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## A VIEW CONCERNING THE PROBLEM OF TREATMENT AMONG PATIENTS WITH MECHANICAL JAUNDICE OF NONNEOPLASTIC GENESIS

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Retrospective analysis of 218 case histories of patients with mechanical jaundice of nonneoplastic genesis in the period from 2005 to 2009 was done. These patients were on the in-patient treatment (Krasnoyarsk station railway hospital (the first surgical department) and city clinical hospital (the first surgical department)). The comparative evaluations of economic effectiveness in according with duration of hospitalization and costs were revealed. The comparative analysis of data (two hospitals and literature sources) is available in the article.

**Keywords:** mechanical jaundice, cholangiolithiasis, endoscopic retrograde cholangiopancreatography, endoscopic papillosphincterotomy, retrospective analysis, economic effectiveness

One of the most difficult problems in the emergency management is the treatment of the patients with the abnormalities of bile outflow of the different etiology [1,3]. The main manifestation of these diseases is mechanical jaundice, which exist as a reason of the obstruction of bile ducts. The most often reasons of mechanical jaundice is cholangiolithias, tumorous destruction of the organs of the pancreatobiliary zone, cicatricial strictures of hepatobiliary tract [2].

The last decade is characterised by the significant heightening of the quantity of the patients with the gallstone disease. Naturally, the quantity of the patients with the mechanical jaundice as a reason of the gallstone disease is heightening [4].

Nowadays the actual researches are those, which are about perfection of the system of management the quality of the medical help, including the surgical help, what is conditioned by the existing negative tendencies, as followed: the low quality of the medical help in general, existing of the defects in accordance of the treatment-diagnostic process, the low level of introduction of the resource-saving technologies. This problem is the most actual today, with the deficit of financing and limited resources of the system of health care [6,9].

The treatment of the mechanical jaundice is the actual problem of the abdominal surgery. Though there is a great progress in the solving of this task the optimal surgery

tactics of the treatment of the diseases of the bile outflows, with the mechanical jaundice, is not defined so far and is being actively discussed in the scientific periodicals [5,7,8].

On the level of the rendering of the emergency help the main task of treatment is decompression of the bile's tract and it doesn't depend on the reasons of obstruction. During many decades the main way of decompression, have been the emergent surgical intervention. But operations, made on the level of jaundice and liver deficiency, especially treating the old patients, having the significant accompanying pathology are attended by the big quantity of complications and high lethality [10]. It is without doubt that today it is necessary to use sparing, less-invasive interventions for the solving the jaundice. Today for this reason are used the following methods: papillosphincterotomy, nasobiliary drainage, mechanical lithotripsy, balloon hydrodilatation, stenting of hepatobiliary tract. These interventions, liquidating the jaundice and cholangitis, not only let to prepare the patient to the planned intervention, but in many cases can be the alternative to the operative intervention [1,7].

That is why the aim of our research is to do the analysis of the structure of morbidity of the mechanical jaundice of the nonneoplastic genesis for the 2005-2009 years by the data of the first surgery of the Road clinical hospital of the station Krasnoyarsk and the first surgery of the City clinical hospital.

### Materials and Methods

Retrospective analysis of 218 medical histories of the patients with the mechanical jaundice of the nonneoplastic genesis for the period since 2005 to 2009, who are on the inpatient treatment in the surgery of the road (1 group) and City (2 group) clinical hospitals. From the research there were excluded the patients with the volume formation of the liver gate, the head of the pancreas, parasitological diseases of the liver. It was diagnosed on the base of complaints, anamnesis, clinic-laboratory data, results of the examination and ultrasound research. All the patients got the traditional therapy (spasmolitics, antibiotics, gemostatics, bloodchanging of the desintocical way).

Getting in the researches material was worked by the methods of statistic analysis, used in the biology and medicine and written in the instructions of Slavin (1989) and Lakin (1990). For all the data the average arith-

metical significance was defined (X), and the mistake of the average arithmetical significance (x). The estimation of the significance of the differences in the average significance was made with the use of the parametrical methods of the statistic analysis – t-criteria of Student. The critical level of Significance  $p < 0,05$ .

### Results and Discussion

The general quantity of the patients with the mechanical jaundice, entered the Road clinical hospital for the period since 2005 to 2009 is 71 patients. The most quantity of the patients was in 2008 year and amounted to 26,8% from the general quantity, the least – in 2009 – 8,5%. To the City hospital entered 147 patients for this period. The biggest quantity of them was in 2006 and amounted 22,5 % from the general quantity of the entered patients, the least – in 2009 – 17,7%, which is statistically significant ( $p > 0,01$ ), (Table 1).

**Table 1**

The results of 2 hospitals										
The year	All the patients				The average bed-day		The lethality			
	I		II		I	II	I		II	
	n	%	n	%			n	%	n	%
2005	16	22,5	31	21,1*	27,9±0,8	29,1±1,1	1	6,6	2	22,2
2006	15	21,1	33	22,5*	28,1±1,0	25,5±0,4	6	40,0	2	22,2*
2007	15	21,1	28	19,1*	28±0,8	28,3±0,9	2	13,2	3	33,4
2008	19	26,8	29	19,7*	20,6±0,5	24,1±0,5	5	33,3	2	22,2*
2009	6	8,5	26	17,7*	24,5±0,7	28,5±0,8	0	0	0	0

\* –  $P > 0,01$  the difference of result is true.

In the Road clinical hospital the dispersion of the patients by the sex sign showed that there were 69% of women and 31% of men. In the City clinical hospital there were 66% women and 34% men. So by this characteristic it does not differ significantly.

The age of the most of the patients with the mechanical jaundice varied from 18 to 80 years old. According to the data of the Road hospital in the researching period the most patients were 66 years old and older, less patients were from 17 to 36 years old. In the

City hospital the data is the same. On this sign the two hospitals do not differ much.

Success in the treatment and the most favourable forecast depends much on the in time help to the patient. That is why we paid attention to the factor of the entering of the patient to the hospital from the beginning of the disease. According to the data of the road hospital the maximum quantity of the patients 83,1% entered in patient department more than 24 hours after the beginning of the disease, earlier – 38,8 % and on the period of 6 hours – 12,9%. As for the season of mor-

bidity there were following differences. In the process of our research the high level of morbidity was defined in winter to the both hospitals. Especially in 2005 and 2008 years, in the Road hospital they were 43,8% and 48% accordingly and 41,9 % and 44,8% in the City hospital. They did not differ much on this sign.

In the last years in the treatment of holedoholithias with the opened methods endoscopic interventions are successfully used, for example, endoscopic retrograde cholangiopancreatography and endoscopic papillosphinterotomy, which are made under the ultrasound and X-ray-TV control. It is necessary to note, that for many patients these methods are only possible ways of treatment. Besides, this intervention lets solve the questions of the differential diagnostics of the jaundice and define the possibility to do radical operations.

Since 2005 to 2009 year in the first surgery department of the Road hospital there

were operated 70 patients with the mechanical jaundice, from who 43 patients were operated by the opened method (laparotomy, holedoholitomy, drainage of holedoh) and 27 operations were made by the endoscopic interventions. For the researched period of time in the City hospital all the patients with this diagnosis were operated, 112 from whom were operated by the opened method, and 35 – by the endoscopic interventions. There are no differences by this sign.

Economic estimation of the effectiveness of the treatment can be expressed in money equivalence, and in the others, and acceptable units, such as frequency of after operation difficulties, duration of the hospitalization, period of disability and others. Their estimation is necessary component in comparison of two different ways of operative interventions in treatment of one disease.

Medico-economical standards in those two hospitals were presented in the table 2.

**Table 2**

The disease	Bed-day	
	I	II
The lithyasis with endoscopic interventions	18	9
The lithyasis with laparotomy, holedoholitomy	25	18
Holedoholithyasis	38	37

The average bed-day of being of the patient in the inpatient department in the Road hospital –  $20,6 \pm 0,6$  –  $28,1 \pm 0,5$ , in the City hospital –  $20,3 \pm 0,7$  –  $32,7 \pm 0,9$ .

