous monument to the classical blood shedding culture (the khanha tribe) in Khorezm [7]. At that time when there began agricultural works near this temple, i.e. During the flood of yulduz tashuvi people celebrated the holiday Adzhgar. It coincides with the 8, 9 may by our calendar.

Traditions, customs, beliefs relating to the fire have been existing since the ancient times. It played an essential role in people's life.

First, it was used in cooking, keeping warm, lightening the darkness. There is a proverb in this connection: "If you are cold, make a fire; if you are afraid, make a fire; if you are hungry make a fire".

Second, the fire has a feature of getting rid of bad. People think that it can protect from evil and clear up from the sins. According to it, when people moved to a new place, they made a fire there and made the people and the cattle pass between two fires. This custom of getting rid of bad is called "alas". During this process people used to say: "Alas, alas, ar paleden khalas, Ot, ot tazart bizdi ar paleden". And saying "alas, alas, keep us from every evil; fire-fire, get us cleaned from everything bad," they get rid of the bad from the sick man's bed, the pram of a baby with the fire smoke. At the beginning of the new year, it is the 22nd of March, people made fire and divided into separate groups according to their ages kept in hands the sticks with fire and passed between two fires. They sang songs in chorus. "Alas, alas, keep us from every evil" and cleaned the surroundings with fire and young people jumped over it. As for the last action it also had its own meaning. It was done for cleaning from different kinds of evil. There was also a custom to make a fire in the middle and dance, entertain around it. Such holidays were celebrated during the longest days in june. They are similar to those ones of the Russians "Ivan kupala", the Belarusian's "Yanka kupala", the French "the St. Sean". Following two words in – n – "young" n-iu "neu" are met in the German language and iung (young) in English. In Turkish languages there is added an affix "i" to these words and having new ones in Uzbek as "aingi – new, eni – new in Turkish. And in the Kazakh language ian-a means new as well. It could have been the reason of only the youth taking part in this holiday.

Third, the fire has a feature of clearing. The Kazakhs, the Kyrgyz worshipped fire and considered it a safeguard against evil. According to the animistic beliefs a mortal body is scared of fire, and the fire is afraid of candle.

Fire can both support the person and be an enemy as well because it is dumb, merciless enemy. It makes people scared and

frighten, that's why a dead body was guarded and a fire was put above his head not to have him come back home. Our ancestors believed that the soul didn't go out from the body for 40 days after death, so making the place lighter they put a fire for 40 days every day. This custom appeared due to the belief of worshipping fire and that is had the features of keeping warm and clean. Sh. Ualikhanov said: "The Kazakhs passed between two fires when they made a promise, swore and to clear themselves from sins… at the same time they worshipped the fire and were frightened of it, and swore having it (Sh. Ualikhanov). At first it was necessary to clear up with fire before swearing. The ancient custom of the turks began during Avesta. About fire worshipping much is said in a mythology about siyauish, that is common for the people of central Asia and Parsi. Professor S.P. Tolstov says about this story: "Siyawish, who was wearing a golden helmet and riding a black horse, to try himself in the fire clearing had to pass between two flames''. The process of passing it is described in the work of Firdousi called "Shakhnama'' in detail as well. Burning a mortal body is based on the belief of clearing by fire. The ancient people thought that this way would help the mortal body to get rid of sins. Gordizi who lived in the xi century wrote about the following: the Kazakhs like the Indians burnt a mortal body anal said at the same time: "fire is the cleanest thing, everything that is put into fire can be cleared, mortal body can also get rid of sins''[8].

According to the archeological data found out on Kazakh lands, the tribes of the bronze period worshipped the fire; it is obvious by a widespread custom of burning a mortal body as there were found a lot of burnt people bones of that period. To the ancient people's mind, fire could clean the body from the evil and protect a dead body from bad spirits. Sometimes you could find the odds of ashes and coal at the tombs, it can also prove the custom of worshipping the fire. "During the bronze period there was a widely spread a tradition at the funerals when people put some ochre on a mortal body and onto his tomb while they were burying. To the people's mind a red color meant fire equivalent to the sun, the greatest force of fire can protect from bad spirits.

Fourth, fire has a feature of threatening. "appreciating fire people are at the same time afraid of its power that's why they curse saying the words of fire… they think that most diseases are because of the fire curse, so they are treated by fire". There is one of such treatments as to cut out seven pieces of meat from seven different parts of the animal body and after grilling them on fire, put on aching places of the body. To get rid of the illness people also heated a copper scoop until it was red, then poured some oil into it and put some part of blue fabric, after both of them began to burn, they got it close to the face of a sick man and poured some cold water into the scoop there was vapour out of it. This kind of treatment was called "Zhelushyk" (Sh. Ualikhanov).

Fifth, fire was considered as a "totem". As fire was connected with oil, the Kazakhs might have considered fire as a "totem" as well. Professor K. Zhubanov shows the meaning of the word "oil" in Kazakh as "Mai ana kotoroi obraschayutsya zhenschiny za pomoschyu v trudnye momenty ih zhizni – vo vremya ih rodov, ne mogla byt nikem inym, krome kak pokrovitelnitzy zhenschiny – umai. No ee imya proiznositsya Kazakhami ne kak v sibiri, a kak mai bez nachalnogo glasnogo u" [9]. Consequently there appeared a custom of pouring some oil on the fire.

In ancient times this custom, i.e. Adding oil to the flame had an important role in the beliefs of the Turkish people and it is still kept. The Kazakhs believe that the fire is a beacon of the house, that's why a just married woman has to worship it. It is as one kind of the fire worshipping, as the last one could protect the family like "god of sun". This custom, the background of which lies in the ancient guns, has been kept with most Turkish people (Sh. Ualikhanov). A just married woman is taken to the house of her father-in-law. As soon as she enters the house she has to kneel and bow greeting at the same time. Then she is ordered to sit on the leather rug, as it means to be as soft as that leather. After it she pours oil on the fire and several times she bows in front of it saying *"Ot ana, mai-ana, zharylka"* and prayed. Sometimes these were replaced by those ones *"Ot aulie, mai aulie"*. For example, a young just married woman while entering the house of her husband has to bow three times till she reaches the fire place and then pours a scoop of oil on the flame. The old women stretched their hands towards it saying "Ot aulie, mai aulie" and stroke their faces (Y. Altynsarin). The custom of pouring oil on the flame is done not only by daughters-in-law but by sons-in-law as well. It was performed when a young groom first came to his parents-in-law. The

people call it "Otka kuyar" [10]. According to this custom "the groom while crossing the threshold bows three times and as he reaches the fire place, he is given a scoop of oil" (Y. Altynsarin).

Kazakh people consider the fire as scared. Every family had the tradition of respecting the fire. That's why there appeared the word phrases like "*oshak*" – a fire place. *"Oshaktyn ush butynan suraimyn"* – it is said while prayng for the welfare of your family. *"Otynyn basynan, oshagynnyn kasynan ber!"* – wish not to be dependant on somebody. *"Oty ore zhanbady"* – it means that somebody is miserable and in despair; and *"Ot basynan ort shyksyn!"* – curse meaning to say when you wish someone to end up in broke and to be destroyed. There are also word combinations connected with fire – "ot" in Kazakh as *"ot basy = ot basy oshak kasy"* – being among the members of your family. *"Ot zhagyp, kul shygardy = ot zhagyp – su tasydy"* – being busy with the domestic chores. *"Ot zhurek" – veru brave and courageous. "Ot keship, muz tosendi"* – having a lot of calamities in life. *"Otka itermedi" – causing failure. "Otyn oshirdi"* – demolishing the hearth, to destroy the zeal. *"Otaskan da bar, ot baskan da bar", "ot basyna ort salma, ozegine dert salma",* such phrases also represent the culture of the people.

We can see that Turkish people have a lot of similar meaning proverbs and word combinations connected with *"ot – fire"*. "Eki ottyn arasynda kaldy", it means that you are between two fires. In the Kyrgyz language it sounds as following "Bir zhak zhar, bir zhak suu", in Azerbaijan – "Ikl od arasynda", in Uzbek "Ikki ud arasynda kolmak", Karachai-balkar "Eki otnu arasynda tururcha", Uigur "Iki balanyn otturisida". "Ottan kashsan – zhalynga, enbekten kashsan donbekke" sounds in Kyrgyz "Angekten kachsa dongokko"; in uigur "Bir baladin kutulup, unindinmu yaman bir balaga tutulmak", Karachai-balkar "Otdan chyk ta dzhalyna degencha". Turkish people have had proverbs in their every day life since ancient times such as "Ot teas agyz koima"- "Ot degenge auiz kuimes"; "Otug ozguch birla ochurmas" – "Otty jalynmen oshirmes"; "Ot tutunsuz bolmas, iyigit yazuksuz bolmas" – "Ot tutinsiz bolmas, jigit jazyksyz bolmas"; "Kul urguncha, koz ursa iyg" – "Kul urlegennen, shok urlegen jaksy".

Used methods during research. During research the theory "Image of language of the Universe" was taken as a basis as antrotseptivny and cognitive linguistics. Similar to it the historical and comparable characteristic, systematicity, a sgruppirovaniye, comparison, an etymological explanation, ethnolinguistic analysis, compound and conceptual, application of analysis of a method on a frame.

By means of a comparative method of the Kazakh, Kyrgyz and Uzbek languages related roots in their language history, cultural, and also religious became clear.The origin of cult phraseological units in language, is century history mythological and various the relioznykh of popular beliefs, traditions and customs, is connected with features of ancient culture, and also found manifestation in language units.

The Kazakhs believed that this tree brought happiness, protected from diseases, and prolonged the lives, that's why it was considered as the greatest sin to cut it. While passing it they stopped, kneed and prayed.

Conclusion

In conclusion we found out symbolic-cognitive properties of creation the concepts, discovered the past history of the power of gods concepts and the meanings of symbolic (semiotic) signs, superstitions and rituals of the whole turkic Cult of the Fire, Cult of the Water, Cult of Tree, Cult of the Moon, Cult of the Sun. During research showed that the word a cult and the names concerning it, steady combinations, its understanding and the main sample, a "cult" is cognitive model of an ethnocultural concept. "Cult" – abstract category-worship-respect-worship-entreaty, tried to distinguish by means of the above-named mythemes. To analyze suitable elements the lingvosemiotich-eskikh of units of a cult.

The cult's concept was determined and the associations of these lexemes were allocated to groups. Firstly, we see that the basis of spiritual-ideological worldviews in Kazakhs' life customs, religious signs and superstitions lies deep, written records and archeological records complement each other without any conflicts. Secondly, the cult phraseologisms were grouped into lexica-semantic groups concerning to the cult's concept. Thirdly, they was given ethno-linguistic descriptions by the classifications given above and there was determined and proved the connotation property of the Kazakh national being and was determined the antropocentristic paradigm of the distinguished cult phraseologisms. Fourthly, the cult phraseologisms originated from mentioned familiar in structure and content

concepts are often found. We understand it as it because of the historical interrelation of the turk nations. Do to moon's cult, sun's cult, the cult of Umai mother, Cult of the Fire, Cult of the Water, Cult of Tree, Cult of the Moon, Cult of the Sun power the interrelation of the cult phraseologisms and cahoots of Turk languages manifested in synchronic development.

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ASSESSMENT OF INFORMATION ADVANTAGE

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The article analyzes the information advantage of one object to the other. The basis of the analysis is the information situation. The article considers two types of relationships between the compared objects, "one to one" and "one to many". This article describes the rules for assessing the benefits when comparing two objects. This article describes the different types of information advantages and methods of assessment. The article introduces the concept of "information exchange ratio" This concept simplifies the evaluation of the benefits of information. Article formulates the rules for assessing the benefits of the information. The article offers a method for estimating an information advantage in relation to "one to many". This method uses a matrix of pairwise comparisons. This article contains an example of using this method. The article discusses the problems of using the method of evaluation of the benefits of the information.

Keywords: Information, news, situation, information flows, information, communication, information state, an informational advantage

Information advantage creates competitive advantage. Information advantage is necessary for survival of a system or a subject. Information advantage is a desired state when making decisions. In practice, it is important to assess presence or absence of information advantage. An information situation is necessary for assessment of information advantage [1]. Creation of an information situation model is a prerequisite for assessment of information advantage. Information advantage [2, 3] is considered as a relation. The information advantage model determines the area, in which an information advantage occurs. Being a relation, information advantage has two qualitative implementations. The first implementation of assessment of information advantage is built on "one-to-one" relation. The second implementation of assessment of information advantage is built on "one-to-many" relation. This approach enables you to use a methodology for hierarchical relationships [4] for analysis and assessment of information advantage.

Materials and methods of research

Research methodology is based on application of systems analysis, paradigmatic relations [5] and dichotomous analysis [3, 6].

Basic concepts

We apply the following basic concepts to make an assessment: "information situation" [1], "information state" [7, 8], "information awareness" [9, 10]. We determine information advantage as a relation of one object to another object in an information situation ("one-to-one" relation), or as a relation of an object to many objects in an information situation ("one-to-many" relation). These two types of relations define two methods of assessment of information advantage. Information situation is an information model, which characterizes the information environment [11, 12] of the analysis object or its local information environment [11].

Information situation may contain a set of states for different objects. This gives the grounds for comparison of objects by their states. Information state of an object is defined as a set of current parameters for a particular information situation. Information state is assessed with a part of a set of parameters, which are included into a description of an information situation. Information state is a comparative characteristic. Information state of A_i object at the current point of time t_i can be assessed on the basis of the following factors:

1. State of A_{i-1} object at the previous point of time t_{i-1};
2. State of B_i object at the current point of time t_i;
3. Purpose T sought to be reached by A object.
4. Information awareness possessed by A object.
5. Resources owned by A object.
6. Information flows, which come to A object.

Factors 1 and 3 allow you to trace the trend of development of the object over time. Factors of 2, 4, 5, 6 allow to compare the state of A object with other objects and to determine the presence or absence of an information advantage.

Information awareness [9, 10] often means quantity and quality of information resources, which are possessed by A object. Information awareness is characterized by the level of information awareness [13, 14].

Information awareness by internal relative assessment means comparison of information distribution with the level which is required to

achieve the stated objectives. It is called information awareness "by objective" since it characterizes the possibility of achievement of an objective.

Information awareness by external relative assessment can be determined when comparing information indicators of different objects. It is called information awareness "by comparison object". Such information awareness allows to assess information advantage or absence thereof.

In addition to information resources, there may be other resources: technical, technological, organizational, cognitive and intellectual. They are all included in factor 4. If they affect the object state in the information situation, they can also create information advantage. In order to build formal models, we will use the paradigmatic relations [5].

Results of research and their discussion

"One-to-One" Relation

Let's study assessment of information advantage in case of "one-to-one" relation. In this case we refer to two objects. We will consistently use factors 4, 5, 6. Let's start with factor 3 – information awareness.

Consider an information situation, in which information awareness of two objects can be compared. To denote relations between the states of objects by information awareness, you can use "more-than", "less-than" relation signs. This allows you to create a simple description of objects relation by information awareness.

$$Ia > Ib \rightarrow A(I) > B(I), \quad (1)$$

$$Ia < Ib \rightarrow A(I) < B(I). \quad (2)$$

Expression (1) defines information advantage of A object over *B* object by information awareness. It is interpreted as follows. Presence of information resources of better quality *Ia* of *A* object when compared with information resources *Ib* of *B* object entails information advantage "by information awareness" of *A* object over *B* object, all other conditions being equal.

Expression (2) is interpreted in the opposite sense. Information awareness of *B* object is more than information awareness of *A* object, which entails information advantage of *A* object over *B* object, all other conditions being equal. Relations $Ia > Ib$ or $Ia < Ib$ also describe an information asymmetry situation [16].

If inequality signs in expressions (1–2) are replaced with equality signs, "information correspondence" [15] by information awareness, absence of information advantage and absence of information asymmetry will take place.

"Information awareness" indicator I (factor 4) may be replaced with "resources" *R* indicator (factor 5). This gives the opportunity to assess information advantage "by resources" in this information situation.

$$Ra > Rb \rightarrow A(R) > B(R), \quad (3)$$

$$Ra < Rb \rightarrow A(R) < B(R). \quad (4)$$

Expression (3) defines information advantage of A object over B object by resources. It is interpreted as follows. Presence of *Ra* resources of better quality of *A* object when compared with *Rb* resources of *B* object entails information advantage "by resources" of *A* object over *B* object, all other conditions being equal. Expression (4) is interpreted in the opposite sense. Note that only those resources, which affect the information situation, are taken into account.

There can also be an information situation, when objects *A* and *B* receive information flows from external sources (factor 6). Information flows can have different intensity. This situation allows to assess information advantage by "information flows". This is shown in expression (5).

$$(F_{S1} \rightarrow I_B > F_{S2} \rightarrow I_A) \rightarrow B(F) > A(F). \quad (5)$$

Expression (5) is interpreted as follows. Information flow F_{S1}, directed to *B* object, surpasses information flow F_{S2}, directed to *A* object, which entails information advantage of *B* object over *A* object by information flows, all other conditions being equal. The opposite situation is possible (6), when *A* object has advantage by flows over *B* object.

$$(F_{S1} \rightarrow I_B < F_{S2} \rightarrow I_A) \rightarrow B(F) < A(F). \quad (6)$$

Such information situation is called as flow information situation. This information situation is procedural, as it characterizes the process. We define relative coefficient of information flow K_{FB} to *B* object as follows

$$K_{FB} = F_{S1} / (F_{S1} + F_{S2}). \quad (7)$$

We define relative coefficient of information flow K_{FA} to A object as follows

$$K_{FA} = F_{S2} / (F_{S1} + F_{S2}). \quad (8)$$

Relative coefficients of information flow K_{FA} and K_{FB} have values from 0 to 1. Input coefficients belong to the relative scale and are normalized. This simplifies the process of flows analysis.