The duration of being of the patient in the hospital after the operations with different methods differed significantly. The average after operation bed-day after the biliodigestive anastomosis and drainage of the holedoh in the Road hospital was  $35,14 \pm 1,5$ , in the City hospital –  $35,79 \pm 1,7$ . After endoscopic interventions – in the Road hospital –  $7,08 \pm 0,5$  days, in the City hospital –  $8,01 \pm 0,7$ , there are no statistically significant differences.

For the estimation of the economical effectiveness of the different ways of the operative benefits there were cost the straight medical expenses: the cost of the operation, the cost of the after operation period. In the cost of the operation are included: the cost of the anesthesia, the expenses on the amortization of the equipment, personnel's wage, cost of the materials.

The cost of the endoscopic interventions in the Road hospital is 1637 roubles and 1903 roubles, if both are done – 3540 roubles.

Being in the hospital costs without the medical insurance – 1426, with it – 746 rou-



bles, if you want to be one in the room – 1798 roubles.

So, the general expenses for the patients with the mechanical jaundice is 26110 roubles, if they are treated by the traditional methods, and if by the endoscopic methods – 8762 roubles.

In the City hospital it will cost 16403 roubles with the traditional methods, and if the endoscopic interventions are done, it will cost 8350 roubles.

The open operations are more expensive and are characterized by the less effectiveness. The endoscopic methods are more effective, but they can be used not in all cases.

In the Road hospital there were no cases of the after operation lethality. The minimum after operation lethality was in 2005 – 1 patient, the maximum – in 2006 – 6 patients. In the 46,7 % of lethality the reasons were the liver deficiency. In the 33,3 % the reason was the two sided pneumonia.

In the City hospital in 2009 there were no lethality by this pathology. In 2005, 2006 and 2008 died 2 patients every year. In 2007 3 patients died. By this sign the hospitals don't differ much. The reasons of the lethality are the same, as in the Road hospital.

### Conclusions

So, according to the data of the surgery departments of the Road and City hospitals since 2005 to 2009 the quantity of the patients with the mechanical jaundice increased. The two-third of the patients were women, the most of them were 60 years old and older. Endoscopic methods of interven-

tion are more effective, but the use of them is limited by the cases.

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## Materials of Conferences

### INFLUENCE OF SEX DIFFERENCE ON THE PAIN CHARACTER AND TACTICS OF CURE

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According to World Health Organization, in the developed world, the pain on the scale of its dissemination is quite comparable to the pandemic. The pain - a subjective phenomenon, not amenable to any objective.

In particular emotions and tolerance of pain may be influenced by ethnic characteristics, demographic factors, age and sex. Current studies of the age and gender differences of perception of pain, is one of the new approaches to this problem (Averkin N.A., Filatova E.G., 2000; Adashinskaya G.A., 2003; Veyne A.M., 2006).

We researched 3 groups of patients with neurogenic (such as neuralgia facialis vera and trigeminal neuralgia), somatogenic (postoperative pain, pain due to joint inflammation, abdominal pain) and psychogenic painful syndromes (Tension headache, vertebral pains), low-back pain, myalgias and migraines. We researched the peculiarities of pain perception and the emotionally-affective relation to it (alarm level and level of depression) in these groups.

Methods of research: Scoring by Numerical Rating Scale (NRG) scale from 0 – «no pain» to 10 – «unbearable pain», Hamilton scale for alarm and depression valuation (HARS).

Results revealed that men have more anxiety disorders (7-8 points) in relation to an expressed painful syndrome (6-7 points). Women prevailed over the depressive component (10-12 points) and the level of pain perceived was insignificant (3-4 points). In 3 groups – by lowering the alarm level – it will lower the pain perception. By lowering the depressive component, the pain reactions became stronger in group of men; in the group of women, no reliable difference was observed.

A combination of pharmacotherapy (Analgetics, Anxiolytic and Antidepressants) led to registration of considerable lowering of the pain perception and improvement of emotional condition.

The work was submitted to International scientific conference «Fundamental and applied research in medicine», Sochi, September 22-25, 2010, came to the editorial office on 29.06.2010.

### THE FREQUENCY OF ASSOCIATED PATHOLOGY OF GASTROINTESTINAL TRACT OF THE PATIENTS WITH THE GASTROESOPHAGEAL REFLUX DISEASE

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**The aim of research:** to reveal the frequency of association of gastroesophageal reflux disease (GERD) with other diseases of gastrointestinal tract (GIT).

**Materials and methods:** there were examined 115 patients with the GERD, their average age were 42±7,6, from them 36 women and 76 men. The criterion of including to the research was the presence of nonerosive or erosive GERD. Patients went through the standard examination which includes fiberoptic esophagogastroduodenoscopy (EGD) with the morphological verification of diagnosis, radioscopy of esophagogastroduodenal region, ultrasonic research of abdominal organs (ultrasonic examination of abdominal organs), diagnosis of infection *Helicobacter pylori* (HP) was carried out by means of urease breath test and histobacterioscopic, the examination of bowel included lower gastrointestinal series and/or colonoscopy.

**Results:** It was established that in 90 cases (78,3%) GERD was combined with the chronic gastritis (CG). The structure of CG while the EGD occurred with the following way: 25 patients (27,8%) had the focal atrophic gastritis, 2 patients (2,2%) had the total atrophic gastritis, 42 patients (46,7%) had the catarrhal gastritis, 21 patients (23,3%) had the erosive gastritis. 35 patients (30,4%) had GERD associated with the ulcerous disease (UD), and in 33 cases (94,3%) there was diagnosed UD of duodenum, in 2 cases (5,7%) – UD of stomach. 75 patients (65,2%) had GERD combined with the chronic pancreatitis, 20 patients (17,4%) with the GERD had chronic cholecystitis, 30 patients (26,1%) with the GERD had chronic nonspecific colitis, 65 patients (56,5%) with the GERD had the infection *Helicobacter pylori*. Besides, in 30 cases (26,1%) GERD was associated with the hernia of esophageal opening of diaphragm, in 45 cases (50%) – with the *antro*-pyloric duodenal discoordination, in 40 cases (34,8%) – with the anomalies of form of gall bladder.



Conclusion: received facts demonstrate the most frequent associations of gastroesophageal reflux disease with the chronic gastritis and pancreatitis, helicobacteriosis, markers of undifferentiated dysplasia of connective tissue of gastrointestinal tract (the hernia of esophageal opening of diaphragm, *antro*-pyloric duodenal discoordination, anomaly of gall bladder form.

The work is submitted to Scientific Conference "The Problems of International Integration of Educational Standards", England (London) – France (Paris), 23 April -1 May, 2010. Came to the Editor's Office on 11.02.2010.

# **NEW COMPONENTS OF OPERATIVE THERAPY OF LUMBAR OSTEOCHONDROSIS**

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If excepting nonradical discal hernia excision and technical faults during surgery, then the main reason for pain syndrome relapse after operative therapy of lumbar osteochondrosis in 8,9% cases is relapse of hernia of the operated intervertebral disc. Eliminating the possibility of discal hernia relapse development, the result of operative therapy of lumbar osteochondrosis can be much better.

Taking into consideration the fact, the aim of our research is to work out a method of preventive treatment of pain syndrome relapse and technology of the obtained result estimation of operative therapy of lumbar osteochondrosis.

The essence of the method of preventive treatment of pain syndrome in operative therapy of lumbar osteochondrosis concludes in that during operation on lumbar intervertebral discs after excision of pathologically changed intervertebral disc, irrigation of the formed cavity and the remained in it not excised part of pulpal core is carried out with chondrolitin enzyme. As chondrolitin enzyme Caripazimum (35 PU saluted in 1ml of isotonic saline) is used, which is inserted into cavity of the operated intervertebral disc with the help of special device for irrigation of the operated intervertebral disc with chondrolitin enzyme. The irrigation is carried when a patient is prone and that prevents enzyme getting into epidural cavity. A patient stays in such position for an hour as the enzyme's activity longs 60 minutes. A patient may be raised to his feet after necrobiotic process is completed in 3-4 days.

In case of absence of the effect of using the suggested method in the nearest after-operation period (in rising a patient on his feet, that increases interdisk pressure) a pathologic situation appears in the form of falling out of not excised fragments or microparticles of the disc into artificially formed defect of posterior

longitudinal ligament into the field of spinal cord root. In this case compression or cicatrical- adhesive process around it may be caused. This data show the necessity of monitoring the efficiency of operative therapy of lumbar osteochondrosis by neurovisualization of lumbar spine in the nearest after-operation period after raising a patient on his feet.

This method was used in treating 72 patients with lumbar osteochondrosis. There were no complications during the operation or in after-operation period. There were no neurovisualization signs of relapse of hernia of the operated intervertebral disc or signs of epidural abscess development on the level of operated segment. Result of the operative therapy according to "Polyfactor estimation of the operation results in lumbar osteochondrosis" corresponded to "good".

The essence of the method of "Polyfactor estimation of the operation results in lumbar osteochondrosis" concludes in that clinical symptoms of lumbar osteochondrosis are conditioned by joint impact of a complex of different pathologic situations in the field of the nidus. Not eliminated components of the complex during the operation and errors of the operation predetermine clinical implications of the disease in after-operation period. Quantitative terms of the implications of the disease in before-operation and after-operation periods and their comparison become possible in quantitative terms of clinical implications of the disease, pathologic processes, conducting to implications of the disease.

To estimate the results of operative therapy of lumbar osteochondrosis we use individual card, which consists of sectors of pain syndrome intensity, neurologic, neurovisualization, electrophysiological implications of the disease and sector of possible complications of the operation. Post-event analysis of the data of complex check-up of patients with lumbar osteochondrosis and its comparison with clinical picture of 396 patients allowed determining quantity value of every neurologic symptom and pathologic sign, taking part in forming implications of the disease.

Using method of polyfactor estimation of the operation results in lumbar osteochondrosis allows detecting 3 result groups – good, no effect and unsatisfactory.

Taking into consideration the obtained data and the experience of the primary using of preventive treatment of pain syndrome relapse and estimation method of its efficiency in operation on lumbar intervertebral discs allows recommending the suggested methods (able to minimize the disease relapse in after-operation period) as new components of operative therapy of lumbar osteochondrosis.

The work is presented for an International Science Conference "Contemporary problems of experimental and clinical medicine", Thailand, February 20-28, 2010. Received by the editorship on 26.12.2009.

# **TRAUMATIC BRAIN INJURY: STRUCTURE, TACTICS OF OPERATIVE OPERATION (CLINICALLY-EXPERIMENTAL RESEARCH)**

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Traumatic brain injury (TBI) occurs in 30-35% of cases in the structure of traumatism. On its lot there are 75-80% of lethal terminations, and TBI is one of the most important reasons of disability of population. Last 2 centuries in Russia there is also observed the increase of number of cases of traumatism, particularly TBI. The prevalence of this phenomenon reaches 4 - 7,2 cases up to 1 000 of population in different regions [1]. Every year about the 70 thousands of adults and 17,6 thousands of children were considered to be invalids because of traumas of any localizations. While this in the general structure of traumatism to the part of abnormalities of CNS's functions it's a share of 30—40%, and in the structure of disability's reasons — 25—30% [2].

There were examined sick patients, who entered the neurosurgical department of municipal Belgorod clinical hospital №1 over 2004-2007 years inclusive. For the analysis of data were chosen medical carts of stationary sick patients with the serious form of TBI to whom there were giving an operative benefit. In the research there were taken laboratorial animals: rats of "Vistar" line (20 units), were separated on several groups: to the 15 of them there was carried out the resectional trepanation of skull in the right temporal region with the implantation of nanostructural titanic implant with the nanocrystalline hydroxylapatite coverage, and 5 of them were the control group (false operated). Histological preparation were tintured with hematoxylin and eosin and were researched in the light microscope «TOPIS-T» CETI. Bone lamella were pulled out with the implant and without supplementary treatment were examined and photographed in the raster electronic microscope Quanta 200 3D. The examination of bone tissue were carried out through 7, 14, 21 days.

Through the examined period were chosen 189 medical reports, from which to the part of men it's a share of 158 (83,6%) humans, women - 31 (16,4%). Patients were carried out 3 types of operative intervention: resectional trepanation of skull – 146 cases (77,3%), bone-plastic trepanation of skull with the moving of bone flap - 8 (4,2%). The prevalence of resectional trepanation of skull is conditioned by indications to the decompression of brain, and also by the presence of traumatic defects of bones of calvarium (linear and pressed fractures that make the fulfillment of bone-plastic trepanation of skull impossible). The presence of postoperational defect leads not only to the cosmetic inferiority but also to the development of posttrepanational syndrome: cephalgia, meteorolabil-

ity, hydrocephaly. The regress of all above-listed is observed after the restoration of skull's integrity. Therefore in the late postoperative period it's reasonable to carry out the plastic of bone defect. Thereby TBI holds its leadership between the injuries of other anatomico-physiological regions of body of humans. While this it has the huge socially-economic mean, because the majority of victims are reckoned among the capable of working population.

More currency is gain by the use of different materials for the implementation of plastic of posttrepanational defect [3,4]. Among the examined clinic cases in the capacity of materials for the cranioplasty were used osteobond - 10 (45,5%), titanium - 2 cases (9,0%) и autobone - 10 (45,5%).

It was revealed that operative treatment with the use of titanic implants with the calcium-phosphate covering from the nanocrystalline hydroxylapatite promotes better regeneration of bone tissue. While this there isn't observed the phenomenons of intoxication and development of nanopathology [5]. The use of innovative methods of allo transplantation makes possible the fast and automatic the healing of bone structures. Adequate leading of postoperational period is necessary condition of favourable outcome of consequences of TBI. It is supposed in the sequel the use of implants from the recreated nanomaterials.

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## **EMBRYONIC DEVELOPMENT OF INFERIOR VENA CAVA**

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Initiation of inferior vena cava (IVC) appears with embryo 5 mm length (4 weeks) as excrescence of vitelline- umbilical trunk. It unites sinusoids of caudate lobe of liver. 6 week embryos' IVC includes right

subcardinal vein. "Ascension" of growing kidneys at the 7<sup>th</sup> week into abdominal cavity is accompanied by fast pass of sacrocardinal and intersubcardinal anastomosis, mesocardinal veins – longitudinal vein anastomosis, connecting supracardinal (ascendant lumbar) and subcardinal veins, upper (paranephric) and lower (gonadal). Right parts of subcardinal and sacrocardinal sinuses, right lower mesocardinal vein compose IVC. Subcardinal sinus is divided into left renal vein (central part) and retroperitoneal lymphatic sac, sacrocardinal sinus – into left general iliac vein and subaortic sac. Left lower mesocardinal vein is switched off from the blood flow and turns into left lumbar trunks. Abdominal parts of postcardinal veins are reduced, chest parts become azygos and hemiazygos veins. Chest subcardinal veins are switched off from the blood flow and turn into two thoracic ducts. Thus, IVC is formed in the sub-basin of postcardinal veins involving hepatic sinusoids in the process of intensive growth of caudate lobe of liver, adrenals and kidneys, displacing mesonephros.