Informational advantage by flows is possible in case of information exchange between

two objects. It occurs when there are mutual differently directed information flows. Flows perform the functions of provision of information to objects. This information situation is called procedural, as it is determined by the process. Information exchange changes the amount of information possessed by objects and can also create information advantage by information exchange.

$$(F_A: I_A \rightarrow I_B > F_B: I_B \rightarrow I_A) \rightarrow B(F) > A(F). \quad (9)$$

Expression (9) is interpreted as follows. Information flow F_A, directed from A to B, surpasses information flow F_B directed from B to A, which results in information advantage of B object over A object by information exchange. We define information exchange coefficient KA_{EXC} from source A to source B as follows:

$$KA_{EXC} = F_A / (F_B + F_A). \quad (10)$$

In the opposite direction

$$KB_{EXC} = F_B / (F_B + F_A). \quad (11)$$

Here F_A is an intensity of flow from A to B, F_B is an intensity of flow from B object to A object. Coefficients KA_{EXC} and KB_{EXC} can be compared with each other. They are normalized from 0 to 1. Application of coefficients allows to describe informational advantage (9) for information communication using expression (12)

$$(KA_{EXC} > KB_{EXC}) \rightarrow B(F) > A(F). \quad (12)$$

Expression (12) is interpreted as follows. Information exchange coefficient KA_{EXC} from A to B, surpasses information exchange coefficient KA_{EXC} from B to A, which entails information advantage of B object over A object by information exchange.

Expression (12) helps to define a general rule: the object which communicates more information than it gets loses relation of equality by information awareness and creates informational advantage for another object.

Flow information situation changes the object information awareness and can result in information asymmetry [17, 18] in case of prior information correspondence. Information asymmetry is a sign of information advantage. Semantic gap is another sign of information advantage [19, 20].

At the same time, not every information flow situation results in information asymmetry. It can reduce asymmetry. If there is a semantic gap [20], direction of flows may decrease or increase the semantic gap.

Consequence. Information flow situation can increase or decrease information advantage and creating or decreasing information asymmetry.

Information situation occurring in the course of situation analysis [21] is also possible. Assume that A object is in S_1 situation, which is characterized with the set of parameters P_1. B object is in S_2 situation, which is characterized with the set of parameters P_2. Using preference theory [22] or another criterion [23], we can conclude (conditionally) that P_1 is more preferable than P_2 when using preference criterion (PC) [24].

$$(PC: P_1 \Rightarrow P_2) \rightarrow A(PC) > B(PC). \quad (13)$$

Expression (13) means that situation S_1 of A object is more preferable by PC criterion than situation S_2 of B object, which entails information advantage of A object over B object "by situation".

"One-to-Many" Relation

Expressions (1–13) implied comparison of relations between A and B objects. Such relation can be defined as "one-to-one" relation. If A object is compared with N objects, "one-to-many" relation occurs.

In this case, information advantage is determined by means of integral expert assessment or attributive detailed assessment.

In both cases, pairwise comparison matrix should be used. In case of integral assessment, an expert compares each two objects pairwise and enters the result of comparison into pairwise comparison matrix (table).

Pairwise Comparison Matrix

	A	B	C	D	Σ	Rating
A		1	1	1	3	1
B	0		1	0	1	3
C	0	0		0	0	4
D	0	1	1		2	2

Table is an example of comparison of four objects. Object advantage is indicated by 1 in the line, which describes this object. According to table 1, the expert has found advantage of A object over other objects and put ones into its line. Absence of advantage is denoted with 0. A object has scored the maximum number of "advantages", which is denoted with the sum (Σ) of scores 3. All comparison objects are ranked by the number of "advantages". Ranking result is placed in the "rating" column (Rating). Table can be a criterion of competitiveness of objects within a group.

Attributive detailed assessment requires application of pairwise comparison matrix for each attribute of all objects with further

consolidation of the advantage sums into a single assessment with application of weight coefficients for every attribute.

Above expressions (1–6) included restriction "all other conditions being equal". If conditions are not equal, i.e. difference by information awareness, by resources or by information flows (attribute three) takes place, and there are many objects, advantage is assessed by means of three pairwise comparison matrices. Then the results are consolidated into a single assessment as shown in [22]. There can be any (however, finite) number of objects.

First version of advantage assessment based on "one-to-one" relation (1–6, 9, 12, 13) allows to assess not just advantage or competitiveness of two objects.

The first version of advantage assessment based on "one-to-many" relation (table) allows to compare many objects in the overall information situation.

Information advantage is a comparative characteristic. It is close to the concept of information asymmetry, being wider. It is also possible to make a comparison between different objects and between an object and an objective reached by it. The above assessment methods include qualitative and quantitative analysis.

Expressions (1–6), (9), (12), (13) are based on qualitative-quantitative assessments and require expert assessments. Such assessments are mostly of comparative nature. This means that in case of any change to the number of parameters used for assessment, the result of assessment of information advantage can differ.

Information advantage may be natural and artificial. For example, in case of teaching, all teachers have natural information advantage. Flow action and information interaction between a teacher and a student removes such advantage and information asymmetry. The subject's awareness of the absence of information advantage and of the presence of information asymmetry creates an information need for obtaining of education or receipt of information.

Conclusion

This paper does not make a distinction between the object and the subject. This means that the results are applicable for assessment of information advantage between information systems and between subjects. Analytical expressions shown in this article are applicable for assessment of information advantage. Competitiveness of groups and objects can be assessed on the basis of the above expressions. Results of the research allow to obtain an integral "information advantage" characteristic of one object over another object. Results of the research allow to assess the possibility of achievement of the goal by the object "by situation" or "by information awareness". Results of the research allow to assess "object resources availability" indicator.

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CONSISTENCY AS A FORM OF EXPRESSION OF OBJECTIVE TRUTH: A CRITICAL ANALYSIS

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The systems approach emerged mainly in natural science as an expression of scientists' naive belief that the universe has a very simple and logical structure. Today, more and more philosophers rightly criticize this methodological ideal. The critics argue that, firstly, the systems principle in its most important aspects is alternative to the holistic principle; secondly, the holistic principle is much richer and more realistic than the systems principle. The whole not only includes the unimaginable number of systems, but also certainly always contains in its essence anti-systemic trends – forces aimed at changing or destruction of existing things and phenomena. Apparently, the system's concept is associated not so much with the sign of epistemic truth, but with one of the rules of language games of philosophers, theologians and scientists.

Keywords: Systemness and wholeness, The systems approach, A thing as a metasystem, The holistic approach, Epistemic truth of knowledge about the wholeness of things and logical correctness of systematic knowledge about any fragment of some object

"System" is a set of structured elements, "element" is a minimal integral part of some system and "structure" is a way of relationships of elements and larger parts within the system [6, p. 102-105]. German classical philosophy sees in the systematic knowledge one of the criteria of science. G.V.F. Hegel and K. Marx believed that the real-valued truth is born only in the philosophical or scientific system. The systems analysis began to turn into a special methodological approach in works of A.A. Bogdanov, V.I. Vernadsky, L. von Bertalanffy, T. Kotarbinski and others. Extensive researches of systems were developed from the late 40s years of XX century and continue to our days. The systems approach mainly formed inside the natural sciences as an expression of belief in the fact that our universe has a very simple logical device. This belief is rooted in the teachings of Pythagoreans, Platonists and Christians, according to which the laws of nature created by God are very simple, and these laws are the easiest to express through the simple mathematical formulas. It is enough here to recall that, according to Pythagoras, the essences of things are their numbers; according to Plato, the God is the Master of geometry; by G. Galileo and I. Newton, mathematics is the key to the reading of the Book of Nature.

Literally, the word "system" is translated from the Greek as "congestion" ("barrier") and figuratively – as "fixation of thought at some point". During his experiments, a scientist withdraws a definite piece from any natural whole thing, reworks it into a "reference object" and subjectively identifies thus obtained "standard" with some real genuine part of the universe. Then the world around us begins to look like systematically and clearly arranged. Later people will find that the "standard", already recognized by science, is not perfect, and it does not organically fit into a living whole.

It is important to remember the idea of B.S. Gryaznov that a scientific theory is, above all, the knowledge of abstract objects, but not the knowledge of real objects of nature and society. Therefore, the theoretical conclusions should not be directly – without special technical amendments and empirically determined coefficients – use for practical purposes [2, p. 13–25].

The systems principle in its most important aspects is an alternative to the holistic principle. Irrationalists, who criticize the systems approach and justly appreciating it as "naive realism", declare that any living entity has some metalogical unity, which comprehends only by intuition. According to them, wholeness is not reducible to any system or a metasystem if to understand by the latter some of exhaustive scientific and rational descriptions.

The whole – is a way of existence and cooperation of parts, complex unity of simple components, and qualitative certainty of interrelated elements. We can distinguish different types of integrity on logical grounds, depending on the nature of the relationship and the degree of fusion of parts into a whole thing. There are becoming and became integrity, totalitarian integrity and partitive integrity, etc. Integrity is a measure of unity of parts, measuring their interpenetration of each other. Characteristics of totalitarianism as a kind of integrity (totality) are the suppression of the whole of its parts, domination of uniformity and identity, leveling of internal quantitative distinctions between

elements of some total quality. Partitive integrity, on the other hand, distinguishes the highest possible autonomy of its parts and a clear manifestation of their "individualism".

The whole is not only includes the unimaginable number of systems, but also certainly embodies antisystem trends in its essence – forces aimed at changing or destruction of existing things and phenomena. In the whole there are rationally knowable moments and moments that are inaccessible to our reason. Integrity can be oneness of sensual perceptions and something extrasensory, and of real and ideal. Often a conglomerate of conceptual systems, competing with each other, theoretically describes the same entity.

The problem of the relation of the whole and its parts is composed of the following questions:

1) the whole is the sum of its parts, or it is still more than the simple sum of its parts?

2) parts precede the whole or the whole precedes its parts?

3) parts give rise to the whole or the whole generates its parts?

4) but, perhaps, the relationship between them is quite different, non-causal?

5) from what it is better to start cognition of the whole – by studying its parts or by cognizing all integrity at once, immediately, i.e. to begin from the idea of the whole, which immediately will describe and explain parts of the whole themselves?

Three basic approaches have developed when addressing these difficult issues: 1) holism with its holistic principle, 2) merism with its principle of elementary and 3) antinomism trying to hold dialectically the opposite solutions stated above.

Holism (from the Greek. holos – whole, entire) – the methodological approach, according to which the whole is ontologically (or logically) primarily in relation to its parts, and it takes precedence over its parts.

Merism (from the Greek meros – a part, role, queue) – the methodological setting to explain the whole in terms of properties of its parts. Merism takes the form of:

a) elementarism (the whole first divides, theoretically or practically, into simple components, and then it provides itself with partitive properties);

b) mechanisism (its representatives understand the whole as a simple sum of the mechanically associated parts);

c) reductionism (the whole, really having highly, complex and solid quality, reduces to the level of simple units).

Antinomism and rationalist dialectics seek to resolve the dilemma of holism and merism, focusing not so much on the whole or on its parts, but rather on relations among the whole and its parts. The secret of totality lies in the cooperative effect, in mutual influence and interpenetration of parts. Interconnected parts, changing each other, form within their sets the mediator, general for them, which invisibly pervades every part and at the same time qualitatively differs from every part.

"System" – a concept specified and simplifying the philosophical category of "whole". When scientists want to cognize rationally the metalogical whole, they reduce it to some system of simple parts (elements) and replace the idea of the inner form of the whole with the notion of structure. The real whole mentally decomposes into a set of simple parts. Then a structural network (possible connection between components) imposes on parts, and the system image of a specific thing arises depending on the amount of our achieved knowledge.

Let us illustrate the disadvantages of the systematic approach with the help of the metaphor of the cloud. For example, we see some cloud, and we observe in it many "illusions-pictures" that spontaneously change each other. Points, lines and volumes, by themselves, which are visible in the cloud, at first, completely meaningless – they are some uncertain events. Nevertheless, just as illusory organize these events in connection with some of our whim, and they immediately become "facts" for us. The observer selects these "facts" and creates of them his own picture of the cloud reality (the images of the sea, mountains, military compounds, people, animals, etc.). When we change the previous setting and switch our attention to other configurations, then the "facts" are starting to transform, and a different picture of the same part of the sky occurs. Cloud "pictures" are mental emergents arising from the fusion of the external optics with cognitive stereotypes of a human being, and not only our minds but also the personal and collective unconsciousness take part in their production.

Let us assume that a single cloud is quite objectively real, and our contemplation of it as a cloud is probably true in Aristotle's sense. However, it is difficult to accept that the set of "pictures" that we see in the cloud, are objectively true. However, what is amazing – we are easily able to convert these pictures-illusions into the corresponding material objects! For example, let us eliminate excess graphs shown in the chaos of points and figures and leave only the "picture" that we have previously seen

in the cloud. Here it is possible to recall a certain analogy, talking about the sculptor who removes all excess material from a block of marble and who releases a beautiful statue from the prison in the chaos of welded particles. It is difficult to answer the question, where is the original, a copy of which was our "picture" – is it:

a) the perceived chaos of particle in clouds?

b) cognitive structure of consciousness of the author of the picture?

c) both in their entirety?

We intend now to extrapolate the sample with a cloud on any cognitive process. A cloud is a metaphor for the fullness of being, which has an innumerable multitude of potential opportunities. A creator constructs something separate when he limits this fullness of being. It is unlikely that someone is able to check for validity the created image of the object by an external experience or practice (if you define "truth" in the classical sense – as the correspondence of knowledge with objective reality). It is hard to resist the temptation to draw an analogy between pictures in clouds, a statue in a block of marble and scientific theory about the examinable object. Several alternative but equally plausible reviews of the same areas of things often compete in every science. But why? Is this because we see the world, as we want to see and understand it, and we understand it in the end, as we are able to act practically with it?

Further, we go back to talking about the systemic approach and the holistic principle. Philosophical categories of "whole", "part" and "form" extremely simplified when they unthinkingly equated with general interscientific concepts of "system", "element" and "structure". A thing as a real whole is metalogical and metasystemic actuality. Researchers usually reduce the integrity of things in the process of rational cognition – in the spirit of the methodology of mechanicism – to the object's system model which modern scientists are able to understand. In this case, the objectively existing thing mentally decomposed into series of simple parts (elements), and the details mentally fastened to each other by means of simple idealized communications (invented speculative structure). In this way, an articulate image of being as a system of elements arises logically.

If to associate scientific objects with the metaphor of clouds, then it can be assumed that – like different pictures-illusions attributed to the organization of the same cloud – no one of many invented scientific systems (theories, hypotheses), interfaced with the same object as a whole, does not copy the contents of the whole in an exhaustive and complete degree. There is always a significant and unavoidable moment of imaginary, illusory, utopian in scientific systems. This moment, existentially real, is often more valuable in pragmatic terms than the epistemically true component. Epistemic truth is the relation of knowledge to holistic reality, but not to the remnants of once living parts of being which theorists artificially reconstruct in the form of systems.

Undoubtedly, the great thinker J.W. Goethe is right that truth is in "the whole but not in the system". "The natural system – Goethe writes – is a contradictory expression. Nature has no system, it lives, it is life and it is travelling from the center to the unknown indefinable edge" [1, p. 149]. The experimental division of nature into pieces-objects in accordance with the needs of scientists and a systematic review of these objects is caused by specific European cultural ideals of Christian monotheism. In addition, the rules of correctness of that network of categories, which scientists use in the construction of theoretical systems, change historically.

Remember the parable of A. Edington, the famous astronomer, about a man who has studied the deep-sea life, throwing his network with three-inch cells. After many measurements captured samples, the researcher concluded that there are no deep-sea fish shorter than three inches. According to Edington, we catch only what is defined by our fishing tools. The same is true with regard to science. For example, cells of the systemic network of science cannot catch and hold those spiritual things, which are the objects of religious experience. Science is very selective and is not able to draw by itself its own universal view of the world.

It is understandable why spirit, soul, life, love, hope, and other similar categories escaped from the conceptual network of materialistic science. It would seem, biology, physiology and psychology directly study these objects, and the conclusions of these sciences have practical value for people. However, spirit, mind, and life, interpreted in a materialistic manner, become just technical terms, meanings of which materialists determine by series of instrumental procedures. Is the definition of the essence of life as, say, "the mode of existence of protein bodies, exchanging material with the environment" (F. Engels) brought us closer to solving the mystery and meaning of life? From this definition of life only follows that a certain class of amino acids, specifically associated with its chemical environment, capable to reproduce itself (heredity) and to change. In his "Notebooks" Ludwig Wittgenstein left

the following note: "I dare say that even when science will answer all conceivable questions, problems of life still remain intact". Science does not know how we learn and remember, how we think and communicate, how the brain stores information, what is the relationship between language and thought.

Kurt Gödel, logician and mathematician, indirectly contributed to debunking ideal of the system approach when in 1931 he formulated several theorems about incompleteness. The conclusion follows from his second theorem that incomplete (rich) formal theories, in which all true theorems of arithmetic would have proved, do not exist. We always can find in any incomplete formal system two mutually exclusive statements derived from the same axioms [3, p. 13–25]. A wide (freestyle) interpretation of Gödel's results suggests that every developed logical-mathematical or scientific theoretical system has consequences, which cannot be determined either as true or as false. The property of systemness itself which scientific knowledge provides through logical and mathematical rules, as well as by artificial language, inevitably combines with dilemmas, aporia and paradoxes. It turns out that systemness should rather refers to certain technical criterion of correctness, to the accepted rules of reasoning, but systemness is not the same as totality and truthfulness. Science as a systemic knowledge is logically paradoxical, so we are not able to install the truth of its statements using the internal means of a variety of its disciplines.