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#### CONSTRUCTION OF HUMAN CARDIOVASCULAR SYSTEM

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Cardiovascular system is formed as closed circular system of blood vessels with anastomoses and collaterals including lymphatics which are many in peripheral vascular bed. Undirect anastomoses (semishunts) are "connected up" tissues: together they organize metabolism between blood and tissues. Peripheral vascular bed, especially microcirculatory bed (MCB), in functional plan is the hydraulic reductor – the construction for reduction of blood flow (lymphatic bed as supplementary to veins drainage of organs begins in micro-districts of MCB) and blood pressure to level when metabolism between blood and tissues can take place (frequent branching of arteriae and arteriolae) and for constant blood pressure is preserved in MCB (frequent and different anastomoses on different levels of MCB organization). From the point of view cardiovascular system consists of pump (heart) and reductor (microvessels in connection with tissues), between them conduits stretched – pressure (aorta and its branches, venae cavae and their roots – closed system of blood circulation together with heart and MCB) and unpressure (lymphatic bed). Lymphatic bed beginning from its roots in micro-districts of MCB plays role of venous collaterals and develops from it in phylogenesis and ontogenesis by means of

reducing of connections with magistral vascular bed (pressure conduit) on gradient of blood pressure. In result lymphatic bed unloads venous bed by means of accumulation of surplus tissue fluid as lymph including large particles and cells which cannot penetrate through thickening walls of venous capillaries. Their basal membrane cuts off lymphatic collaterals.

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#### DEVELOPMENT OF CELL BIOMATRITS BASED ON HYALURONIC ACID

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Nowadays there a lot of researches of different organic and inorganic materials are done for the purpose of creating biocompatible matrices, at the base of which cells can be cultivate and transplant (including stem cells). The sphere of use of such materials is rather wide: implants of vitals; transplantation of cells; transdermal or implant systems with the controlled yield of bioactive substances. One of the key problems of creating of bioartificial organs and tissues is development of biodegrade three-dimensional matrices (bearers) for cells at the base of different chemical-biological complexes.

In the capacity of matrix materials there were researched a whole number of synthetic polymers [Robert Lanza,1997], such are polydioxanones, polylactides, polyglycolids [Spychkyna O.G.,2006; Shved U.A.,2006]; polyethers of bacteriological origin (polymer  $\beta$ -hydroxybutyric acid (polyoxibutyrate, POB), polymer of oxioctanoic acid and two-component copolymer of  $\beta$ -oxi-butyrate and  $\beta$ -oxivalerate (POB-co-POV) [Volova T.G.,2003]. But metabolization of these polymers leads to the formation of acids, which lower cell survival.

Use of natural polysaccharides (chitin and its derivative chitosan) in the capacity of biomatrices in cell technologies demonstrated its low effectiveness.

The most optimal base of cell biomatrix by the dates of many researchers is biopolymer – hyaluronic acid (HUA) [Brown T.J. et al.,1999; Burg KJL et al., 2000; Greco R.M. et al.,1998; Jia C. et al.,1998; Kuzuya M. et al.,2006; Livesey S. et al.,2004].

Hyaluronic acid, briefly (HUA) is long linear polysaccharide, which consists of repetitive disaccharide units N-acetyl-D-glucosamine and D-glucuronic acid. HUA has unique rheological qualities that allow polymer to make viscoelastic gel while its low concentrations. These physicochemical qualities with the biological compatibility and not immune origin of

molecule HUA create the basis for guarantying of cell adherence.

Nowadays in order to receive biomatrices at the base of hyaluronic acid there is used the method of chemical modification (cross-linking) – partial or full esterification of HUA by means of chemical reaction of carboxyl polymer group with the alcohol. According to this technology at the first stage stable ether compounds were received through cross-linking of hydroxyl groups. The second step draws synthesis of ether compounds, which were received by cross-linking through the carboxyl groups, into [Syaobyn Jao, Jane Freither, 2008].

But use of these technology requires special conditions of use of biomatrices and leads to their considerable rise in price.

We have the goal of development of biocompatible cell matrix at the base of polymer of hyalu-

ronic acid with the use of method of holographic photopolymerization.

For prevail there is planning to develop the technology of forming of side cross-link between linear subunits of hyaluronic acid with the help of ultraviolet radiation with the length of wave 246 nanometers, which is received with the help of laser (deep ultraviolet). Such technology will allow to receive the matrix template with the minimal stepping interference 100 nanometers. It is supposed that biomatrix received by this way will have optimal bioengineering qualities for the cell adherence, migration and mitotic activity.

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This work was represented at the international scientific conference “Innovativa technologies”, Thailand (Pattaya), the 21-28 of February 2010.

# THE INTERACTION IN THE SYSTEM MOTHER-PLACENTA-FETUS IN THE CONDITIONS OF EXOGENOUS INFLUENCE OF PLUMBUM

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In the model experiment was shown that introduction to the pregnant rats the acetate of plumbum in the dose of 45 mg/kg per day cause metastructure changes of placental barrier, which manifest themselves by refinement of cyto- and syncytiotrophoblast, vacuolization and clarification of cytoplasmic matrix, decomposition of mitochondrion, diminution of intercellular contacts between the cyto- and syncytiotrophoblast elements. Revealed abnormalities promote the appearance of placental insufficiency, which negatively affects at the development of posterities of white rats, at the forming of their liver and kidneys.

**Keywords:** white rats, the acetate of plumbum, placental barrier, metastructure, liver, kidneys

The aim of the work is the influence of acetate of plumbum to the metastructural reconstruction of placental barrier, morphological abnormalities of liver and kidneys of the white rats' posterities at the early postnatal ontogenesis. Received facts allow to make the assumption, that introduction to the pregnant rats the acetous plumbum in the dose of 45 mg/kg per day cause rather big metastructural changes of placental barrier, which are typical for the lead intoxication. Appearing changes cause the development of placental insufficiency, which negatively affects at the development of posterities of white rats, at the forming of their liver and kidneys.

The worsening of ecological situation nowadays is one of the main factors in the abnormalities of reproductive function of woman and the factor of risk for the baby's health [6]. Among the most dangerous anthropogenic polluters of environment the leading position is hold by plumbum and its compounds [2, 3, 4]. At the same time a lot of questions are still not clear, including morphofunctional changes of placenta while the influence of plumbum, which lead to the abnormalities in the development of fetus and newborn [1, 5]. Thereby the examination of maternal-fetus relations in the conditions of lead intoxication needs the comprehensive and system approach.

## Materials and methods

The experiment was carried out with the observance of principles of humanity that were stated at the directions of European

community (86/609/EEC) and the declaration of Helsinki and due to the demands of rules of carrying out the works using experimental animals.

In the experiment there participated 10 sexually matured pedigreeless white rats-females with the weight of 200,0-250,0 g. And their 10 young rats on the 30<sup>th</sup> day of postnatal period of development. The first group of animals (control) was compiled from: 5 female physiologically pregnant, 10 young rats at the 30<sup>th</sup> day of postnatal period of development. These group of animals was situated at the general routine of vivarium. The second group (experiment) was compiled from: 5 females, who from the moment of revealing of embryo of labyrinth (8<sup>th</sup> day of pregnancy) daily peroral got the acetate of plumbum in the dose of 45 mg/kg of body weight, 10 young rats at the 30<sup>th</sup> day of postnatal period of development. All rats were decapitated under the ether narcosis.

For the electronically microscopic research the pieces of placenta were fixed in the 2,5% solution of glutaraldehyde to the 0,1M phosphate buffer (pH=7,2). Fixation was carried out in the 1% solution of osmic acid to the 0,2M phosphate buffer (pH=7,2). The embedding of material was carried out to the compound epon-araldite. The contrast of ultrathin section was carried out with the uranyl acetate and the citrate of plumbum. Received material was looked through the electronic microscope ЭМ-125.



For the microscopical research the material was fixed with the 10% solution of neutral formalin, and after the dehydration was embedded into the paraffin. Sections were prepared with the thickness of 5 micrometers and were dyed with hematoxylin and eosin.

The definition of the substance of plumbum in the placenta, liver and kidneys was carried out with the method of atomic absorption spectrometry. The degree of development of posterity was valued by the changes of their mass.

Numerical results were worked up statically with the use of t-criterion of Student and pair correlated analysis.