European science is still proud of its systemic nature defining itself as a systematically organized knowledge about the world. Its systematization is based on the seemingly unshakable logical-mathematical foundation. Now it becomes increasingly clear that logic and mathematics are a lot of diverse estimates and systems that we cannot consistently generalize or dip into the large super system, which extremely unifies them. Logical criterion of truth shatters into many private technical ways to determine the correctness of systems of propositions, and it turned out to be weakly sensitive to the wholeness of truth. The ideal of systemness as a form of expression of objective truth, rooted in the belief in the accuracy of the logical-mathematical dialogue with nature, fades and loses its fans. Previously, truth is seemed as living like a canary in a cage, in the system of scientific statements; scientists supposed to measure its properties using the criterion of correctness (consistency, feasibility). It seems that the truth-bird cannot live in such a system-cell.

It is time to stop to say that science creates a "scientific worldview" and certain systemic "scientific picture of the world". Yuri Osipov, former President of the Russian Academy of Sciences, came to the conclusion that scientific knowledge by itself even in its entirety is not a worldview and cannot be a worldview, since science does not study being as a whole [4, p. 3]. Science does not study specifically worldview issues; therefore, always there were scientists with very different worldviews (agnostics, believers, atheists). Every worldview is primarily the area of religion and philosophy. From this, it is clear, that the term "scientific worldview" is conditional.

Thus, the principle of totality is much richer and wider than the systems principle. The latter only partially and within pure logical thinking explains, but does not replace the first. Beyond the capacity of rational knowledge, the idea to express the world in the form of a coherent system of elements is in direct contradiction with the intuition of wholeness of the world. Therefore, it is not always useful to a scientist-theorist "not to abandon his principles", "not to give his opponents a single step", and "to bear his cross to the end".

Perhaps it is more appropriate to philosophers and scientists have engaged in "language games" (Ludwig Wittgenstein) and periodically radically change their theoretical paradigm. For example, Karl Popper, a prominent opponent of Plato's line in philosophy, stated publicly in the 80s XX, that now for him Platonism becomes the most attractive doctrine. As we know, the world philosophy perceptible won due to this Popper's decision.

Apparently, "systemness" is not so much a sign of epistemic truth, but it is one of the rules of language games of philosophers, theologians and scientists.

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POSSIBLE COMPLEX STATES OF THE DETERMINISTIC MODULAR STRUCTURES FROM THE CRYSTAL NANO-DIMENSION FRACTAL RNF CLASS

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The possible complex states of the multi-components deterministic modular structure of crystal nano-dimension fractal objects from RNF class with discrete components are discussed. Classification of the possible states of crystal nano-dimension fractal structures, including the 1-, 2-, 3-aperiodic structural and quasi-structural states and their possible combinations, the 1D-and 2D-continuum containing complex states were proposed. The possibility of the existence of 336 integrated structural states including the 108 states with 1D continuum and the 18 states with 2D continuum were showed. It is intended that some of these structural states are the result of a certain phase-disordered state of multiphase materials and can be the 3D folds description of the crystal, nano-dimension and fractal structural states of composites with heterogeneous structures.

Keywords: crystal structure, nanostructure, fractal structure, modular structure, module, structural state, quasi-objects, aperiodic objects, 1D and 2D continuum

It was showed [38–40], the deterministic modular structures with necessary dimensional and spectral module's characteristics are may be formed into certain cellular 2D or 3D space. Characteristics of these structures are may be determined from structural states descriptions and used for interpretation of the peculiarities of the phase distributions and inter-phase borders configurations onto surface and into volume of the compositional materials [1–6]. The analysis results of the possible types of structural states are necessary for influence calculation of the dimension parameter on some additive properties of the corresponding material [7–9].

Formally the "hyper-spatial" description of the possible structural states determined the values of the effective dimensional parameter of compositional materials and corresponding chemical and physic-mechanical properties is include the symbolic description of (r r r) from crystal component, the state (n n n) from nano-dimension component and the state (f f f) from fractal component of the composite [10–12]. The description of the last state consist the information about the possible quasi-fractal configurations of the inter-phase borders $(f\ f\ f)_{3Dconf}$, which are the 3D shall of the system of elements of analyzed deterministic modular structures with corresponding fractal states, about the possible quasi-fractal 3D elements distributions onto sites of modular structures $(f\ f\ f)_{site} = (f\ f\ f)^*$, and about the possible quasi-fractal 3D distributions of the r and n elements on sizes $[(r\ r\ r)_{f,} + (n\ n\ n)_f]_{size}$.

Crystal nano-dimensional fractal class RNF is the unique class contained the all types of the state components which presented in description of the some compositional material:

$$[(r\ r\ r), (n\ n\ n), (f\ f\ f)_{3D\ conf}, (f\ f\ f)^*_{site}, ((r\ r\ r)_f + (n\ n\ n)_f)_{size}]).$$

Therefore, the combinatorial search of all possible structural states of this class and a description of them are relevant to the preliminary assessment of the influences of dimension parameter on the volumetric or superficial characteristics of the analyzed composite.

If the possible continual components of the states τ are use then for ultrafine composite materials can be viewed the amorphous structural elements of some nano-structured heterogeneous object.

The formalism of the presence of continual components in structural state description is may be regards as a method of realization of the deterministic structures splitting on substructures with continual 1D and 2D borders. Continual 1D and 2D elements are may be considered as a conditional borders between structural modules, module blocks, layers and other modules associates are formally presents in structures of some ordered and disordered solid solutions [13–18, 44], in structures of the members of some homological series [13–17, 36, 37, 41, 42], into composites and heterogenic structures [43]. Note that the results of the analysis of possible structural conditions of (RNF) class are necessary in order to take account of the impact of dimension option on some additive properties of the corresponding nano-structured composite material [7–9].

Thus, the need to analyses of the possible structural states of the objects of (RNF) class

not only with discrete but and continual elements are obvious.

Analysis of the possible dis-continual structural states

Taking into account the elements of discrete $\{t_i\}$ groups of translations (i = 1, 2, 3) the main subclasses of apparent structural states of crystal nano-fractal objects into 3D space are may be obtained [3, 4, 14, 19]. It is anticipated that all local elements of these states (fragment r, nano-structured fragment r_n, fractal f, fractal fragment r_f, local fractal f_r, nano-structured fractal f_n, nano-particle n, nano-fragment n_r or nano-fractal n_f) are asymmetrical elements. Therefore, partial or full disordering of these elements will consider the deterministic modular structure type $R^3_{s,0}$. Indexes s and 0 in the designation of the structure are means the number of independent crystallographic directions in which the asymmetric elements of positional and orientation are ordered in 3D space.

Cite brief compared with [20–22] description of the possible structural states for the abstract fractal crystal nano-dimensional 3D objects.

Crystal nano-dimension fractal class (18 subclasses, 210 states by type (r n f) or its derivatives).

1. Subclass RNF:

– 27 states by type (r n f) from ordered chains of different fragments, nano-particles and Fractals: (r n f), (r n f_r), (r n f_n), (r n_r f), (r n_r f_r), (r n_r f_n), (r n_f f), (r n_f f_r), (r n_f f_n), (r_n n f), (r_n n f_r), (r_n n f_n), (r_n n_r f), (r_n n_r f_r), (r_n n_r f_n), (r_n n_f f), (r_n n_f f_r), (r_n n_f f_n), (r_f n f), (r_f n f_r), (r_f n f_n), (r_f n_r f), (r_f n_r f_r), (r_f n_r f_n), (r_f n_f f), (r_f n_f f_r), (r_f n_f f_n).

2. Subclass RNF_0:

– 9 states by type (r n f_0) from ordered chains of different fragments, nano-particles and quasi-chains of Fractals: (r n f_0), (r n_r f_0), (r n_f f_0), (r_n n f_0), (r_n n_r f_0), (r_n n_f f_0), (r_f n f_0), (r_f n_r f_0), (r_f n_f f_0),

– 9 states by type (r n_0f) from ordered chains of different fragments, Fractals and quasi-chains of nano-particles: (r n_0 f), (r n_0 f_r), (r n_0 f_n), (r_n n_0 f), (r_n n_0 f_r), (r_n n_0 f_n), (r_f n_0 f), (r_f n_0 f_r), (r_f n_0 f_n),

– 9 states by type (r_0n f) from ordered chains of different Fractals, nano-particles and quasi-chains of fragments: (r_0 n f), (r_0 n f_r), (r_0 n f_n), (r_0 n_r f), (r_0 n_r f_r), (r_0 n_r f_n), (r_0 n_f f), (r_0 n_f f_r), (r_0 n_f f_n).

3. Subclass RNF_{00}:

– 3 states by type (r $n_0$$f_0$) from chains of different fragments and quasi-chains of nano-particles and Fractals: (r n_0 f_0), (r_n n_0 f_0), (r_f n_0 f_0),

– 3 states by type (r_0n f_0) from chains of different nano-particles and quasi-chains of fragments and Fractals: (r_0 n f_0), (r_0 n_r f_0), (r_0 n_f f_0),

– 3 states by type ($r_0$$n_0$f) from chains of different Fractals and quasi-chains of fragments and nano-particles: (r_0 n_0 f), (r_0 n_0 f_r), (r_0 n_0 f_n).

4. Subclass RNF_{000}:

– 1 state by type ($r_0$$n_0$$f_0$) from quasi-chains of ordered Fractals, fragments and nano-particles.

5. Subclass a-periodic RNF_s:

– 9 states by type (r n f_s) from chains of different ordered fragments, nano-particles and chains of the disordered Fractals: (r n f_s), (r n_r f_s), (r n_f f_s), (r_n n f_s), (r_n n_r f_s), (r_n n_f f_s), (r_f n f_s), (r_f n_r f_s), (r_f n_f f_s),

– 9 states by type (r n_sf) from chains of different ordered fragments, Fractals and chains of the disordered nano-particles: (r n_s f), (r n_s f_r), (r n_s f_n), (r_n n_s f), (r_n n_s f_r), (r_n n_s f_n), (r_f n_s f), (r_f n_s f_r), (r_f n_s f_n),

– 9 states by type (r_sn f) from chains of different ordered nano-particles, Fractals and chains of the disordered fragments: (r_s n f), (r_s n f_r), (r_s n f_n), (r_s n_r f), (r_s n_r f_r), (r_s n_r f_n), (r_s n_f f), (r_s n_f f_r), (r_s n_f f_n).

6. Subclass twice a-periodic RNF_{ss}:

– 3 states by type (r $n_s$$f_s$ from chains of different fragments and the disordered nano-particles and Fractals: (r n_s f_s), (r_n n_s f_s), (r_f n_s f_s),

– 3 states by type (r_sn f_s) from chains of different nano-particles and the disordered fragments and Fractals: (r_s n f_s), (r_s n_r f_s), (r_s n_f f_s),

– 3 states by type ($r_s$$n_s$f) from chains of different Fractals and the disordered fragments and nano-particles: (r_s n_s f), (r_s n_s f_r), (r_s n_s f_n).

7. Subclass thrice a-periodic RNF_{sss}:

– 1 state by type ($r_s$$n_s$$f_s$) from chains of different disordered Fractals, fragments and nano-particles.

8. Subclass a-periodic RNF_{0s}*:

– 9 states by type (r n f_{0s}) from chains of different ordered fragments, nano-particles and the quasi-chains of the disordered Fractals: (r n f_{0s}), (r n_r f_{0s}), (r n_f f_{0s}), (r_n n f_{0s}), (r_n n_r f_{0s}), (r_n n_f f_{0s}), (r_f n f_{0s}), (r_f n_r f_{0s}), (r_f n_f f_{0s}),

– 9 states by type (r n_{0s}f) from chains of different fragments, Fractals and the quasi-chains of the disordered nano-particles: (r n_{0s} f), (r n_{0s} f_r), (r n_{0s} f_n), (r_n n_{0s} f), (r_n n_{0s} f_r), (r_n n_{0s} f_n), (r_f n_{0s} f), (r_f n_{0s} f_r), (r_f n_{0s} f_n),

– 9 states by type (r_{0s}n f) from chains of different nano-particles, Fractals and the quasi-chains of the disordered fragments: (r_{0s} n f), (r_{0s} n f_r), (r_{0s} n f_n), (r_{0s} n_r f), (r_{0s} n_r f_r), (r_{0s} n_r f_n), (r_{0s} n_f f), (r_{0s} n_f f_r), (r_{0s} n_f f_n).

9. Subclass a-periodic RNF_{0s}:

– 3 states by type (r$n_0$$f_s$) from chains of different fragments, the disordered Fractals and

the quasi-chains of the nano-particles: ($r\ n_0\ f_s$), ($r_n\ n_0\ f_s$), ($r_f\ n_0\ f_s$),

– 3 states by type (rn_sf_0) from chains of different fragments, the disordered nano-particles and the quasi-chains of the Fractals: ($r\ n_s\ f_0$), ($r_n\ n_s\ f_0$), ($r_f\ n_s\ f_0$),

– 3 states by type ($r_0n\ f_s$) from chains of different nano-particles, the disordered Fractals and the quasi-chains of the fragments: ($r_0\ n\ f_s$), ($r_0\ n_r\ f_s$), ($r_0\ n_f\ f_s$),

– 3 states by type ($r_sn\ f_0$) from chains of different nano-particles, the disordered fragments and the quasi-chains of the Fractals: ($r_s\ n\ f_0$), ($r_s\ n_r\ f_0$), ($r_s\ n_f\ f_0$),

– 3 states by type (r_0n_sf) from chains of different Fractals, the disordered nano-particles and the quasi-chains of the fragments: ($r_0\ n_s\ f$), ($r_0\ n_s\ f_r$), ($r_0\ n_s\ f_n$),

– 3 states by type (r_sn_0f) from chains of different Fractals, the disordered fragments and the quasi-chains of the nano-particles: ($r_s\ n_0\ f$), ($r_s\ n_0\ f_r$), ($r_s\ n_0\ f_n$).

10. Subclass twice a-periodic RNF_{0ss}*:

– 3 states by type ($rn_{0s}f_s$ from chains of different fragments, the disordered Fractals and the quasi-chains of the disordered nano-particles: ($r\ n_{0s}\ f_s$), ($r_n\ n_{0s}\ f_s$), ($r_f\ n_{0s}\ f_s$),

– 3 states by type (rn_sf_{0s}) from chains of different fragments, the disordered nanoparticles and the quasi-chains of the disordered Fractals: ($r\ n_s\ f_{0s}$), ($r_n\ n_s\ f_{0s}$), ($r_f\ n_s\ f_{0s}$),

– 3 states by type ($r_{0s}nf_s$) from chains of different nano-particles and the disordered Fractals, the quasi-chains of the disordered fragments: ($r_{0s}\ n\ f_s$), ($r_{0s}\ n_r\ f_s$), ($r_{0s}\ n_f\ f_s$),

– 3 states by type (r_snf_{0s}) from chains of different nano-particles and the disordered fragments, the quasi-chains of the disordered Fractals: ($r_s\ n\ f_{0s}$), ($r_s\ n_r\ f_{0s}$), ($r_s\ n_f\ f_{0s}$),

– 3 states by type ($r_{0s}n_sf$) from chains of different Fractals and the disordered nano-particles, the quasi-chains of the disordered fragments: ($r_{0s}\ n_s\ f$), ($r_{0s}\ n_s\ f_r$), ($r_{0s}\ n_s\ f_n$),

– 3 states by type ($r_sn_{0s}f$) from chains of different Fractals and the disordered fragments, the quasi-chains of the disordered nano-particles: ($r_s\ n_{0s}\ f$), ($r_s\ n_{0s}\ f_r$), ($r_s\ n_{0s}\ f_n$.

11. Subclass a-periodic RNF_{00s}*:

– 3 states by type ($r\ n_0\ f_{0s}$) from chains of different fragments, the quasi-chains of the nano-particles and the disordered Fractals: ($r\ n_0\ f_{0s}$), ($r_n\ n_0\ f_{0s}$), ($r_f\ n_0\ f_{0s}$),

– 3 states by type ($r\ n_{0s}\ f_0$) from chains of different fragments, the quasi-chains of the Fractals and the disordered nano-particles: ($r\ n_{0s}\ f_0$), ($r_n\ n_{0s}\ f_0$), ($r_f\ n_{0s}\ f_0$),

– 3 states by type (r_0nf_{0s}) from chains of different nano-particles, quasi-chains of the fragments and the disordered Fractals: ($r_0\ n\ f_{0s}$), ($r_0\ n_r\ f_{0s}$), ($r_0\ n_f\ f_{0s}$),

– 3 states by type ($r_{0s}nf_0$) from chains of different nano-particles, the quasi-chains of the Fractals and the disordered fragments: ($r_{0s}\ n\ f_0$), ($r_{0s}\ n_r\ f_0$), ($r_{0s}\ n_f\ f_0$),

– 3 states by type ($r_0n_{0s}f$) from chains of different Fractals, quasi-chains of the fragments and the disordered nano-particles: ($r_0\ n_{0s}\ f$), ($r_0\ n_{0s}\ f_r$), ($r_0\ n_{0s}\ f_n$),

– 3 states by type ($r_{0s}n_0f$) from chains of different Fractals, the quasi-chains of the nano-particles and the disordered fragments: ($r_{0s}n_0\ f$), ($r_{0s}\ n_0\ f_r$), ($r_{0s}\ n_0\ f_n$).

12. Subclass a-periodic RNF_{00s}:

– 1 state by type ($r_0\ n_0\ f_s$) – the chains of the disordered Fractals, the quasi-chains of the fragments and nano-particles,

– 1 state by type ($r_0\ n_s\ f_0$) – the chains of the disordered nano-particles, the quasi-chains of the fragments and Fractals,

– 1 state by type ($r_s\ n_0\ f_0$) – the chains of the disordered fragments, the quasi-chains of the nano-particles and Fractals.