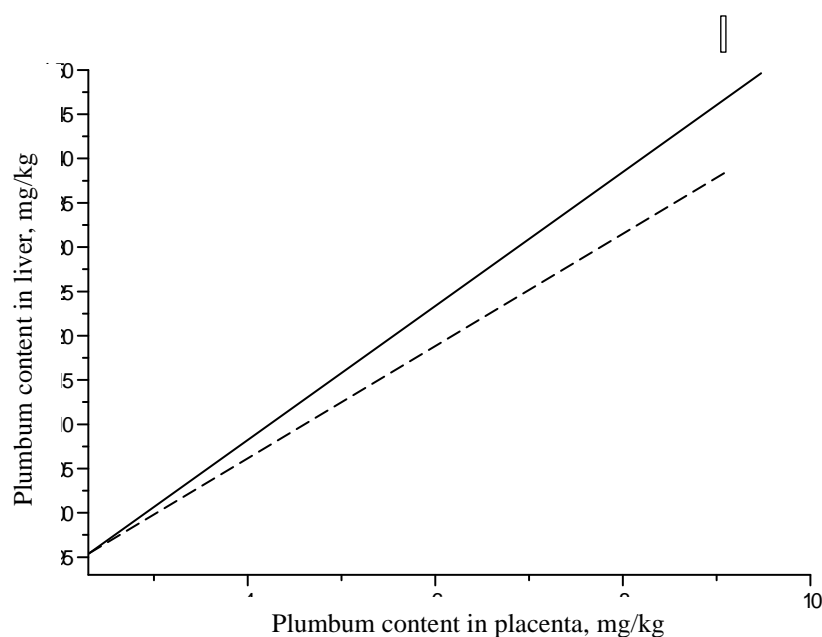
### Results and their discussion

Received with the help of atomic absorption spectrometry facts showed that in the control the substance of plumbum in the placenta of pregnant rats formed  $2,75 \pm 0,51$  mg/kg of natural weight, and in conditions of

lead intoxication –  $7,97 \pm 0,78$  mg/kg of natural weight ( $P \leq 0,002$ ), that 2,9 times more in compare with the intact animals.

30-days young rats of control group had the substance of plumbum in the liver  $0,95 \pm 0,069$  mg/kg of natural weight. The young rats of analogous age who had received acetous plumbum at the period of intrauterine development had the concentration of plumbum in the liver  $1,26 \pm 0,098$  mg/kg of natural weight ( $P \leq 0,05$ ), that 1,3 times more in compare with the control.

The substance of plumbum in the liver of 30-days young rats, which were born from rats with the physiological pregnancy, had very high affirmative correlation with its substance in the placentas. The coefficient of correlation was 0,731 ( $P < 0,05$ ). Young rats, mothers of which had taken the acetate of plumbum, had these affirmative dependence become stronger, and the coefficient of correlation was 0,828 ( $P < 0,01$ ) (fig. 1).



**Figure 1.** Correlation between the substance of plumbum in the placentas of rats and in the liver of their posterity at the 30<sup>th</sup> day of postnatal development

----- – control (physiological pregnancy),  
 ————— – experimental (lead intoxication of female)

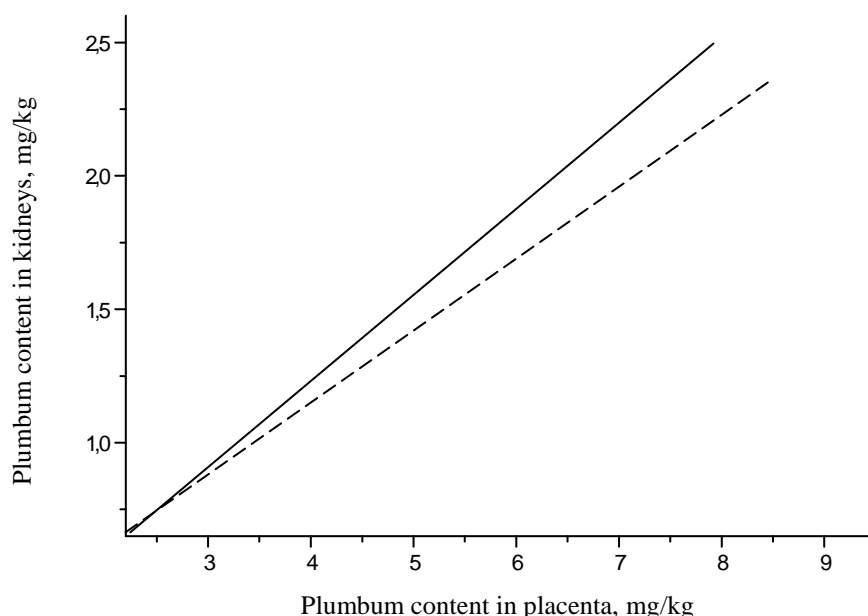
In the control in the kidneys of young rats the substance of plumbum was  $0,80 \pm 0,087$  mg/kg of natural weight, in the experiment –  $2,56 \pm 0,410$  mg/kg of natural



weight ( $P \leq 0,01$ ), what 3,2 times more in compare with the young rats, who was born by intact females.

The substance of plumbum in the kidneys of posterity, born by the rats with the physiologically pregnancy, also had high af-

firmative correlation with its substance in the placenta. The coefficient of correlation was 0,754 ( $P < 0,01$ ). Young rats, mothers of who had received the acetate of plumbum these dependence were more manifested and was 0,887 ( $P < 0,001$ ) (fig. 2).



**Figure 2.** Correlation dependence between the substance of plumbum in the placenta of rats and in the kidneys of their posterity at the 30<sup>th</sup> day of postnatal development

----- – control (physiological pregnancy),  
 ————— – experimental (lead intoxication of female)

The accumulation of plumbum in the organs of young rats of experiment group testify to its passing through the placenta from the mother's blood to the fetus. As the researches showed in the conditions of lead intoxication of mother organism the greatest occurrence of plumbum posterity has in the kidneys, what is connected with their high sorption activity.

Electronically-microscopic researches showed that daily introduction to the pregnant females of white rats the acetous plumbum in the dose of 45 mg/kg leads to the derangement of compensatory mechanisms of placental barrier, which is expressed by the refinement of the cyto- and syncytiotrophoblast, vacuolization and clarification of cytoplasmic matrix, decomposition of mito-

chondrion, diminution of intercellular contacts between the cyto- and syncytiotrophoblast elements. Against the background of edema and destruction of trophoblastic structures of labyrinth zone of placenta it was observed the presence of regions with the numerous osmiophil formations, apparently which were the deposits of plumbum.

Microscopical researches showed that 30-days young rats of experiment group had the plethoric tissues of liver, liver's beams are saved, but along the periphery from the central veins their structure is "diffused". In the same zones were observed hepatocytes with the powdered, in the same places atomized fat dystrophy. The form of hepatocytes is varyable, sometimes were found hypertrophied cells. The nucleuses of cells of round

shape, hyperchromic with the reticulate structure of chromatin. The cytoplasm is swelled, grainy nature, some places has single small transparent and semitransparent vacuoles. Intralobular sinusoid capillaries are insignificantly widen (edema), filled with serous liquid. The lumens of the majority of central and interlobular veins have the erythrocytes. It was observed the fibrosis of the central veins' walls. In the portal tracts were found the areas of ill-defined lymphohistiocytic infiltration.

In the kidneys of 30-days young rats of experiment group was found the abnormality of nephritic haemodynamics, dystrophically-moronic changes of epithelium of canaliculuses. There was observed the widening and hyperemia of vessels of cortex of kidney, the substance in them partially lacks erythrocytes. In the epithelium of nephritic canaliculuses was found necrobiosis and necrosis of separated groups of cells. The interfaces of other epitheliocytes are diffused. The nucleuses of these cells are of round shape, with the friable reticulate chromatin. In the some nucleuses are visible small hyperchromic grains – the mark of possible rexisis of nucleuses. In the lumen of certain nephritic canaliculus are founded transparent masses, possibly of hyaline. In the lumen of other canaliculus are found the accumulations of destroyed epithelial cells.

The observations of the development of the posterity of white rats showed, that the mass of young rats at the 30<sup>th</sup> day after birth while the physiological pregnancy was  $41,54 \pm 1,16$  g, and in conditions of lead intoxication –  $37,46 \pm 1,77$  g ( $P \leq 0,05$ ), that is 9,82 % less than control indicators.