13. Subclass twice a-periodic RNF_{0ss}:

– 1 state by type ($r_0\ n_s\ f_s$) – the chains of the disordered nano-particles and Fractals, the quasi-chains of the fragments,

– 1 state by type ($r_s\ n_0\ f_s$) – the chains of the disordered fragments and Fractals, the quasi-chains of the nano-particles,

– 1 state by type ($r_s\ n_s\ f_0$) – the chains of the disordered fragments and nano-particles, the quasi-chains of the Fractals.

14. Subclass twice a-periodic RNF_{00ss}**:

– 3 states by type ($r\ n_{0s}f_{0s}$) from the quasi-chains of the disordered nano-particles and Fractals, the chains of different fragments: ($r\ n_{0s}\ f_{0s}$), ($r_n\ n_{0s}\ f_{0s}$), ($r_f\ n_{0s}\ f_{0s}$),

– 3 states by type ($r_{0s}n\ f_{0s}$) from the quasi-chains of the disordered fragments and Fractals, the chains of different nano-particles: ($r_{0s}\ n\ f_{0s}$), ($r_{0s}\ n_r\ f_{0s}$), ($r_{0s}\ n_f\ f_{0s}$),

– 3 states by type ($r_{0s}n_{0s}f$) from the quasi-chains of the disordered fragments and nano-particles, the chains of different Fractals: ($r_{0s}\ n_{0s}\ f$), ($r_{0s}\ n_{0s}\ f_r$), ($r_{0s}\ n_{0s}\ f_n$).

15. Subclass twice a-periodic RNF_{00ss}*:

– 1 state by type ($r_{0s}\ n_0\ f_s$) – the quasi-chains of nano-particles and the disordered fragments, the chains of the disordered Fractals,

– 1 state by type ($r_{0s}\ n_s\ f_0$) – the quasi-chains of Fractals and the disordered fragments, the chains of the disordered nano-particles,

– 1 state by type ($r_0\ n_{0s}\ f_s$) – the quasi-chains of the fragments and the disordered nano-particles, the chains of the disordered Fractals,

– 1 state by type (r_s n_{0s} f_0) – the quasi-chains of Fractals and the disordered nano-particles, the chains of the disordered fragments,

– 1 state by type (r_0 n_s f_{0s}) – the quasi-chains of the fragments and the disordered Fractals, the chains of the disordered nano-particles,

– 1 state by type (r_s n_0 f_{0s}) – the quasi-chains of nano-particles and the disordered Fractals, the chains of the disordered fragments.

16. Subclass twice a-periodic RNF_{000ss}**:

– 1 state by type (r_{0s} n_{0s} f_0) – the quasi-chains of Fractals and the disordered fragments and nano-particles,

– 1 state by type (r_{0s} n_0 f_{0s}) – the quasi-chains of nano-particles and the disordered fragments and Fractals,

– 1 state by type (r_0 n_{0s} f_{0s}) – the quasi-chains of the fragments and the disordered nano-particles and Fractals.

17. Subclass thrice a-periodic RNF_{00sss}**:

– 1 state by type (r_{0s} n_{0s} f_s) – the quasi-chains of the disordered fragments and nano-particles, the chains of the Fractals,

– 1 state by type (r_{0s} n_s f_{0s}) – the quasi-chains of the disordered fragments and Fractals, the chains of the nano-particles,

– 1 state by type (r_s n_{0s} f_{0s}) – the quasi-chains of the disordered nano-particles and Fractals, the chains of the fragments.

18. Subclass thrice a-periodic RNF_{000sss}***:

– 1 state by type ($r_{0s}n_{0s}f_{0s}$) – the quasi-chains of the disordered fragments, nano-particles and Fractals.

Thus, the descriptions of the complex structural states of deterministic modular structures, quasi-structures and a-periodic structures that contain the crystalline, nano-dimension and fractal components in the form of asymmetric modules, fully or partially ordered into 3D space were received.

Classification of continuous structural states

Taking into account the elements of discrete $\{t_i\}$ and continuous group of translations $\{\tau_i\}$ (i = 1, 2, 3) the main subclasses of apparent structural states of crystal nano-fractal objects into 3D space are may be obtained [23, 24].

1D continual RNF class (10 subclasses, 108 states).

1. Subclass RNF_τ:

– 9 states by type (τ n f) – 1D continuum, the chains of the different nano-particles и fractals: (τ n f), (τ n f_r), (τ n f_n), (τ n_r f), (τ n_r f_r), (τ n_r f_n), (τ n_f f), (τ n_f f_r), (τ n_f f_n),

– 9 states by type (r τ f) – the chains of the different fragments and fractals, 1D continuum: (r τ f), (r τ f_r), (r τ f_n), (r_n τ f), (r_n τ f_r), (r_n τ f_n), (r_f τ f), (r_f τ f_r), (r_f τ f_n),

– 9 states by type (r n τ) – the chains of the different fragments and nano-particles, 1D continuum: (r n τ), (r n_r τ), (r n_f τ), (r_n n τ), (r_n n_r τ), (r_n n_f τ), (r_f n τ), (r_f n_r τ), (r_f n_f τ).

2. Subclass $RNF_{0\tau}$:

– 3 states by type (τ n f_0) – 1D continuum, the chains of the different nano-particles and the quasi-chains of the fractals: (τ n f_0), (τ n_r f_0), (τ n_f f_0),

– 3 states by type (r τ f_0) – the chains of the different fragments, 1D continuum and the quasi-chains of the fractals: (r τ f_0), (r_n τ f_0), (r_f τ f_0),

– 3 states by type (r $n_0\tau$) – the chains of the different fragments and the quasi-chains of the nano-particles, 1D continuum: (r n_0 τ), (r_n n_0 τ), (r_f n_0 τ),

– 3 states by type (τ n_0f) – 1D continuum, the chains of the different fractals and the quasi-chains of the nano-particles: (τ n_0 f_r), (τ n_0 f_n), (τ n_0 f),

– 3 states by type ($r_0\tau$ f) – the chains of the different fractals, 1D continuum and the quasi-chains of the fragments: (r_0 τ f), (r_0 τ f_r), (r_0 τ f_n),

– 3 states by type (r_0n τ) – the chains of the different nano-particles and the quasi-chains of the fragments, 1D continuum: (r_0 n_r τ), (r_0 n τ), (r_0 n_f τ).

3. Subclass $RNF_{00\tau}$:

– 1 state (τ n_0 f_0) – 1D continuum, the quasi-chains of the nano-particles and fractals,

– 1 state (r_0 τ f_0) – 1D continuum, the quasi-chains of the fragments and fractals,

– 1 state (r_0 n_0 τ) – 1D continuum, the quasi-chains of the fragments and nano-particles.

4. Subclass a-periodic $RNF_{s\tau}$:

– 3 states by type (τ n f_s) – 1D continuum, the chains of the different nano-particles and the disordered fractals: (τ n f_s), (τ n_r f_s), (τ n_f f_s),

– 3 states by type (r τ f_s) – 1D continuum, the chains of the different fragments and the disordered fractals: (r τ f_s), (r_n τ f_s), (r_f τ f_s),

– 3 states by type (τ n_s f) – 1D continuum, the chains of the different fractals and the disordered nano-particles: (τ n_s f), (τ n_s f_r), (τ n_s f_n),

– 3 states by type (r $n_s\tau$)– the chains of the different fragments and the disordered nano-particles, 1D continuum: (r n_s τ), (r_n n_s τ), (r_f n_s τ),

– 3 states by type ($r_s\tau$ f) – the chains of the different fractals and the disordered fragments, 1D continuum: (r_s τ f), (r_s τ f_r), (r_s τ f_n),

– 3 states by type (r_sn τ) – the chains of the different nano-particles and the disordered fragments, 1D continuum: (r_s n τ), (r_s n_r τ), (r_s n_f τ).

5. Subclass twice a-periodic $RNF_{ss\tau}$:

– 1 state (τ n_s f_s) – 1D continuum and the disordered nano-particles and fractals,

– 1 state (r_s τ f_s) – 1D continuum and the disordered fragments and fractals,

– 1 state (r_s n_s τ) – 1D continuum and the disordered fragments and nano-particles.

6. Subclass a-periodic $RNF_{0s\tau}$*:

– 3 states by type (τ n f_{0s}) – 1D continuum, the chains of the different nano-particles and the quasi-chains of the disordered fractals: (τ n f_{0s}), (τ n_r f_{0s}), (τ n_f f_{0s}),

– 3 states by type (r τ f_{0s}) – the chains of the different fragments, 1D continuum and the quasi-chains of the disordered fractals: (r τ f_{0s}), (r_n τ f_{0s}), (r_f τ f_{0s}),

– 3 states by type (r n_{0s} τ) – the chains of the different fragments and the quasi-chains of the disordered nano-particles, 1D continuum: (r n_{0s} τ), (r_n n_{0s} τ), (r_f n_{0s} τ),

– 3 states by type (τ n_{0s} f) – 1D continuum, the chains of the different fractals and the quasi-chains of the disordered nano-particles: (τ n_{0s} f_r), (τ n_{0s} f_n), (τ n_{0s} f),

– 3 states by type (r_{0s} τ f) – the chains of the different fractals, 1D continuum and the quasi-chains of the disordered fragments: (r_{0s} τ f), (r_{0s} τ f_r), (r_{0s} τ f_n),

– 3 states by type (r_{0s} n τ) – the chains of the different nano-particles and the quasi-chains of the disordered fragments, 1D continuum: (r_{0s} n_r τ), (r_{0s} n τ), (r_{0s} n_f τ).

7. Subclass a-periodic $RNF_{0s\tau}$:

– 1 state (τ n_0 f_s) – 1D continuum, the chains of the disordered fractals and the quasi-chains of the nano-particles,

– 1 state (τ n_s f_0) – 1D continuum, the chains of the disordered nano-particles and the quasi-chains of the fractals,

– 1 state (r_0 τ f_s) – the chains of the disordered fractals, 1D continuum and the quasi-chains of the fragments,

– 1 state (r_s τ f_0) – the chains of the disordered fragments, 1D continuum and the quasi-chains of the fractals,

– 1 state (r_0 n_s τ) – the chains of the disordered nano-particles and the quasi-chains of the fragments, 1D continuum,

– 1 state (r_s n_0 τ) – the chains of the disordered fragments and the quasi-chains of the nano-particles, 1D continuum.

8. Subclass twice a-periodic $RNF_{0ss\tau}$*:

– 1 state (τ n_{0s} f_s) – 1D continuum, the chains of the disordered fractals and the quasi-chains of the disordered nano-particles,

– 1 state (τ n_s f_{0s}) – 1D continuum, the chains of the disordered nano-particles and the quasi-chains of the disordered fractals,

– 1 state (r_{0s} τ f_s) – the chains of the disordered fractals, 1D continuum and the quasi-chains of the disordered fragments,

– 1 state (r_s τ f_{0s}) – the chains of the disordered fragments, 1D continuum and the quasi-chains of the disordered fractals,

– 1 state (r_{0s} n_s τ) – the chains of the disordered nano-particles and the quasi-chains of the disordered fragments, 1D continuum,

– 1 state (r_s n_{0s} τ) – the chains of the disordered fragments and the quasi-chains of the disordered nano-particles, 1D continuum.

9. Subclass a-periodic $RNF_{00s\tau}$*:

– 1 state (τ n_0 f_{0s}) – 1D continuum, the quasi-chains of the nano-particles and the disordered fractals,

– 1 state (τ n_{0s} f_0) – 1D continuum, the quasi-chains of the fractals and the disordered nano-particles,

– 1 state (r_0 τ f_{0s}) – 1D continuum, the quasi-chains of the fragments and the disordered fractals,

– 1 state (r_{0s} τ f_0) – 1D continuum, the quasi-chains of the fractals and the disordered fragments,

– 1 state (r_0 n_{0s} τ) – the quasi-chains of the fragments and the disordered nano-particles, 1D continuum,

– 1 state (r_{0s} n_0 τ) – the quasi-chains of the nano-particles and the disordered fragments, 1D continuum.

10. Subclass twice a-periodic $RNF_{00ss\tau}$**:

– 1 state (τ n_{0s} f_{0s}) – 1D continuum, the quasi-chains of the disordered nano-particles and the fractals,

– 1 state (r_{0s} τ f_{0s}) – the quasi-chains of the disordered fragments and the fractals, 1D continuum,

– 1 state (r_{0s} n_{0s} τ) – the quasi-chains of the disordered fragments and the nano-particles, 1D continuum.

2D continual RNF class (4 subclasses, 18 states).

1. Subclass $RNF_{\tau\tau}$:

– 3 states by type (τ τ f) from the 2D continuum and the chains of the different fractals: (τ τ f), (τ τ f_r), (τ τ f_n),

– 3 states by type (r τ τ) from the chains of the different fragments and the 2D continuum: (r τ τ), (r_n τ τ), (r_f τ τ),

– 3 states by type (τ n τ) from the chains of the different nano-particles and the 2D continuum: (τ n τ), (τ n_r τ), (τ n_f τ).

2. Subclass $RNF_{0\tau\tau}$:

– 1 state (τ τ f_0) – 2D continuum, the quasi-chains of the fractals,

– 1 state (τ n_0 τ) – the quasi-chains of the nano-particles, 2D continuum,

– 1 state (r_0 τ τ) – 2D continuum, the quasi-chains of fragments,

3. Subclass a-periodic $RNF_{s\tau\tau}$:

– 1 state ($\tau\ \tau\ f_s$) – 2D continuum, the chains of the disordered fractals,

– 1 state ($\tau\ n_s\ \tau$) – 2D continuum, the chains of the disordered nano-particles,

– 1 state ($r_s\ \tau\ \tau$) – the chains of the disordered fragments, 2D continuum,

4. Subclass a-periodic $RNF_{0s\tau\tau}{}^*$:

– 1 state ($\tau\ \tau\ f_{0s}$) – 2D continuum, quasi-chains of the disordered fractals,

– 1 state ($\tau\ n_{0s}\ \tau$) – quasi-chains of the disordered nano-particles, 2D continuum,

– 1 state ($r_{0s}\ \tau\ \tau$) – 2D continuum and the quasi-chains of the disordered fragments.

3D continual RNF class (1 subclass, 1 state).

Subclass $RNF_{\tau\tau\tau}$,:

– 1 state ($\tau\ \tau\ \tau$) – 3D continuum, formally it's not a structural state.

Discussion of the results

As the RNF class is contain the all kinds of state components, a set of descriptions of states (r n f) can be seen as the abstract full folding "hyper-spatial" description of the material [25, 26]:

$$[(r\ r\ r), (n\ n\ n), (f\ f\ f)_{3D\ conf}, (f\ f\ f)^*_{site}, ((r\ r\ r)_f + (n\ n\ n)_f)_{size}]).$$

Indeed, if transposed of matrix from three arbitrary states by type (r n f) can always get the three relevant states from the crystalline, nano-dimension and fractal components:

$$\begin{Vmatrix} r_n & n & f_r \\ r_f & n_r & f_r \\ r_n & n_r & f_r \end{Vmatrix}^T = \begin{Vmatrix} r_n & r_f & r_n \\ n & n_r & n_r \\ f_r & f_r & f_n \end{Vmatrix}.$$

The consideration of the conjugate to fractal states $(f_r\ f_r\ f_n)^*_{site} = (r_f\ r_f\ n_f)$ and the states with r and n components, distributed by fractal law, is contain the information about dimension of quasi-fractal distributions of the relevant component.

All this information is necessary when evaluating conditional dimension parameter D_i for each i-th structural 3D state by the formula

$$D_i = 0{,}5(d_r\ D(r) + d_f\ D(f) + d_n\ D(n))_i,$$

were d_r, d_f and d_n – are the numbers of the relevant component of the same grade. The dimension parameter for crystalline component is D(r) = 1, for the fractal component is the fractal dimension:

$$D(f) = DimR_f = Dim\ (GenR_f) < 1,$$

for nano-dimensional component $D(n) = (\langle n\rangle / n_o) < 1$, if the average size of the nano-object $\langle n\rangle$ is smaller, then n_o = 100 nm [7–9].

It can be assumed that some of these structural states of the type (r n f) are may describe the results of manifestations of the specific phase-disordered state onto surface of composite materials and coatings [2, 5, 6, 27–30]. The results of the analysis of these states were, in particular, used in determining of the level of synergies for some composite coatings by friction and wear [31–35, 45, 46].

In this work was showed a concept possibility of existence of the 1D-continuum containing complex structural states for crystal nano-dimension objects, for crystal fractals and nano-fractals, as well as the 2D continuum containing complex structural states of crystalline, nano-dimension and fractal objects. It is anticipated that some of these structural states may be characteristic of the some composites with heterogeneous structures.

Conclusion

The organization peculiarities of the possible states for deterministic modular structures of the crystal-nano-dimension fractal objects of the (RNF) class with discrete components were reviewed.

The states classification of crystalline nano-fractal structures, including the 1-, 2- and 3-a-periodic structural states, the 1-, 2- and 3-quazi-structural states, the 1D- and 2D-continuum containing complex states and possible its combinations was proposed.

The possibility of the existence of the 336 complex structural states, including the 108 states with 1D continuum and 18 states – with 2D continuum was showed.

It is anticipated that some of these structural states may characterize the certain phase-disordered states of multi-phase materials and formally considered as a 3D convolution of "hyper-spatial" representation on crystalline, nano-dimension and fractal structural states of composites and materials with heterogeneous structures.

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Short Reports

THE INTERSECTION OF STRICTLY CONVEX SETS ON THE SPHERE OF S^N

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We study convex sets $M \leq S^n$, where S^n is an n-dimensional sphere.