### Conclusion

The results of research showed that the introduction to the pregnant rats the acetous plumbum at the dose of 45 mg/kg leads to the derangement of compensatory mechanisms

of placental barrier, cause in the liver and kidneys of posterity the hemomicrocirculatory abnormalities and dystrophic changes.

The decrease of the body weight of posterity of white rats apparently connected with that plumbum when it accumulates in the organisms of animals, demand the considerable expenditure of energy on its elimination, and also can be the result of abnormalities of metabolic, transport and other functions of learnt organs, which are extremely important for the guaranteeing of normal development of organism.

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## Materials of Conferences

**CHANGES OF LEFT VENTRICLE  
MYOCARDIUM STRUCTURE OF A RAT'S  
HYPERTROPHIC HEART INFLUENCED  
BY HYDRA'S PEPTIDIC MORPHOGEN**

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It is given that hydra's peptidic morphogen (HPM) in invertebrates organism is a growth hormone, and its role in mammal's organism is unclear. According to substituted data HPM is a tissue nonspecific regulator, stimulating some functions of organs in health and none. Aim of the research is studying of single dosing of HPM into different layers of rat's hypertrophic myocardium. The research is carried out with 9 Wistar rat-males 180-200 gr. HPM is from peptide synthesis laboratory of Institute of Experimental Cardiology of Russian Cardiology Research-and-Production Complex, IP injected in dose 20 mcg/kg of the body in the volume of 1 ml once after coarctation of aorta surgery. Control animals were injected normal saline solution, containing equimolar mixture of aminoacids. The surgery of dosed 50% abdominal aorta coarctation was carried out under Nembutal narcosis. In 10 days chest was opened, heart was perfused with 2% gluteraldehyde and then taken out. Tissue sheets were cut from the middle third of the left ventricle, fixated with 1% osmic acid, dehydrated with graded alcohols and embed in Epon resin. Semifine section, dyed in toluidine blue, was evaluated by 1350 times amplification, using morphometric reticle. Morphometric analysis did not show differences between series of operated animals that got and did not get injection of a mixture of aminoacids. There were determined volume fraction of myocytes  $V_v(m)$ , connective tissue  $V_v(ct)$  and capillary  $V_v(c)$ , surface of myocytes  $S(m)$  and capillary  $S(c)$ , surface density of myocytes per unit of surface of capillary  $S(m)/S(c)$ , surface of cardiac myocytes per unit of its volume  $S(m)/V_v(m)$ , volume of myocytes per volume of capillary  $V_v(m)/V_v(c)$ , and volume of capillary per volume of connective tissue  $V_v(c)/V_v(ct)$ . The average value of diameter of myocytes was calculated ( $\mu m$ ). PC 1640 "Amstrad" was used for statistical processing. Injection of HPM led to change zone decrease, marked in subendocardial layer and moved to ventricular cavity. With that myocyte vacuolization was decreased, and changed cores and abbreviated myocytes were detected rarer. No signs of structure failure were detected in other myocardium layers. Hydrops of subendocardial layer was less expressed than in control. Other myocardium layers did not show hydrops signs. Resetting of myocyte volume fraction was

marked in subendocardial layer when HPM injected. Myocyte surface was accurately decreased in comparison to control when average diameter of myocytes was increased. Content of connective tissue was decreased because of hydrop reduction, capillary apparent density came to N. Surface - volume data of myocytes came to normal level. Myocyte surface to capillary surface ratio was at control level. Myocyte volume to capillary volume ratio was decreased. When HPM injected more significant part of myocytes was observed in intramural layer of walls of the heart than in subendocardial layer. Average myocyte diameter did not change. Content of connective tissue was decreased because of tissue hydrop reduction. Capillary surface was comparable with the control one. Volume-surface characteristics of capillary in subendocardial and intramural layers of myocardium showed increased volume of blood flow. In subendocardial layer the HPM injection restored specific to normal balance between volume fraction of myocytes and connective tissue. Myocyte diameter was increased with that which shows their earlier involvement into hypertrophy process. Capillary surface and volume decrease showed their decrease of blood supply level in subepicardial layer. It is followed from the represented data that single HPM injection relieved the development of myocardium hypertrophy in subendocardial layer and in less extent in intramural and subepicardial layers, influencing all tissue components.

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**CONCEPTUAL MODEL OF STRESS-INDUCED  
DYNAMICS ACID-HEMOLYTIC STABILITY  
OF ERYTHROCYTE**

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The problem of the adaptation of living organisms to the continuously changing conditions of their environment, occupies one their visible places in the number of those, at which work the specialists of biomedical profile. As key component in the theory of adaptation comes out the concept of stress, created with G. Selye.

According to the contemporary ideas, stress (in man) – this is the typical pathologic process, at basis of which lies the prevailing in the course of evolution standard unspecific general adaptive reaction of the complete organism to the action of ultrapowerful stimulus or its threat, that is the result of integral interaction of the complex of reciprocal psycho-neuro-endocrine-immune and cellular-tissue factors and

mechanisms, which form the stress-realizing and stress-limiting systems, represented by the multilevel and multicomponent regulated totality of the structures, which function relatively antagonistically in the direction of mobilization and redistribution of energy and plastic resources for the purpose of the restoration of the disrupted homeostasis and increase in the local and overall adaptive possibilities of organism.

The process of adaptation is universal and, in spite of the variety of nosologic forms, it is logical to assume existence of general, fundamental regularities in a change in the properties of erythrocytes with the acute stress of any origin. In fact, in the works explores V.V. Novitskiy, N.V. Ryazantseva, E.A. Stepovaja and other are described the standard mechanisms of changes in the molecular organization of the membranes of erythrocytes, general for the very different pathology (tumor, vascular defeats, inflammatory processes, dismetabolies and the disease of dis-regulation, infection and intoxication, burn injury and postoperative period).

In the number of integral characteristics, which give idea about the system shifts in the organism, can prove to be one of the parameters of the system of erythron, which lies at the basis of the hemolytic durability of its cells and determined by the method of acidic erythrograms. This method was developed in its time as the method of hematologic studies for studying the changes in the properties erythrocytes with gemoblastoses, anemias and intoxications with the defeat of the system of the red blood. With the aid of it was evaluated the heterogeneity of erythrocytic population in the dependence on the age, since the acidic durability erythrocytes esides in all, and as the function of the age of erythrocytic cell.

The works, in which method of acidic erythrograms goal directed would adapt for the dynamic estimation of the course of the diseases of nongematological profile, which are accompanied by acute stress, in the accessible literature are not encountered. But those, in which it is used in conjunction with other methods out of the sphere of hematology, are not numerous, contradictory and bear the separate nature, that does not make it possible to obtain the integral idea about the stress-induced dynamics of the acid resistance of erythrocytes (ARE), its factors and mechanisms. In the pathophysiology as the method of studying specific hematologic and unspecific general organismal laws governing the acute stress in the early postaggressive period it also is not used.

The purpose of a study it was on the basis of the experimental and clinical data about the stress-induced dynamics of the hemolytic durability of erythrocytes to study the special features of the functioning of the system of erythron in the early postaggressive period from the positions of interaction of the adaptive systems of organism.

The experimental part of the work was carried out on the white rats, the mice, the dogs. ARE was

fixed with the following forms of acute stress: hypoxia, immobilization, operation, the injection of turpentine, acute coronary insufficiency, the magnetic storm, mechanical injury. ARE was determined to stressing, during it (in several series) immediately after, through 1, 2, 3, 6, 12, 24 hours and then every 24 hours for a period of 3-7 days (in a number of cases – for a period of 2-3 weeks) employing classical procedure.

In the clinical part of the work was used the blood of patients with the acute nongematological pathology or the aggravation of chronic (hypertensive crises and acute coronary insufficiency, stroke and craniocerebral injury, assault of bronchial asthma and pneumonia, pyelonephritis and renal colic, the fractures of the bones of extremities and postoperative period, hepatic colic and cholecystitis, ulcer and pancreatitis, acute thrombophlebitis and the gangrene of extremity). ARE was fixed during the day of rotation and then every 24 hours within a week. With the acute coronary insufficiency in man (unstable stenocardia, Q-positive and Q-negative myocardial infarction), besides ARE, was determined an also whole series of generalgematological and biochemical indices, then the analysis of functional interrelations was produced.