The set $M \leq S^n$ is strictly convex [1] when it doesn't contain diametrically opposite points of the sphere and with any pair of points it contains a small arc of a great or a certain (definable) circle.

We prove the following

Theorem. Let there exists the set of closed strictly convex sets $A = \{A_1, ..., A_m\}$, $m \geq n+1$ such that 1) $\bigcap A = \varnothing$, 2) for all sets $B \subseteq A$ s.t. $|B| = n+1$ and $\bigcap B \neq \varnothing$ and for all natural numbers k satisfying conditions $n+2 \leq k \leq m-1$ minimal number of subsets $P \subseteq A$, $|P| = k$, $\bigcap P \neq \varnothing$ is equal to C_{m-n-1}^{k-n-1}, so maximal number of subsets A, containing k elements with the empty intersection is $C_m^k - C_{m-n-1}^{k-n-1}$.

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APPROACHES TO THE CREATION OF ENERGY EFFICIENT ELECTROMECHANICAL DEVICES FOR SELECTIVE DISPERSION MATERIAL

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The article is devoted to the development of methodological approaches for solving design problems of electromagnetic mechanical activators EMMA, providing selective grinding materials. Selective grinding is provided by the introduction of an innovative method for forming a dispersing loads in magnetic liquefied layer ferromagnetic elements – grinding machine bodies. A feature of computational methods is expounded them to the challenges of reducing energy intensity of the processed products while improving quality indicators of finished products. Analyzed the effectiveness of the process control in the formation of the given technology of shear deformations in magnetic liquefied layer grinding elements. A method for the design of structural parameters of EMMA. In general, presented in the article the results of research are applied nature of the fundamental theory of the electromagnetic method of mechanical activation and provide practical recommendations for improving the characteristics of EMMA, the introduction of which in the production lines allow a priori increase the energy efficiency of production of the domestic industry.

Keywords: electromagnetic mechanical activators, the dispersion process, the method of calculation

Electromagnetic mechanical activators with magnetic liquefied layer can be implemented in various constructive forms [1, 2, 3]. EMMA design covers a range of problems, the solution of which should be to strive for the optimal ratio of parameters such as the effectiveness of the product dispersion process, economical design of the device, selective dispersion and energy efficiency of production lines processing industries.

In the development of EMMA put the problem of optimal use of materials, reduced energy costs, simplify design and improve reliability. EMMA model features due to the technological requirements for carrying out the process of grinding the product, taking into account the change in its physic-chemical and organoleptic properties in the mechanical, physical and thermal treatments [4, 5, 6] .. Of great importance in the design, challenges become associated with study the adjustment capacity and performance management. The ability to fine and safe management of physical and mechanical processes in magnetic liquefied ferromagnetic elements layer allows you to create devices with high selectivity materials grinding process [7, 8, 9].

The aim of the study is to develop a methodological approach to solving design problems of electromagnetic mechanical activators EMMA providing selective grinding materials.

Material and research methods

Object of research are methods of designing EMMA design parameters based on the analysis of the magnetic state of the system.

Results of research and their discussion

Fig. 1 shows the structural form of an electromechanical device that implements the method of forming the electromagnetic force in dispersing magnetic liquefied layer ferromagnetic elements. The design concept and principle of action of the device are the subject of the invention (RF patent № 1457881). EMMA comprises actuator, the container 1 for placing the product treated with the loading and unloading two nozzles 3, the grinding elements 4, permanent electromagnets 5 and 6 with adjustable current windings 7 and 8 controls. The magnet 5 is placed in the container 1, fastened with the possibility of rotary motion to the shaft 9 and has barbs on the outer surface 10. The magnet 6 is fixedly fastened outside the container 1. Inside the container 1 installed partition 11, which are placed between the grinding elements 4 are made as cylindrical ferromagnetic cores designed for forming the outer surface of the magnet 5. The height of the teeth 10 smaller in diameter than the rods 4. to supply the coil 7 are installed on the shaft 9 of the brush contacts 12.

The device operates as follows: in the working volume of the reservoir 1 is pumped through the pipe 2 to be processed product. Drives the shaft 9, which is mounted on the magnet 5 with the teeth 10. At the same time through the sliding contact 12, power is supplied to the coil control 7. Power is also supplied to the coil 8. The electromagnetic forces cause arisen grinding elements 4 are attracted to the surfaces of the magnets. From the grinding elements 4 are formed various spatial constructions in the intervals between which receives the processed product.

The magnitude of induction in the gap between the magnets 5 and 6 depends on the current in the control windings 7 and 8

and determines the degree of exposure of the grinding elements on the treated product. Available on the magnet surface 5 tines 10 provide a secure grip elements 4 with the surface. The drive motor as applied three-phase motor with wound rotor (P = 3 kW, n = 1470 rev / min). The regulation of high-speed modes of operation carried out by a speed variator, controlled strobotuners ST-5 having the basthic error of not more than – 0,5 % of reading. Power control windings is made from the switchboard via the contacts for automatic switch and bridge rectifiers, diodes built D-245A. magnetic induction of constant magnetic field produced using the milliteslametr portable universal (TPU). To measure the speed used by a digital tachometer AKIP-9201.

After filling the working volume processed product and the grinding elements include a drive motor, set the inner cylinder speed EMMA and the current in the control windings. When power is applied to the winding current arise electromagnetic force under the influence of which the ferromagnetic grinding elements form the spatial construct, carrying a mechanical connection in the form of strikes and friction each other and surfaces of the product layer by electromagnets. The product passes through the working volume of the container is exposed to various deformations: compression, abrasion, impact and shear. Grain size distribution and the degree of comminution of the material was determined the device "FRITSCH-4M".

Assuming concentrated winding control device on the stationary part and on the basis of the above, for each *x*-th section of the magnetic circuit K_{PX} dispersion ratio is determined from the following expression:

$$\Phi_X = \Phi_{X-1} + \Phi_{PX} = \left(1 + \frac{\Phi_{PX}}{\Phi_{X-1}}\right) = \Phi_{X-1} K_{PX}, \quad (1)$$

where Φ_{X-1} – the magnetic flux in the x-1 site;
Φ_{PX} – magnetic leakage flux;
K_{PX} – magnetic flux leakage coefficient as it moves from site x to site 1-x ($K_{PX} > 1$).

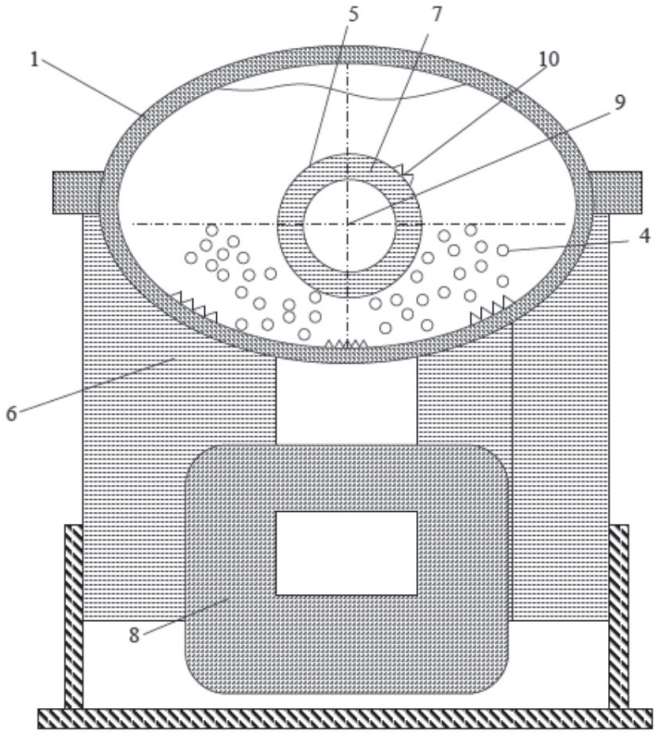

Fig. 1. Electromechanical device EMMA (RF patent № 1457881): 1 – capacity; 2.3 – feed and discharge pipes; 4 – grinding elements; 5.6 – electromagnets; 7.8 – adjustable current winding; 9 – shaft; 10 – teeth

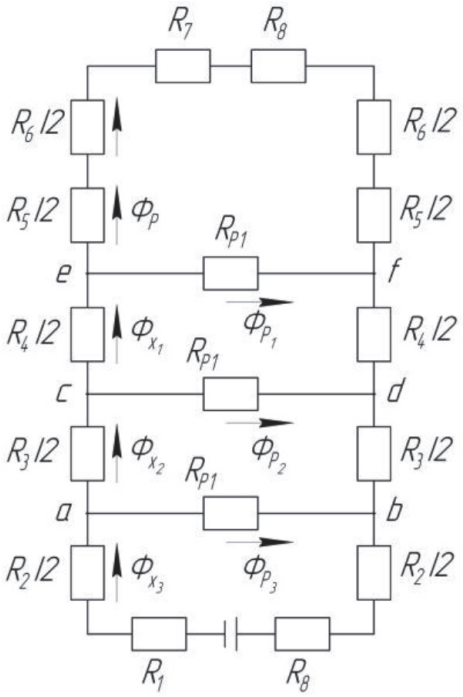

Fig. 2. The equivalent circuit of substitution magnetic circuit EMMA

The magnitude of the magnetic flux Φ_{PX} is determined by the difference of magnetic potential and magnetic resistances between points on the magnetic path of the respective streams scattering. In engineering calculations (in order to simplify their permissible) presence of stray magnetic fluxes into account by using a correction factor of K_P, which is calculated as a ratio of Φ_{OY} magnetic flux produced by the magnetizing force control winding to the magnetic flux in the working volume Φ_P.

$$K_P = \frac{\Phi_{OY}}{\Phi_P}$$

K_P size ranges from 1.1 to 1.3.

Methods of calculating the magnetizing force F_X x-th area of electromechanical devices:

1. It determines the value of Φ_X, taking into account the scattering of magnetic flux.

2. $B_X = \frac{\Phi_X}{S_X}$ is calculated by the formula B_X on the magnitude of induction stations (here – the S_X this magnetic sectional area portion).

3. For the induction of values B_X to $B = \phi(H)$ graphical dependencies defined numerical value of H_X. Tension in the individual sections of the magnetic circuit may also be calculated by the formula:

$$H_X = \frac{B_0 S_{CP}}{\mu_X S_X},$$

here, μ_X – magnetic permeability of the section.

4. Taking in to account the values of the average length of the magnetic field lines are calculated values $l_X F_X$ $F_X = H_X l_X$ separate sections.

In the calculation of the magnetic circuit must be considered that the cross-sectional area portions with a radial direction of the magnetic field lines substantially changes along their length. Calculation magnetomotive force required for the magnetic flux in these areas is performed as follows.

If the value for induction station $B_{X\max}$ varies sectional diameter D_1 to $B_{X\min}$ in section on a diameter of D, then x unsaturated portion $B_{X\max}$ and is located on the characteristics of the linear part $B = \phi(H)$. The calculation is carried out according to the formulas:

$$B_{X\max}\frac{\Phi_X}{\pi D_1 l_X},\ B_{X\min}\frac{\Phi_X}{\pi D l_X},$$

$$H_{XCP} = \frac{H_{X\max} + H_{X\min}}{2},$$

here l_X – sectional area x length in the axial direction; H_{XCP} – the average value of the magnetic field strength, $H_{X\max}$ and $H_{X\min}$ – the maximum and minimum value of the tension at the site of the values of $B_{X\max}$ and $B_{X\min}$.

If the dependence of B_X and H_X on the current plot is linear, it is necessary to determine the value of H_{Xi} for the greatest possible number of sections spaced at equal distances from each other. The average value of tension is determined by the formula:

$$H_{XCP} = \frac{\sum_{i=1}^{i=m} H_{Xi}}{m}, \quad (2)$$

where m – number of sections.

$$\sum F = F_{X1} + F_{X2} + ... + F_{Xn}.$$

Thus, by setting the shape and constructive geometric dimensions EMMA properties and filler materials for manufacturing the magnetic core portions can determine the total or resultant magnetomotive force (M.M.F.) to be established by the current flowing through the winding (or windings) Control to allow passage of magnetic flux calculation value. To do this, we calculate a value of the magnetic field strength on selected portions H_X of the magnetic circuit EMMA:

$$I_Y W_Y = B_0 S_{CP} K_{P\varepsilon} \sum_{X=1}^{n} \frac{l_X}{\mu_X S_X}. \quad (3)$$

For structural shapes EMMA shown in Figure 1, the following expression for the calculation of the resulting M.M.F.:

$$\sum F = I_y W_y = B_0 S_{CP} K_{P\varepsilon} \left(\frac{l_1}{\mu_1 S_1} + \frac{2l_2}{\mu_2 S_2} + \frac{2\delta_{K3}}{\mu_3 S_3} + \frac{2l_4}{\mu_4 S_4} + \frac{2l_5}{\mu_0 S_{CPv}} + \frac{2l_6}{\mu_6 S_6} + \frac{2l_7}{\mu_7 S_7} + \frac{2\delta_{K8}}{\mu\ S_8} \right), \quad (4)$$

where l_1, l_2, l_4, l_5, l_6, l_7 – length sections I, II, IV, V, VI, VII;
δ_{K3}, δ_{K8} – structural gaps;
μ_1, μ_2, μ_4, μ_6, μ_7 – permeability magnetic material portions at certain values of induction;
μ_0 – permeability working volume filled with a working ferromagnetic bodies and milled product, for given values of the induction;
μ_y – magnetic permeability of air;
$S_1,...,S_8$ – cross-sectional area of the magnetic areas;
$S_{CP} = L_1 L$ – area through which magnetic flux passes current in the working volume;
L – working volume length in the axial direction;
L_1 – length of the working volume along part of its circumference within the area of the magnetic field EMMA.

On the basis of the calculation of the total M.M.F. (And calculating the winding or control winding) specified dimensions of the window (or windows) to accommodate the control winding. The magnetic sketch amended subsequently clarified total M.D.S. winding (or windings) control.

Methodology to evaluate the magnetic state of the magnetic EMMA:

Assuming the next induction values in the working volume $B_{0i} = K_P B_0$ ($K_P = 0{,}2\ldots1{,}25$), in each case calculated value M.M.F. Control windings necessary for the magnetic flux of the magnetic circuit portions Φ_P. According to the calculations it is plotted $\Phi_P = \phi\left(\sum F\right)$, characterizing the state of the magnetic device. This relationship defines the characteristics of EMMA to the extent that the current management. Using the values dependencies $P_\tau = \phi(B_0)$, P_τ values determined for a number of values defined by the induction in the working volume [9, 10, 11]. EMMA, which has a magnetic operating point (nominal value in the working volume induction) on the linear part of characteristic $\Phi_P = \phi\left(\sum F\right)$ is magnetically unsaturated. At the same time the degree of saturation of the magnetic steel has a significant influence on the properties of the device. The saturation state violated the conditions of formation of regulated power contacts in the system "particle layer magnitoozhizhennogo – particles of processed product". Those. violated conditions for effective selective crushing of materials.

Conclusion

Presented in the article are techniques applied in nature and contain practical recommendations for improving the characteristics of EMMA, the introduction of which in the production lines can improve the energy efficiency of domestic industry production by producing products with a given technology, particle size distribution (given selective grinding) [11, 12, 13].

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KINETICS OF FATIGUE CRACKING OF THE MAIN STRUCTURAL ELEMENTS AND WELDED JOINTS BASIC BLOCKS OF FIXED OFFSHORE PLATFORMS

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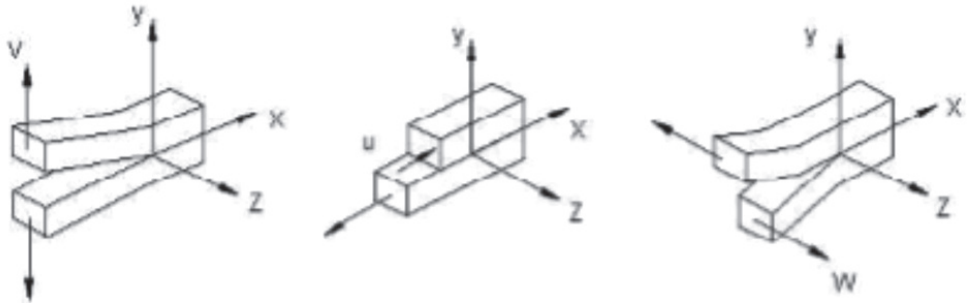
The article investigates the kinetics of propagation of cracks in main structural components and welds of the support blocks of fixed offshore platforms. It describes the process of metal fatigue in relation to offshore installations. Also it is necessary to give definition of the stress intensity factor and description of the methods of calculation for some cases. Based on the analysis of scientific studies, the authors provide methods allowiang to calculate two Vanesa parameters describing the kinetics of crack propagation in relation to the elements and welded joints of offshore fixed platforms, in other words there are the methods of calculation of threshold and critical stress intensity factor. On the basis of the conducted, research, the authors constructed the kinetic chart of the development of fatigue cracks in relation to the elements and welded joints of the supporting blocks of fixed offshore platforms.

Keywords: fatigue crack, a supporting block fixed offshore platforms, structural elements, welded joints, kinetic diagram

Continuous operation of steel offshore oil and gas constructions requires an assessment that leads to the necessity of introduction of fatigue criteria. Fatigue cracks can be such as a criterion. According to some experimental studies of different authors, strength of samples that model large-sized facilities sharply fell with the appearance of the fatigue crack with depth of 2–3 mm the sample stability, modeling large-sized facilities dropped sharply and they were destroyed with the voltage, that is less than the rate one [1, 2, 12]. In all the studies cracks caused fracture with law nominal voltage after their depth were more than 2–3 mm. These dangerous defects that can be formed in the main structural elements either in in welded joints represent quite a serious danger and may lead to the destruction of the construction in particular conditions [1–12]. Moreover, fatigue cracks can break vacuum rating of the offshore platforms, entail the leakiness with the further submersion. Cracks elimination is connected with unscheduled downtime that influences economic profitability of constructions. The importance of taking into account the requirements providing fatigue durability is recognized by all the leading worldwide organizations in the offshore development field. Firstly, concepts ‘fatigue” and “fatigue crack” are needed to be determined. Metal fatigue is a process of gradual damage accumulation in material effected by alternating voltage that caused by various loads and impacts [2, 3, 7–12] (temperature, corrosion and vibration) leading to metal property change and appearance of cracks. A crack, gradually developing and weakening a cross-section, causes sudden destructions of constructed elements and welded joints. Though during test model samples of the support block, cracks occurred in welded joints mostly, however, there was a case when the crack occurred in the main metal during experiments and caused test pattern fracture before crack occurred in welded joints. Also it needs to be stated that there were incipient cracks in the place where the test pattern was attached to the priming. The authors explain this fact by large value of bending moments occurring in the test pattern cross-section, attached according to a console scheme. It is well known that the basis mechanism causing fatigue crack development is effect of variable loads and impacts that, in turn, lead to changing with some frequency alternating voltage. Earlier, the authors systematized the concepts of load and impacts and described their influence on appearance and development of fatigue cracks. Mathematics methods are offered to describe those impacts and to determine their effects on the voltage condition of tested elements. In this article a solution to the important practical question is suggested, i.e. a process description of initiation, development and crack opening displacement for the main structural constructed elements and welded joints of the constructed block of the fixed offshore platform. The purpose of this article is to analyze the existing methods describing the kinetics crack growth and on the basis of it to devise a method describing those processes in welded joints and main constructed elements … Let us give a short description of basic concepts relate to cracking process. The key idea is so called elastic strain, that implies the energy of external forces, is expended on the element’s elastic deformation. All the work that is done during elastic deformation is saved as the energy, that restores the element after relieving [2, 12].



a) b) c)

Fig. 1. Tipes of cracks depending on the type of the applied load

However, if there is a crack in the element, the rate of the elastic force is changed. If the elastic deformation energy of the plate with no cracks at the given voltage level equals U_0 then if there is a crack, it will be defined according to expression:

$$U = U_0 - \frac{1}{E}\pi a^2 \sigma^2 + 4aT, \qquad (1)$$

where E – is the material's modulus of elastic. The expression $\frac{1}{E}\pi a^2\sigma^2$ shows the reduction of the elastic deformation energy of the plate because of the cracks, 2a – full length of the crack. The expression is built up from the assumption that if there is a crack in the plate, with the size 2a, there is no elastic deformation force in the material volume, that equals πa^2. The value 4aT-crack's surface energy, taking inti account the initiation of 2 surfaces; T – crack's specific energy, that equals to the work that is necessary to form a new unit of surface. At first, the body's full energy increases with the crack's length increasing, which says that the crack's growth can be only if there is voltage increasing. In this case there is a stable crack growth. If the crack growth reaches the critical dimension, cracks increase because of the elastic energy supply without any further increase in voltage. Such a crack development is called unstable. It is typical for brittle failures. Crack growth processes are described with the stress intensity factor K, that defines changes in the stress-strain state at the crack top. K values, taking into consideration a type of the applied load, by which the crack unstable deformations starts in plane deformation conditions, are called critical values of stress intensity factor K_{Ic}, K_{IIc}, K_{IIIc}. Depending on the types of the applied load, the body deformation with the crack can occur according to the following main schemes [12]; I – (tension, fig. 1, a) – the crack surfaces are diverging from each other; II (transverse cross, fig. 1, b) – the cracks are slipping one on the other in the transverse direction: III (the longitudinal dislocation, fig. 1, c) – the crack surfaces are slipping one on the other in the longitudinal direction.

Fig. 2. The scheme of the elliptical-shaped crack

The stress intensity factor value K depends heavily on a crack type. In the author's opinion, most of the cracks, both in welded joins and in the main structural supports, can be described with the elliptical-shaped crack (fig. 2). It can be explained by the experience observation of the crack growth, as cracks mostly initiate in the corners or on the edges of the body, where there is the stress concentration. Such cracks propagate into the body and have an elliptical or a quarter of an ellipse shapes. The stress state in such cracks, with the account of the crack surface curvature, is defined by Snedden and other authors [2].

For the elliptical crack, the stress intensity factor is defined according to the formula.

$$K_1 = \frac{\sigma\sqrt{\pi a}}{\Phi}\left(\sin^2\varphi + \frac{a^2}{c^2}\cos^2\varphi\right)^{1/4}. \qquad (2)$$

And Φ can be defined to an accuracy of 5 % according to the following formula:

$$\Phi = \frac{3\pi}{8} + \frac{\pi}{8}\cdot\frac{a^2}{c^2}. \qquad (3)$$

Table 1

Resilience steel weld at different combinations of welded steel

Welded steel	Resilience + 20 °C kg – force/cm²	Resilience – 40 °C kg – force/cm²
Carbon steel + low alloyed or (chromium + molybdenum) steel.	5	2,5
Carbon steel + austenite steel.	5	2,5
Low alloyed steel or (chromium + molybdenum) + austenite steel.	5	2,5

Table 2

The coefficients of the equation (15)

A_0	A_1	A_2	A_3	A_4
1,2114378	– 1,6577755	11,743555	– 16,672913	9,7708125

The stress intensity factor has the maximum by values $\phi = 90°$. Then the formula can be given in the following form [2]:

$$K_{I(\varphi=\pi/2)} = \sigma\sqrt{\pi a}/\Phi, \quad (4)$$

$$K_{I(\varphi=\pi/2)} = \frac{\sigma\sqrt{\pi a^2/c}}{\Phi}. \quad (5)$$

Knowing the stress intensity factor values, the crack growth speed can be defined, that is some function from them and is described by the kinetics diagram of the fatigue crack growth, the scheme of which is shown in the picture. It is important to state, that it is an unstable growth, in other words, it can be described by the three lots with the different growth speeds [12]:

I – low $\left(0 < \frac{da}{dN} < 5\cdot10^{-5}\frac{millimeter}{cycle}\right)$,

II – middle $\left(5\cdot10^{-5} < \frac{da}{dN} < 10^{-3}\right)$,

III – high $\left(da/dN > 10^{-3}\right)$

The critical K_{fc} and threshold K_{th} value factors are the border transfers from one lot to another one and the growth speed is calculated according to the formula:

$$\frac{da}{dN} = C(\Delta K)^n, \quad (6)$$

where a – a crack length increment at a cycle, (ΔK) – the stress intensity factor sweep, n and C – some material constants. The threshold stress intensity factor for steel constructions, including supported blocks of the fixed offshore blocks, can be calculated by G.V. Matokhin's formula [4]:

$$K_{th} = 15{,}86 - 1{,}05\cdot\frac{\sigma_{temp}}{100}, \quad (7)$$

where K_{th} – is the threshold stress intensity factor, MPa·$m^{0,5}$; σ_{temp} – temporary steel resistance, MPa. In the basis that the temporary resistance, having been described in chapter 3 of the welded joint is 490 MPa, the value stress intensity factor will equal to 10,7 MPa·$m^{0,5}$.

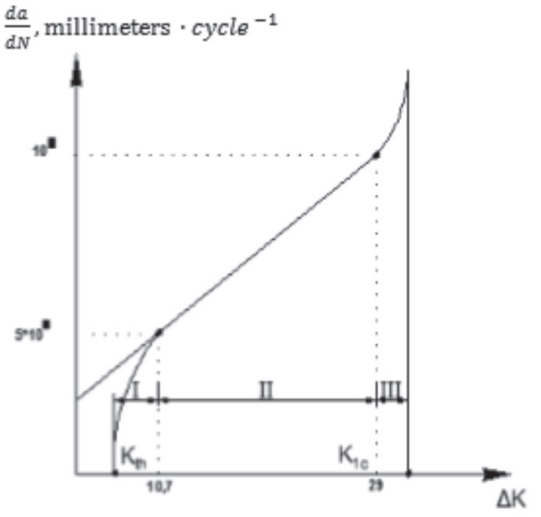


Fig. 3. Kinetic diagram fatigue fracture of welded joints and the major structural element of the fixed offshore platform

The empirically received formula in works [5] is offered to use by the authors to describe the kinetics crack growth:

$$\frac{da}{dN} = C_R^H \cdot 2{,}13\cdot10^{-26}\cdot K^{20}, \quad (8)$$

where a – the crack length increment at a cycle, ΔK – the stress intensity factor sweep, C_R^H is defined by the formula:

$$C_R^H = \frac{1}{\left(1 - 0{,}461R^1\right)^{20}}, \quad (9)$$

where R^1 – threshold factor of the asymmetry of the cycle, taken according to the work data [5]. After defining the parameters of the straight line II, describing the growth speed on the lop

I and calculation of the threshold value stress intensity factor, it is necessary to dewher – fine the parameters of the straight line on lop II. For this purpose, the authors offers to use the equation, that is solved during the work [5]:

$$\frac{da}{dN} = C_R^E \cdot 1{,}45 \cdot 10^{-11} \cdot K^{2{,}91}, \qquad (10)$$

where a – the length increment at a cycle, ΔK – stress intensity factor sweep, C_R^E is defined according to the formula:

$$C_R^E = \frac{1}{\sqrt{1-R^1}}, \qquad (11)$$

where R^1 value is the same as the one in the formula (9).

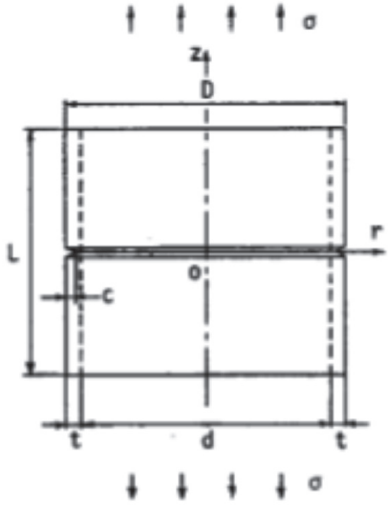


Fig. 4. Scheme of structural element of the offshore platform in the presence of a ring fracture

The proposed equation is valid until the critical stress intensity factor is reached K_{Ic}, that characterizes the unstable crack growth, that can be defined by the direct experimental methods according to GOST 25.506-85 or to use for the calculation of this value the dependency, proposed in this work [3]:

$$K_{1C} = \sqrt{\frac{2kEa_v}{1-\nu^2}}, \qquad (12)$$

where E – elastic modulus; ν –poisson's ratio, a_v – resilience on the Charpy type models; k – dimensionless ratio of the proportionality, calculated according to the formula:

$$k = \frac{0{,}075\left(\frac{\sigma_m}{\sigma_{temp}}\right)}{1+\frac{0{,}33\sigma_{temp}}{\sigma_m}}, \qquad (13)$$

where σ_{temp} and σ_m – temporary resistance and yield stress of steel. The study materials resilience can be defined from the data certificate, according to the normative documents; in some situations the data from RD RTM 26-298-78 (table 1) can be used.

The result of the calculation shows that the threshold stress intension factor of the sudy welded joint is 29 MPa. The same principles of making a kinetic diagram are applied to the main constructed element of the supported block of the offshore stationary platform. On the basis of the available calculations, the authors created the kinetic diagram of fatigue destruction of the welded joints and the main constructed elements of the support blocks of offshore stationary platforms. For example, the value of the stress intensity factor for the brace support, representing a hollow tube if there is a surface ring crack both with the bending failure and tensile value of stress intensity factor, can be defined according to the following formula:

$$K = F\sigma\sqrt{\pi c}, \qquad (14)$$

where σ – intensity tensile and bending value, c – crack depth, counted from the surface, and F – the function, determined by the formula:

$$F = A_0 + A_1\lambda + A_2\lambda^2 + A_3\lambda^3 + A_4\lambda^4, \qquad (15)$$

where λ – relation of the crack depth C to the wall width of the t constructed element, and the corresponding rates are determined in table 2.

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MATHEMATICAL MODELLING OF THE PROCESSES IN THE REAL GASES

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In this work we are considering the approach for the mathematical modeling of interrelated thermo-dynamic and hydrodynamic processes in real gases. The specific feature of the approach, is the method of forming the equations of state during the construction of mathematical models for processes and the way to solve the model equations.

A numerical approach is proposed to generate the equations of state. This approach is based on the analysis of experimental data. Analyzed properties of substances belong to the regions of existence of liquid, steam and gas phases, with a first-order discontinuities at the interfaces.

The method comprises the following steps [1]:

1. Search of the experimental data. According to the conditions of the problem, for each individual substance that is involved in this process, the search of the table dependencies state parameters is conducted.

2. The processing of table relationships. Received tables are approximated by analytical functions. It is known that, at phase transitions, some thermodynamic characteristics such as density, viscosity, specific heat, undergo considerable abrupt changes. According to this, some difficulties with approximation of data characteristics in mathematical model is arised. Therefore, for each task, the most appropriate approximation algorithm is chosen (linear, cubic spline interpolation), which allows to use the values in this diapasons without large mistakes.

3. Construction of the mathematical model. The mathematical model includes the obtained approximation relationships, basic equations of thermodynamics and the laws of conservation of energy. Thus, the equation of state are replaced by approximations for the table values of thermodynamic parameters. Depending on the specific conditions, an additional equation may be present in the mathematical model. These equations consider the heat exchange with the structural elements, the working fluid leaks through the seals, phase changes, chemical reactions, and so forth.

4. The solution of model equations. The solution method is based on an analytical solutions of of linear differential equations system for the local temporal and spatial domains of intervals where processes are taking place. The solution is carried out iteratively; as a result, the required parameters of the working fluid and the energy-characteristics of current processes are determined.

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CONCENTRATIONS OF HEAVY METALS IN THE VEGETATION AND SOILS OF MANGISTAU REGION

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At decision of environmental issues of large industrial cities a great understanding of the importance dangerous anthropogenic caused migration of pollutants, including heavy metals It is known that in addition to the natural migration of rocks from atmospheric precipitation and natural waters, heavy metals released into the environment as a result of technogenic processes. Most of them is absorbed and accumulates in the soil, and the rest migrate to the surface and underground waters. Among the important role of a barrier in the way of migration of heavy metals, in addition to soil, plants perform, so the search among these species, the most objectively reflect the degree of contamination by heavy metals, are current a task. Thus, it was definitely the concentration of heavy metals in the vegetation of Mangistau region.

The soil cover of the Mangistau region is experiencing high technogenic load related with functioning industrial enterprises oil and gas industry. The factors of pollution and violation soil advocate the use of a powerful drilling and construction equipment with high destructive effect; great length of transport communications for the export of raw materials; lack of reliability of the exploited fishing equipment and vehicles; the formation of oil and drill cuttings; high content of hydrogen sulphide in the feed; oil spills; organized and unauthorized landfill. Petrochemical pollution of soils observed in an area of the existing oil and gas fields near the infield pipeline network as a result of irrational exploitation of natural resources and raw materials. Causes of soil contamination in the oil fields are gaps pipelines, emergency blowout exploration wells, technological disturbances in the transport and storage of raw materials, the use of obsolete and worn-out equipment and processing equipment, resulting in the soil acquire new, negative signs and properties different from natural soil, required to recover high material costs[1].

Materials and methods of research. Samples were selected 4 types of vegetation and soil samples 2 in the immediate vicinity from the boundary of the well field is Zhetybai. Analysis of the presence of individual species in the composition showed that in the immediate vicinity of the oil well 95% of the total mass of plants was Garman (other names: burial, adraspan, prairie root, Turkish paint). This weed clog pastures and grazing pastures greatly brought down in the southern steppes and deserts. grows on the slopes of the foothills, on sandy, sandy loam, clay, alkaline and saline shallow gravelly soils in the piedmont plains deserts. In clayey slopes and deserted valleys of the rivers rises in the mountains. As Garman weed is widespread in the desert near houses and wells. Not eaten by animals. Other species represented rare specimens in the samples near borehole and a sample of background section

Wormwood white land – 3-45 cm tall shrub. The whole plant was young white, later gray-greenish from arachnoid-tomentose pubescence; root thick, vertical, woody. Baskets on the legs, small, 2–3 mm long, ovoid, in the loose, fairly broad panicle; flowers (including 4–5) when ripe fruits have unbuttoned corolla purplish-pink or yellow. Decoction, alcoholic extract in the experiment accelerates blood clotting, recommended for clinical trials in the gastro-intestinal diseases. Essential oil illuminates anatomical preparations can be used as a foaming agent in the flotation of ores [2].