Statistical processing and graphic mapping of results was conducted with the use of standard programs of Microsoft Of Excel XP and batch of programs for the statistical analysis of Statistika 6.0. The authenticity of the differences between the groups was evaluated with the aid of the criteria of Student and Wilcoxon-Mann-Whitney. The quantitative expression of the similarity of the dynamics of indices was obtained with the aid of the correlation coefficient of Pirson.

Basic results are reduced to the following. In the first 1-3 hours from the moment of the action of stress factor proceeds a decrease ARE. The degree of this decrease is directly proportional to the force of stress-factor action. Then occurs increase ARE. On the maximum numbers it is held 24-48-72 hours, depending on gravity of stress. Its decrease occurs after this. The degree of a decrease, the degree of increase and the speed of recovery ARE to the initial values directly depends on gravity of stress, what is the expression of the stress factor of the effect of reaction dose-dependent from the value, according to the law of Wilder (Arndt-Shultz). A decrease ARE slows down with the appearance of complication, stops or again it appears its increase. With the unfavorable flow of basic pathologic process and the progressive loading of stress ARE steadily it increases up to the day of the loss of a patient or experimental animal. The fundamental difference in the stress-induced dynamics ARE with the enumerated pathologic processes and the states is absent, i.e., the discussion deals with its nosologic nonspecificity. Occurs the interspecies similarity of the trajectories of acidic-hemolytic erythrograms in the early postaggressive period, i.e., the discussion



deals also with the specific nonspecificity of the stress-induced dynamics ARE. Phase character remains, independent of floor and the age of patients. With the presence of complication and its successful treatment occurs daily shift in the dynamics ARE.

The highest positive correlation ARE is noted with components or indices of the work of the stress-realizing system or of the answer of acute phase (hydrocortisone, general cholesterol, LPL, sodium, calcium, glucose and glikogemoglobin, globulins, amylase, Alt and Ast, C-RP, fibrinogen, erythropoietin, the total quantity of leukocytes and neutrophils. In turn, the highest inverse correlation ARE is noted with components or indices of the work of the stress-limiting system (total protein, albumin, insulin, triiodothyronine, potassium, magnesium, the eosinophils and lymphocytes).

Is interesting the fact that in proportion to the loading of damage and degree of the manifestation of the coronarogenic stress and postaggressive reaction as a whole, is noted an increase in the portion of close couplings and by the decrease of the portion of weak bonds, correspondingly, with an increase in the generalized correlation coefficient.

The discovered regularities make it possible to make following conclusions.

1. The stress-induced dynamics of the hemolytic durability of erythrocytes both in the experiment and under the clinical conditions, bears phase nature, it does not have specific, sexual and nosologic specificity, which makes it possible to consider it as the standard reaction of the system of erythron to the un-specific damage in the organism.

2. The stress-induced dynamics of the hemolytic durability of erythrocytes has the specific temporary organization on the maximum numbers it is found on the elongation of 24-48-72 hours from the moment of the action of stress factor and depends on its force.

3. Temporary organization, phase nature and nonspecificity of the stress-induced dynamics of the hemolytic durability of erythrocytes are caused by temporary organization, phase nature and nonspecificity of stress reaction itself as interactions of stress-realizing and stress-limiting systems.

4. Predominance in interaction of the adaptive systems of the stress-realizing mechanisms in the initial stages of stress reaction is accompanied by reduction in the portion of low-steadfast forms as a result of their destruction and by total increase in the stability of erythrocytes to the acidic hemolysis. Roportion to reduction in the stress-realizing activity and increase in stress-limiting, occurs the recovery of acidic erythrograms to the original values.

5. With the complicated course of postaggressive period, independent of its nature, occurs the delay of a decrease or an increase in the hemolytic durability of erythrocytes. The favorable course of postaggressive period is accompanied only by daily shift (absence of a decrease) in the dynamics ARE. The unfavorable

course of postaggressive period, connected with the progression of basic pathologic process or complication, is characterized by a steady increase in the time of acidic hemolysis.

6. The coronarogenic stress is accompanied by strengthening the degree of the coupling of interaction between different systems of organism, which is manifested by the increase in the correlative connections between the acidic durability of erythrocytes and by other indices, in this case the positive correlation of the dynamics of the parameter is noted for the indices of the work of the stress-realizing system, and negative – for the indices of the stress-limiting system.

The carried out experimental and clinical experiments, and also the data analysis of literature, make it possible to as follows describe the conceptual model of changes ARE with the acute stress.

The action of stress factor leads to the activation of sympathoadrenal system and the ejection of catecholamines with the cerebral substance of the adrenal glands. Catecholamines strengthen free-radical processes, which leads to the damage of the membranes erythrocytes, and this is accompanied by the lysis of least resistance cells. In the remained cells the activity of antioxidant systems rises, and hypercatecholaminemia it is changed by hypercortisolemia, that renders the membranostabilistive action. Under the action of the hormones of stress is strengthened the lipolysis, which leads to the increase in the blood of the level of cholesterol and LPL, thanks to which in the membrane erythrocytes changes the spectrum of phospholipids – begin to predominate the difficultly oxidizable forms (sphingomyelins and cholinephosphatides), due to the cholesterol entering from the plasma of the blood of surplus. Catecholamines cause the generalisative vascular spasm, including and the arteries of kidneys. This leads to ischemia of nephritic tissue and strengthening of the formation of erythropoietin, which possesses the membranostabilistive activity. Under the action of the high concentrations of erythropoietin the erythropoiesis considerably is strengthened, and the younger cells of an erythroid number, which possess higher resistance, begin to enter into the blood. Furthermore, under the action of all these neurohumoral reactions is included the stress-erythropoiesis, result of which is the formation of the stress-erythrocytes, which have smaller sizes and deformability, but possessing anomalously high resistance. With the positive dynamics of stress the activity of the stress-realizing system is gradually decreased, but grows the activity of the stress-limiting system, that also leads to the opposite neurohumoral and metabolic shifts, which are correspondingly reflected in the dynamics ARE (it is lowered).

Thus, to the standard mechanisms of increase ARE with any stress can be attributed following: 1) destruction least resistance erythrocytes as a result of strengthening of the peroxide oxidation of the lipids of their membranes; 2) the output of the less ripe and in-

tact forms from the depot; 3) change in the relationship of different fractions of lipids, proteins, polysaccharides of the membranes erythrocytes, which leads to modulation of the activity of ferments and their complexes, fixed in the membrane or connected with it, and also to a change in its physical chemistry properties; 4) an increase in the antioxidant activity and stability erythrocytes (influence of its own and plasma factors, erythropoietin, glucocorticoids); 5) the stress-

stimulation of erythropoiesis with the formation of the stress-erythrocytes, which possess anomalously high resistance. The mechanisms of a decrease ARE with the stress are, apparently, connected with the oppositely directed processes.

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## STRENGTH PROPERTIES ESTIMATION OF FROZEN ROCKS BY LOGGING DATA

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Geological situation of the South-Yakutian coal-field is complex due to geocryological factors, e.g. overall development of insular permafrost.

Strength and indexes of permafrost rock are increasing for 30% at an average. Natural gamma-intensity  $I_\gamma$  does not undergo practical changes in the process of epigenetic transformation of rock and cryogenic processes. Consequently, gamma-ray logging data (GL) present the opportunity to evaluate argillaceousness and lithologic composition, which have dominating effect on strength property of rock.

The structure and texture characteristic properties of the section are being evaluated by the data of borehole gauging. Data of borehole diameter variation during the drilling process may be regarded integral characteristic of rock strength.

Using multimeasuring correlations between geophysic parameters  $I_\gamma$ ,  $\delta v$  and strength properties of rock  $\sigma_{cm}$  and  $\sigma_t$ , are being studied the strength properties of permafrosted coal-containing rock by the finding of logging.