Peganum harmala L. Perennial herbaceous vegetation a height of about 50 cm with a powerful root of many heads of up to 2–3 m in length, departing vertically into the soil to aquifers. Stems 30–80 cm tall, branched, glabrous, green. Leaves are alternate, short, sessile, three-deep, with linear acute lobes. The flowers are yellow or white, large, single or on stalks up to three at the ends of branches. Calyx remaining in fruit, almost to the base quinquepartite share its linear, pointed, entire or slightly incised. Corolla of five petals elliptic, length of 1,5–2 cm The fruit – Spherical, somewhat flattened box, 6–10 mm in diameter.As a medicinal plant used grass harmala (lat. Herba Pegani harmalae). The raw materials harvested in the budding phase – beginning of flowering. Drying air. Repeated harvesting on the same bush are possible after 2 years Contains a significant amount of alkaloids, indole and quinazoline derivatives. Of the total alkaloids first isolated in pure form harmaline, harmine (banisterin) garmalol and L-peganin (vasicine), and in recent years – pegamin, peganol, It was found that out of alkaloids. seeds, 50–95% are harmaline that prevails in the roots of harmine (67–74% of the total), while the bulk of the grass is peganin (up to 78% of total alkaloids). It was also revealed that the young roots twice alkaloids than the old, with Garmin dominates. With the development of the aerial part of the plant is reduced and the amount of alkaloids and share peganina in it, and the amount of harmine

increased. The qualitative composition of alkaloids depends strongly on the place of growth of the plant. In addition to the alkaloids from the seeds of the plant are marked red colorant and drying fat oil. The herb contains protein (24 %), fatty oil (4 %) and extractives (31 %). *Peganum harmala* L. is known as Syrian rue, Wild rue and Harmal. *P. harmala* extracts are considered important for drug development, because they are reported to have numerous pharmacological activities in the Middle East, especially in Iran and Egypt. For a long time *P. harmala* has been used in traditional medicines for the relief of pain and as an antiseptic agent. *P. harmala* also have antibacterial, antifungal, antiviral, antioxidant, antidiabetic, antitumor, antileishmanial, insecticidal and cytotoxic activities and hepatoprotective and antinociceptive effects. Harmaline, harmine, harmalol, harman, quinazoline derivatives, vasicine, vasicinone, anthroquinons and fixed oils are reported from seeds and roots of this plant. This plant is used as a medicine in Turkey, Syria, Iran, Pakistan, India, Egypt.

Barnyardgrass solonchak, or Anabasis salsa (Latin Anabasis salsa.) – The form of flowering plants of barnyardgrass (Anabasis) family of amaranth (Amaranthaceae). Shrub (lat Suffrútex.) Life form (biomorph) plants; perennial floor wood-floor herb, which, in contrast to the bushes and shrubs, only the lower part of shoots bearing buds resume, stiffens and stored in the winter for many years, and the upper – grassy – annually with the onset of cold weather is dying, and with the advent of heat re-grows. Shrubs usually not higher than 80 cm, rarely they reach 150–200 cm shrubs common in arid areas – deserts and semideserts:. Eurotia, some species of wormwood, thistle, astragalus. Aboveground position kidney shrubs protects against overheating in the red-hot soil. In the temperate zone to the shrubs are sage, blueberry, lavender. Low-growing shrubs, whose height rarely exceeds 15–20 cm (for example, thyme), usually called shrubs [3].

Suaeda acuminata 10–75 cm high., Naked, straight, obliquely upward directed branches, often with reddish stems. Leaves glaucous, narrowly linear, multiple, flat top, bottom protruding, sharp or pointed, sometimes with bristle-shaped, very short pointed. The flowers are used. h. bisexual, clustered in dense tangles.When colored leaves and collected rare, loose, spicate inflorescence, forming a generally whisk. Perianth with lobes, fused to 2/3, in the upper half with a small sharp keels. Stigmas 2–3, very short, no longer than 0,5–0,75 mm. Seeds of both vertical and horizontal, 1–1,5 mm., Black, strongly convex, shiny and smooth. Annual plant 10–75 cm high., Naked, direct from obliquely upward directed branches, often with reddish stems [4]. Leaves glaucous, narrowly linear, multiple, flat top, bottom protruding, sharp or pointed, sometimes with bristle-shaped, very short pointed. Flowers, clustered in dense tangles. When colored leaves and collected rare, loose, spicate inflorescence, forming a generally whisk. About bashlyk flower with prominent lobes, fused to 2/3, in the upper half with a small sharp keels. Stigmas 2–3, very short, no longer than 0,5–0,75 mm. Seeds of both vertical and horizontal, 1–1,5 mm., Black, strongly convex, shiny and smooth.

Methods of Inductively coupled plasma mass spectrometry (ICP-MS). In tracing paper or glass weighing taking a sample of the sieved sample (soil) is not less than 0,5 g, quantitatively transferred into a glass for a microwave oven, for the same cup, 10 ml of nitric acid and 2 ml of hydrogen peroxide and 2 ml of hydrochloric acid and then put on microwave oven for 1 hour. After that, we take out the cups and filter the solution through a filter paper “white ribbon”. The walls of the cup is washed with bidistilled water and poured it into the same 25 mL volumetric flask, bringing the solution to a volume label. Thus, we get ready soil samples for the determination of heavy metals using ICP-MS.

The vegetation samples Artemisia terrae-albae; Peganum harmala (Peganum harmala L.) – adaryspan;) – Anabasis salsa, pointed Sweda (Suaeda acuminate) ground into slices of thickness up to 0,8 cm, the samples were dried in an oven at a temperature of 60–650 °C Air dry sample is crushed in a mill and screened through a sieve with holes diameter 2 mm. Sample preparation in plants was conducted by the above mentioned method but it was posted 0,2 g of vegetation, and the solution was added only nitric acid 10 ml.

Results of research and their discussion.

The results of analyzes to determine the concentration of heavy metals

Characteristics of soil contamination in the oil fields Zhetybai							
Name of samples	Cd	Cr	Cu	Mn	Ni	Pb	Zn
Soil1 (outside sanitary protection zones deposit)	0,111837	15,25779	5,8493	155,8579	6,044999	2,80699	14,567
soil2 (near production well)	0,122652	13,1567	4,643379	160,619	4,829	3,082	13,2298

The standards of maximum permissible concentrations of harmful pollutants in soil

Name substances	Maximum allowable concentration
	mg / kg in soil
Lead (gross form)	32
Copper (mobile form)	3
Chromium (mobile form)	6
Chromium + 6	0,05
Manganese	1500
Nickel (mobile form)	4
Zinc (mobile form)	23
Cadmium (gross form)	0,5
Arsenic (gross form)	2

Note: * Joint Order of the Ministry of Health of RK as of 30.01.2004 № 99 and the Ministry of Environmental Protection of Kazakhstan from 27.01.2004 № 21-g.

Corrected data for blank and dilution results in mg/kg							
Sample sites	Cd	Cr	Cu	Mn	Ni	Pb	Zn
Plant1	0,092	1,565	6,253	24,266	1,18045	1,862	17,83
Plant1.1	0,0947	1,105	6,50025	27,122	1,0023	0,6546	19,317
Plant2	0,1007	1,068	3,6893	18,586	0,6112	0,7234	12,82
Plant2.2	0,01012	0,1921	0,1897	1,0182	0,0214	0,0037	0,377
Plant3	0,07909	0,74516	2,7533	13,743	0,39717	0,6954	9,798
Plant4	0,08355	1,0213	2,9618	17,657	0,4708	1,2111	9,656
Plant4.4	0,05	0,809	2,7252	13,36	0,044	0,5499	7,425

Plant 1 Artemisia terrae-albae (near production well)
Plant 1.1 Artemisia terrae-albae (outside sanitary protection zones)
Plant 2 Anabasis salsa (near production well)
Plant 2.2 Anabasis salsa (outside sanitary protection zones)
Plant 3 Suaeda acuminate (near production well)
Plant 4 Peganum harmala L. (outside sanitary protection zones)
Plant 4.4 Peganum harmala L. (near production well)

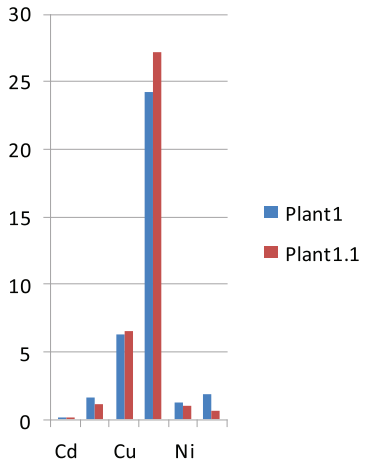

Fig. 1. Artemisia terrae-albae

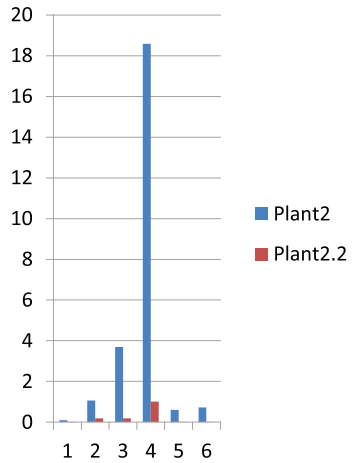

Fig. 2. Anabasis salsa

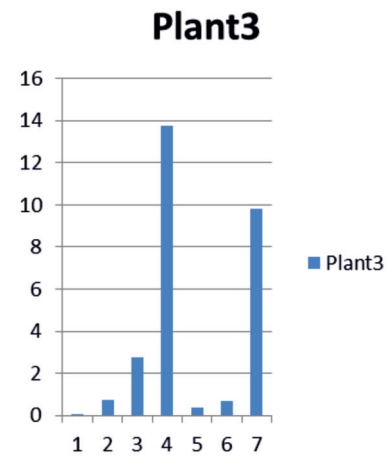

Fig. 3. Suaeda acuminate

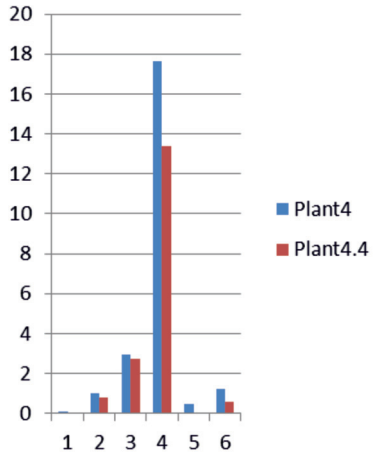

Fig. 4. Peganum harmala L.

From this study it can be concluded that the concentrations of heavy metals in soil type studied were within the limits studied medicinal plants that grow in the highly industrialized area, had a concentration of heavy metals within the data of the content of heavy metals in plants are shown in Fig. 1, 2 As can be seen from the figure, white wormwood – (Artemisia terrae-albae) Peganum harmala or adraspan – Peganum harmala L. Sweda sharpened barnyardgrass solonchak, or Anabasis salsa (Anabasis salsa) accumulate zinc and copper in high degree. Its content in the paragraph number 1, from 1 to 9 samples of zinc ranges between 25,71 ± 7,65 mg / kg, 10 samples its content was 29.9 mg / kg. 11-20 samples of zinc concentration 9,19 ± 3,49 .The content of honey as shown in Figure 2 in paragraph number 1 varies from 19,89 ± 11,85mg / kg 2 item 2,18 ± 1,01 The lead content in the not too high, it was 1,33 ± 0,52 mg / kg, outside the field of sanitary protection zones 0,07 ± 0,22. Analysis of the results of the determination of cadmium in the studied species of plants also showed various accumulative capacity in Figure 1 item number 1 0,03 ± 0,01, in the number 2 point cadmium content 0,2 ± 0,03 The results of these studies have shown that too much pollution is not specified, but the comparison with 2 points the sample outside of the field, that an increase of heavy metals, respectively, increases the level of absorption of heavy metals by 1 point directly at the oil rocking. Thus, the study results indicate contamination of plants manufacturing heavy metals.

Conclusion

From this study it can be concluded that the concentrations of heavy metals in plants have studied drug concentrations of heavy metals within the data content of heavy metals in plants are shown in Figure 1,2,3,4 Thus, analysis of flora contamination by heavy metals Mangistau region shows that the highest number of pollutants found in samples near the oil and gas equipment. Background levels of heavy metals exceeded at certain points within a wide range, the most important pollutants are zinc and copper. In these terms it is necessary to develop measures to reduce the entry of heavy metals into the environment. It is characteristic of the mobile forms of heavy metals. In further studies,ecological condition. Mangistau region is necessary to monitor first and foremost elements having ratios in the maximum amount of concentration of zinc, copper

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E-LEARNING: MEDICAL FACULTY STUDENTS' DEMAND FOR ELECTRONIC MANUALS

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Medical university students' demand for electronic manuals in educational process is studied by the author of the article. Testing of 179 first-year medical faculty students was carried out. First-year students were involved into testing at the end of an academic year. The students were distributed into 3 groups according to their educational activity results: students with excellent results, good results of studies, and poor educational activity results. By testing results, electronic teaching manuals are highly appreciated by medical students. Vast majority of medical students studies both electronic manuals and printed editions, however, preferring electronic teaching manuals. Low academic rate students are actively included into electronic manuals studying, using great advantages of electronic teaching manuals. Medical faculty students consider electronic teaching manuals as irreplaceable components of university educational process, great instrument of representing and visualizing the information, a tool of great effectiveness teaching in educational process individualization.

Electronic teaching manuals are considered as one of the most important elements of medical university e-learning. Electronic teaching manuals are irreplaceable components of university educational process, great instrument of information representation and visualization, a tool of students' cognitive activity stimulation, a way of modern science and technology achievements usage in educational process [1, 4]. The effectiveness of electronic teaching manuals is the object of modern pedagogical researches [2, 3, 6, 7]. At the same time, it has to be noted, that medical university students' demand for electronic manuals is still out of researchers consideration [5].

That's why, the aim of our research is defined as medical university students' demand for electronic manuals in educational process.

Materials and methods. Testing of 179 first-year medical faculty students was carried out. First-year students were involved into testing at the end of an academic year.

The students were distributed into 3 groups according to their educational activity results: students with excellent results – 27,4%, good results of studies – 66,5%, and 6,1% – poor educational activity results.

The experiment was held in constant conditions for all groups of students: the research was held at 11 a.m. in academic auditory. The research duration was about 12 minutes. Medical faculty students performed the testing independently. The testing was built on the basis of original author test including 12 questions.

Results of research and their discussion. Medical faculty students were asked to arrange e-learning various elements according to their frequency in high school educational process use. According to the testing results, examinees choose the second place for electronic manuals in the following list:

1. computer testing;
2. electronic manuals;
3. multimedia lectures;
4. university website information;
5. problem tasks on computer;
6. laboratory works on computer.

We found from testing results, that the electronic teaching manuals are highly appreciated by medical students. So, 88,8% of examinees use electronic teaching manuals at home, every third student uses electronic manuals in class. The operating time with electronic manuals exceeds 3 hours a day for 76,5% of first-year students, and for 81,8% of low academic rate students with regard to 73,5% of students with high results of educational activity.

By testing results, examinees use both electronic manuals, and printed editions. 3,9% of first-year students prefer electronic teaching manuals, approximately the same rate (3,4% of examinees) choose printed manuals. Vast majority of medical students studies from both types of manuals, however, preferring electronic teaching manuals. The tenth part of low academic rate examinees studies only from electronic manuals, and 50% of students with poor results of studies uses mainly electronic manuals.

Examinees noted following advantages of electronic manuals:

– usage simplicity – 67,6%;
– usage comfort – 38%;
– good representation of educational material – 20,7%;
– self-control opportunity – 12,3%;
– convenience of information perception – 10,6%;
– increasing interest of the studied subject – 3,9%.

It should be noted, that students with poor results of studies put the point "good representation of educational material" of electronic manual to the first place (27,3% of examinees). And points "convenience of information perception" (18,2% of examinees) and "self-control opportunity" (18,2% of examinees) were taken to the next places.

Medical students point out the following limitations of electronic manuals:

– need for the hardware (computer) – 72,1%;
– fatigue of – 17,3% of students;
– complexity of use, lack of skill in work – 6,7%.

Thus, research results make us conclude that electronic teaching manuals are highly appreciated by medical students. Low academic rate students actively use electronic teaching manuals. They are included into electronic manuals studying more actively than students with high results of educational activity. It can be explained, firstly, by low level of cognitive activity and , secondly, by great advantages of electronic manuals for students with poor results of studies. Medical faculty students consider electronic teaching manuals as irreplaceable components of university educational process, great instrument of information representation and visualization with great effectiveness in educational process individualization.

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THE APPROBATION OF MATHEMATICAL COMPETENCE MODEL IN MEDICAL SCHOOL E-LEARNING EFFICIENCY STUDYING

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To approbate suggested mathematical competence functional model, the e-learning process results of mathematical competence components development for clinical psychology faculty students were considered. According to research results, 90% of medical students got enough mathematical base for studying the other medical school disciplines, knowledge in math for solving professional activity tasks, high level development in each mathematical competence component to solve practical and theoretical problems. Thus, the suggested model allowed us to esteem the mathematics e-learning effectiveness in formation and development of students' mathematical competence as high.

The successful mathematical tasks solving requires three cognitive components possession: readiness and ability to analysis and synthesis; readiness and ability to abstract from insignificant properties and characteristics of objects; readiness and ability to generalization [3, 5, 6]. The mathematical competence model in three-dimensional space, based on main structural components, is easily realized in educational process to show real university students' mathematical competence development level and its separate components, providing studies of various factors influence on process of mathematical competence formation [1, 2, 4].

The approbation of functional components mathematical competence model in medical school e-learning efficiency studying is our research aim. Medical university clinical psychology students' mathematical competence was chosen as the research object. Materials and methods. The testing of second-year clinical psychology students was carried out. 10 second-year clinical psychology faculty students were involved into mathematical e-learning testing after passing the mathematical course examination. The research was held at 11 a.m. in the academic auditory. The research duration was about 50 minutes. The clinical psychology faculty students performed the testing independently without using any electronic devices. The testing was built on the basis of Atmhauer intelligence structure test including the scale of mathematical abilities determination and a questionnaire "Thinking type".

Results. To approbate suggested mathematical competence functional model, we consider e-learning process results of mathematical competence components development for clinical psychology faculty students. For this purpose we will take 100-grade scale for each mathematical competence structural component. The research results of clinical psychology faculty students' mathematical competence components development in e-learning process are represented in the table.

We build three-dimensional mathematical competence model based on the received results. Provided that $K_{1max} = K_{2max} = K_{3\ max} = 100$, sphere external radius $R_{external}$ is calculated as:

$$R_{external} = \sqrt[2]{100^2 + 100^2 + 100^2} = 173. \quad (1)$$

The magnitude of sphere internal radius $R_{internal}$ is found from expression:

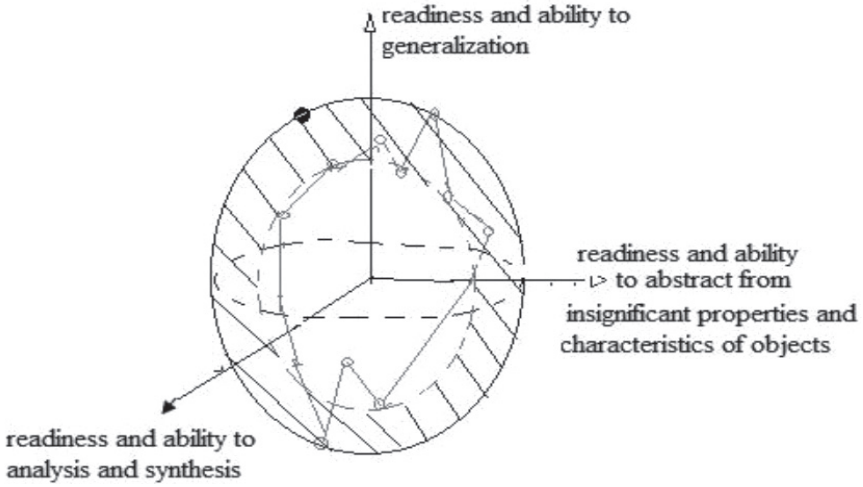
$$R_{internal} = 0{,}6\ R_{external} = 103. \quad (2)$$

The distance between internal and external radii can be calculated from the following formula:

$$d = 173 - 103 = 70. \quad (3)$$

Clinical psychology faculty students' mathematical competence components development in e-learning process

№ p/p	Main structural components of mathematical competence		
	K_1 – ability to analysis and synthesis	K_2 – ability to abstraction from objects' insignificant properties and characteristics	K_3 – ability to generalization
1	90	100	60
2	40	95	50
3	50	85	40
4	65	85	60
5	40	75	50
6	60	85	50
7	70	60	70
8	85	100	30
9	80	65	30
10	60	90	100



Mathematical competence model for clinical psychology faculty students. Note: the area designated by shading on the sphere designates the level of mathematical competence of pupils conforming to requirements of the federal state educational standard

This distance points medical school students' mathematical competence level corresponding to educational standard. The build mathematical competence model for clinical psychology faculty students is shown on figure.

From the figure, nine of ten points, indicating students' mathematical competence level, are located at the area of sphere shell. It means, that e-learning in 90 % cases results to students' mathematical competence level corresponding to educational standard. These students, as the result of e-learning, got enough mathematical base for studying the other medical school disciplines, knowledge in math for solving professional activity tasks, high level development in each mathematical competence component to solve practical and theoretical problems. And only one point, indicated students' mathematical competence level, is located out of the sphere shell. It means, that for 10 % of all students insufficient mathematical competence level was formed. That level is not corresponding to educational standard level. Two mathematical competence components from three were revealed. Thus, the suggested model allowed us to make the conclusion about medical school students' mathematical competence level, to esteem the mathematics e-learning effectiveness in formation and development of students' mathematical competence as high, to diagnose each mathematical competence component separately and all integrative characteristic in general. The model can be used to evaluate the mathematical competence development dynamics, to assess each mathematical competence component separately, to invent the effective mathematics teaching strategy.

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TO THE QUESTION OF LEARNING A FOREIGN LANGUAGE AT SCHOOL

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At the present stage of development of education it is supposed to change approaches to the definition of its content. The school system must help students not only acquire knowledge, abilities, skills, develop foreign language communicative competence, to understand the importance of foreign languages as a means of communication between people of different countries and communities, but also to solve a life, and learning problems.

At this time Russia every year integrates intensively into the world community, collaborating with other countries in the socio-economic sphere. In such circumstances, there is an increasing need to develop students' ability to use a foreign language as a communication tool in the dialogue of civilizations and cultures in the modern world. In the learning process socio-cultural and communicative development of students, preparing students to communicate in the field of school and post-secondary education as well as broaden their horizons and the general cultural level of the student take place.

In today's world of foreign language communication skills in speech and writing, in the field of business communication are essential. Consequently, the main objectives of the implementation of the learning content in school are the formation and development of communicative, linguistic and socio-cultural skills.

The culture of communication is the subject of study of many humanities: philosophy, pedagogy, psychology, linguistics and others.

The philosophical aspects of the culture of communication students is considered from the point of view of the problem with the ratio of public relations, activities and communication. These topics are covered in full in the papers L.P. Buoys, M.S. Kagan, V. Sokolova, V.M. Sokovnin, V.I. Stepinski [1].

The culture of communication is the unity of personality-major philosophical systems. It is value of human beliefs and behaviors that are consistent with the requirements of morality and etiquette. Consequently, the creation of the communication culture is a part of the process of moral education of the person. Special attention is paid to the formation of behavior and communication skills, their ethical content [2].

The problem of creating a culture of communication is due to the need to improve the quality of students as future professionals because the assimilation and use of universal, humanistic, ethical values by students and the realization of their right to communicate not only promote personal and spiritual development of the young person, but also the promote the social, professional potential.

Business communication of people in society is one of the most popular types of communication. The effectiveness of any activity – it is a consequence of the necessary possession principles of business communication.

It is known that the communicative learning a foreign language has a positive effect, particularly it affects the development of the human psyche functions, generalized abstract thinking. On this occasion, L.S. Vygotsky wrote: "Foreign language releases the speech thought from the captivity of specific linguistic phenomena". In the mind of the person who owns the only native language, the thoughts and the ways of their design are linked inextricably. Foreign Language enables us to understand that there are other connections between form and meaning, other ways of expression [3].

A foreign language has a beneficial effect on speech activity in the native language, culture and form of communication. When we form the speech skills in the foreign language, we contribute to the development of all levels of verbal ability learners: auditory, visual and motor sensations. Meaning reading helps to familiarize students with the genre, the main idea of the text by searching for information on the basis of jobs that provide an understanding of the text. Work on the text teaches thoughtful attitude to reading the book at all. Stories on the plan or drawing,

lexical and grammatical workout, extracurricular reading develops skills to express logically their thoughts. They promotes to increase both voice and a common culture.

In the process of communicative learning it is supposed organization of the learning process as a model of the communication process [5]. Therefore, the foreign language nowadays promotes to raise the culture of communication. The foreign language classes are the lessons of learning to communicate through interaction.

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GUIDANCE MANUAL "ORGANIZATION OF PHYSICAL TRAINING AND SPORT OCCUPATIONAL GUIDANCE, SELECTION AND MEDICAL CONSULTATION OF CHILDREN AND ADOLESCENTS"

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Integration an intellectual potential of doctors-hygienists in providing qualitative growth of efficiency of the developed prevention activities makes it possible to implement of new knowledge, techniques, approaches in science, educational system and practical health service. A health state and active longevity are being became leading factors contributing to the further development of government and healthy society foundation in view of what is happening in epochal world changes as integration and unification at the present stage.

Upbringing of harmoniously developed younger generation is one of the priority directions of the Uzbekistan state policy. Strengthening children health and diseases prevention by promoting healthy lifestyles is attended by the State Authority of the Republic of Uzbekistan. In the Republic developed and adopted the state social programs for priority problems solution in this direction. Evidence of this are decisions of the President of the Republic of Uzbekistan: № RP-805 "Youth year" from 29.02.2008, № RP-1271 "Harmoniously developed generation year" from 27.01.2010, № RP-1717 "Family year" from 27.02.2012, № RP-1920 "Wellbeing and prosperity year" from 14.02.2013, № RP-2133 "Healthy child year" from 19.02.2014.

Compliance with the principles of a healthy lifestyle, physical training and sports have a positive effect on health promotion, increase of physical level development and physical fitness are performed important functions such as educational and cognitive, spiritual and moral development, socio-biological adaptation, social tension reduction, morbidity prevention and infringement, addictions (Nikitushkin V.G., 2009; Pogadayev G.I., 2000). Therefore, many processes and phenomena occurring in physical and sports movement, have a deep social meaning and for understanding them possible only in unity with the interests and needs of society. So, a sports occupational guidance, selection and medical professional consultation of children and adolescents are one of the main directions of the health workers' practical services.

Currently there is no consistency in using of approaches and methods of sports selection and diagnostics of the child athletic abilities. However, initial level development determination of the most conservative qualities and abilities necessary to carry out at choice of specialization areas of the young athlete. Studying of the young athlete's qualities and abilities are proposed analysis and decomposition into simpler components. Thus, one of the key issues of the physical training and sports orientation and occupational selection is an issue of integral assessment of child's prospects in a particular sport. Such an assessment of all development studied indicators objectively reflects a young athlete preparedness level and allows us to perform a reliable phased children success prediction aimed to preserving and health promotion, increasing working efficiency level and self-fulfillment. There is no doubt that further progress in the sport occupational orientation development is largely due to the results of scientific research aimed at substantiation of sports selection technology at early stages of many years training.

In the framework of the State grant projects of ADSS-24.3 and ADSS-15.17.1 conducted research by staffs of the children and adolescents hygiene laboratory Research Institute of sanitation, hygiene and occupational diseases of the Ministry of Health of the Republic of Uzbekistan. It has been concerned a fact that the system of public and secondary special, occupational education should be systematically and purposefully used universal directions and mechanisms of physical-sports occupational orientation: career information and upbringing, occupied diagnostic and promotion, career guidance game, professional consultation and matching, selection, adaptation based on age, sex and psycho physiological characteristics of the personality development, health and physical development qualities.

In this regard, an aim of the guidance manual is to provide guidance to faculty, doctors-students faculty training, masters, students of IV-VI courses of medical-prophylactic faculty of the medical higher education institutions and professionals in the field of physical training and sports guidance and medical professional advice.

The guidance manual consists of 5 main units. The first unit contains methods and stages of the physical training and sports career guidance in different educational institutions. It has been provided a job description of coach, physical training teacher and athlete; described main forms of career guidance at sports schools and Olympic reserve colleges.

The second unit includes methods and stages of the sports selection, sports training and athletic ability diagnostic principles. It has been described selection system, which is a complex of organizational and methodical activities, including various research methods based on identifying potential and abilities of an individual, to the greatest extent corresponded to sport's requirements. It has been displayed children foreseen significant signs during

mass selection and selection in a training group, as well as approximate age periods of maximum development growth-weighted indices and physical qualities.

The third unit has been proposed a modified classification of sports groups, which is based on the peculiarities manifestation of athletes physical and technical abilities regarding to sports prevalence in the Republic of Uzbekistan; it has been formed features of different sports groups by requirements point of specific qualities of the child for success in mastering of particular sport; developed criteria, composed in accordance with the sport's requirements individually and the requirements for children involved in sports.

The fourth unit has been provided recommendations for systematic physical training and sports, aimed at prevention of health state disturbance and trauma; it is reflected optimal age periods for practicing certain types of sport; there is presented the hygienic aspects of medical and physiological sports career orientation and consultation; it is described the main tasks of a sanitary inspector in physical training and sports guidance and consultation issues; given a list of diseases classes and pathological conditions that are contraindicated in physical training and sports.

The fifth unit is included a description of new teaching technologies and control forms used in the lesson on this topic for improving acquired knowledge and skills.

Teaching this topic is based on the theoretical and practical knowledge of students on general hygiene, children and adolescents hygiene, normal and pathological physiology, normal anatomy, therapy, infectious diseases, family medicine, podiatry, sports medicine, physical therapy, pedagogy and valeology.

Obtained knowledge during this course will be used for timely and qualitative carrying out of preventive measures aimed at preventing a likelihood of borderline and pathological conditions at children, athletes, related to impact of inadequate physical and psycho-emotional exertion, chronic nervous and physical effort, high intensity and volume of training process, trauma and injuries, etc. Thus, implementation of this guidance manual will be improve the level of doctors and cadets of physicians' continuing education institute, medical universities students, sports physicians, and other specialists whose work is directed on preservation and health promotion at children and adolescents.

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Short Reports

NOBLEMAN IN CASE

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The article discusses the social type, which became widespread in the Russian system of government in the XVIII century – "Random people" or "noble in the case", implemented through the institution of favoritism. The author argues that the analysis of the personality, the historian must study the social type of personality typing methods of the social, as can be identified in the individual belonging to a particular social group, the so-called typical features. The author notes that the spread in the Russian system of government in the XVIII century. received social type – "noble in the case" implemented through the institution of favoritism.

Social personality type consists of two elements. The first is the social status of the individual and the social role associated with it. Social status and role of the individual associated with the personality and activities depend on the situation in the society. The second principle is the relation of the individual to his social status and their social roles. Thus, according to the Marxist approach, the main type of social criteria – class, party, personal characteristics.

This assertion will be proved on the example of a social type, which became widespread in the Russian system of government in the XVIII century. – "Random people" or "noble in the case", implemented through the institution of favoritism.

Note: the word "noble" comes from the dialect "Velma" ("parts"), which means "very" and the verb "Mozhayev", ie be able to, respectively, "nobleman" – a person who has a high status, power, has great power in the state and society. In turn, "noble in the case" – an imperious man, who is in favor, to "favor" the emperor.

Favorit had no definite legal status. However, the Russian reality proves that the absolutist state system was a favorite of the most effective, was more than close to the emperor. Favorite usually was in close relationship with the monarch, and as a result was able to dispose of part of his absolute power.

Another way can be to present the main characteristics of favoritism:

– Favoritism – a special tool in the state system of government in the epoch of absolutism;

– Favorites appointed to high public office, on the basis of personal interest of the monarch in the activities of a person, often breaking the utilities rules for public office according to the "Table of Ranks".

Thus, the favorite was a type of "accidental person" in the system of supreme state power in Russia in the XVIII century. At the same time, having a certain personal qualities, such as: the ability to take risks, the state intuition, initiative, desire to serve the monarch and the Fatherland, a favorite of the state to carry out its activities in accordance with the objective needs of the vast Russia. Also note that often the favorite could make a significant contribution to the development of the Russian Empire.

Occupying an important position, favorites have tremendous power, they have played a huge role in public decision-making. It is known that Anna could not even take a step without its most famous favorite Biron, who had a huge influence on the Empress, who did not have their own views on the development of the Russian Empire. Of course, favorites do not always pursue mercantile interests, sometimes guided by sincere feelings for the monarchy. How, for example, A.D. Menshikov – favorite of Peter I, who not only sought to realize personal interests, but also to work for the benefit of the state.

It should be noted that the modern historical science practically studying the phenomenon of favoritism itself. The most important may be assumed to be a modern Russian historian O.P. Volodkova "Favoritism XVIII century in Russia" [2, p. 47–64], where the example of well-known figures – Alexander Menshikov, E.I. Biron, Peter Shuvalov, A.I. Osterman, G.A. Potemkin, historian attempts to discover the essence of the phenomenon of favoritism. The same approach to the study of favoritism is characteristic of the work of other contemporary scholar I.V. Volkova [1, p. 327–377]. Both researchers determined favoritism through a link personality and power. They conclude that the favorite, thanks to personal connections with the sovereign, receives a portion of its power. In particular, Volodkov O. P. connects the phenomenon of favoritism to the evolution of absolutism and the approval in the economic life of Russia signs of a market economy. The historian says that "favoritism, opportunism, etc. go hand in hand with selfish aspirations, they are based on not only the satisfaction of any particular claim, but also a certain economic interest" [2, p. 47– 64]. O.P. Volodkov does not exclude, in general, the progressive influence of individuals in the history of Russia.

In a study of favoritism is not less important is the work of another well-known contemporary Russian historian – I.V. Kurukin [3]. Historian links appearance following the strengthening of the Institute of the sovereign power in the second half of the XVII century, namely: "At first the Romanovs favoritism in Russia was impossible. Firstly, a new dynasty, not got stronger after the great Troubles, at least until the middle of the XVII century was under the tutelage of heavy Zemsky Sobor, gathered more or less regularly. Secondly, it existed until

1682 archaic system of localism greatly limited the arbitrariness of the king in the appointment of the administrative and military command posts. When in the second half of the century strengthened the autocracy, the emperor began to appear influential advisers-favorites" [3].

Compare the favorite with ordinary civil servants. The results of the comparison are: becoming a favorite, as a rule, violating the principles of ordinary military service, but at the same time he was a favorite of the principle of operation of the absolutist state. A civil servant – a man who has reached a certain position, having passed all the stages prescribed in the "Table of Ranks" receiving nationwide solutions in virtue of their office.

Thus, the favorite – is a type of "random person". However, not every random person could make a brilliant career in the public service in the first half of XVIII century., So we can conclude that a career is following or "nobles in the case" was formed not only due to its proximity to the emperor, but because of their personal qualities, and possibly to certain talents. Characterized "noble in the case", first of all, that an ordinary person becomes a senior official accident, bypassing all the steps of the career ladder. It should be noted that the nobles have a huge impact on the rulers in exchange for the considerable fee. However, the fate of the nobles is relatively short – the reign of the Emperor; and then there are new favorites from the new head of state. Also note that the "noble in the case of" domestic, ie "His", (as, for example, A.D. Menshikov) did not cause resentment on the part of the public, as opposed to a foreign nobleman (such as E.I. Biron), as the latter are not linked their fate with Russia, thinking only about how to quickly "get-away" from here. Biron – remained alien to Russian "nobleman in the case". And this fact is quite understandable, since Biron, being close to the Empress cared about replacing the Germans all the prominent places in the administration, what caused indignation of Russian officials. Man totally insignificant according to his abilities and wicked by nature, but a trusted favorite of Anne Biron interfered in all management matters, although he had no public opinion, no program of activities and the slightest acquaintance with the Russian way of life and people. Biron despised Russian and deliberately drove all Russian. The sole purpose of it was his own enrichment, only concern – the consolidation of its position in the court and in the state.

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