**Keywords:** The South-Yakutian coal-field, coalbearing deposits, permafrost rock, strength, physical properties, elastic wave propagation velocity, electrical resistance, natural radioactivity, magnetic susceptibility, volume density, compression and tensile strength limits.

In conditions of application of modern highly mechanized mining and drifting complexes in construction and exploitation of coal mining industry pits, demands for studies of strength properties of rock have been increasing.

Studies of strength of rock by means of core testing laboratory methods have number of essential disadvantages.

1. Testing is being provided optionally on sections of discrete boreholes, e.g. over the optional network.

2. Being drilled, mechanically soft rock is breaking and it is hardly possible to extract core from them. As a result, for strength property analysis only those cores are being tested in laboratory, which happened to hold their shape sufficiently. It results in artificial increase of strength indexes of the section, while soft rock, bedding in roof and seam floor of coal seam, are considered the most important subject of the research.

In order to enhance the validity of strength prognosis of rock and efficiency of coal exploration in the conditions of permafrost rock, within the South-Yakutian coal field there have been used to special technique, defining the strength of permafrost rock due to their natural state.

The South-Yakutian coal-field is the main base of coking coal in the East of Russia. The area of coal field within the borders of development of mezozoic coal bearing deposits constitutes 26 thousand square kilometers.

Coalbearing deposits are being presented by monotonic considerably transformed aleuro-sand rock, which is referred, according to petrophysical classification of professor V.V.Grechukhin, to VIII - XI stages of coal bearing deposit transformation [1].

Geological situation of the field is complex due to geocryological factors, e.g. overall development of insular permafrost. Permafrost rock have intermittent spread by area and entire spread by vertical. The thickness of permafrosted rock varies from the first meters up to 200 meters.

In general, there is a range of the temperature variation of permafrost rock from  $0^\circ\text{C}$  to  $-4^\circ\text{C}$  within present coal field. Permafrosted seams with temperature from  $0^\circ\text{C}$  to  $-2^\circ\text{C}$  are widespread. The thickness of seasonal frost penetration varies from 1.5-2 meters.

Strength, as well as physical properties have been formed under the influence of both

groups of factors: primary (genetic) and secondary process of rock transformation.

There is a number of factors attributed to the primary factors: material and grain-size analysis, texture, structure, primary material attribution, type and composition of cement, organic impurities [1].

By the feature of material composition coalbearing rock can be divided into clay, carbonate and fragmental rocks. Of all these rocks, clay rock have the lowest strength properties, while carbonate rock and silicified fragmental rock have the highest strength index.

Strength properties of rock are being considerably affected by the cement of this rock. Rocks with carbonate cement or secondary silicification are specified by high index strength properties. Increase of clay cement content in rock is accompanied by decrease in strength properties.

Structure and texture characteristic properties of rock have considerable effect on strength of rock. Usually thin lamination of rocks reduces their strength, especially if there are interlayers of coal argillite. There is an increase in jointing of thin laminated rock, which evokes additional reduction of rock strength [2, 4].

The secondary factors affecting rock strength are processes of diagenesis, epigenesis and metagenesis appearing under the affect of overlapping rock mass pressure and temperature, determined by geothermal gradient and particular paleodepth [1].

With submersion of rock the density increase and porosity decrease take place, accompanied by increase of volume density, elastic wave propagation velocity, increase of strength and deformation properties. These kinds of transformation are irreversible. Therefore, physical and chemical properties of rocks are being specified by the indexes attained at maximum pressure and temperature values, i.e. at the maximum depth of their submersion. Subsequent raise of rock do not cause changes in physical and chemical properties. Established associations and mechanisms become violated in zones with

widespread permafrost rock. In comparison with those of thawed rock, strength and elasticity indexes of permafrost rock are increasing by 30% on an average. The difference of physical properties between different lithologic types of permafrost enclosing rocks and coal is considerably reducing. Cryogenic processes do not influence volume density and magnetic susceptibility. Natural gamma-intensity  $I_\gamma$  does not undergo practical changes in the process of epigenetic transformation of rock and cryogenic processes, while the rest of the mentioned parameters (Table 1) are changing.

Consequently, gamma-ray logging data (GL) present the opportunity to evaluate argillaceousness and lithologic composition, which have dominating effect on strength property of particular rock that constitute sections of boreholes in permafrost rock.

For more precise definition of lithologic composition and zones of broken rock, there is a logging of magnetic susceptibility to be used (LMS), as far as magnetic susceptibility of rock is not affected by cryogenic processes [3].

The structure and texture characteristic properties of the section are being evaluated by the data of borehole gauging. Data of borehole diameter variation during the drilling process may be regarded as an integral characteristic of rock strength.

By the feature of borehole diameter variation during drilling, coalbearing rocks can be divided into two types.

Attributed to the first type are those rocks( dense carbonate sandstone, conglomerate, silicified sandstone), where borehole diameter practically does not deviate from rated .

Attributed to the second type are most of rock (bituminous coal, argillite, argillaceous sandstone), which being drilled through collapse boreholes , diameters increase by 1.3-1.8 times, and there are cavities formed on some borehole intervals with virtual diameter  $\delta v$ , that is exceeding rated borehole diameter 2-3 times.

Table 1

Average values of physical and mechanical properties of the frozen rock  
in the South-Yakutian coal field ( Elga's coal deposit)

Phys.- mech. Properties	Coarse grained sandstone		Medium grained sandstone		Fine drained sandstone		Aleurolits		Coal A <sup>d</sup> = 15% ab- solute	
	thaw- ed	perma- frosted	thaw- ed	perma- frosted	thaw- ed	perma- frosted	thaw- ed	perma- frosted	thaw- ed	perma- frosted
V <sub>p</sub> , m/s	4100	5000	4570	5200	4700	5600	2850	4500	2200	3500
ρ, Ωm	750	4950	450	2930	275	1520	150	1200	7500	9000
I <sub>γ</sub> , pA/kg	0.5	0.5	0.72	0.72	0.86	0.86	1.08	1.08	0.36	0.36
χ × 10 <sup>-5</sup> unit CI	8	8	12	12	18	18	38	38	3	3
δv, g/sm <sup>3</sup>	2.45	2.45	2.58	2.58	2.63	2.62	2.61	2.61	1.37	1.37
σ <sub>cm</sub> , mPa	57	79	65	87	72	91.3	50	72	-	-
σ <sub>t</sub> , mPa	6.3	9.2	7.8	11.0	10.3	12.1	6.7	9.9	-	-

Note: thawed -t > 0<sup>0</sup> C, permafrosted 0<sup>0</sup> > t > -4<sup>0</sup>C, elastic wave propagation velocity, ρ - electrical resistance, I<sub>γ</sub> - natural radioactivity, χ - magnetic susceptibility, δv - volume density, σ<sub>cm</sub>, σ<sub>t</sub> - compression and tensile strength limits.

Therefore, relationship of borehole diameter variation with the lithologic composition of rock in the drilling process is to be observed.

From the borehole gauging data analysis, it follows that with the identical conditions of drilling there is an extension of borehole diameter to be observed: a) with the increase of organic impurity content in rock; b) with the increase of argillaceous cement content; c) with the decrease of carbonate cement content, all these factors are being effected on gamma-ray logging diagram by increase or decrease of natural gamma γ - intensity.

With the same conditions, there is a change of uniaxial compression strength σ<sub>cm</sub> and uniaxial tensile strength σ<sub>t</sub> to take place.

Therefore, variation of natural radioactivity of rocks and borehole diameter depend on rock strength, and utilizing multimeasuring correlations between geophysic parameters I<sub>γ</sub>, δv and strength properties of rock σ<sub>cm</sub> and σ<sub>t</sub>, it gives the possibility to study with certain precision the strength properties of permafrosted coalcontaining rock by the finding of logging.

For the approximating function the following exponential function is to be chosen:

$$y_i = \sum_{i=n}^n C_i \cdot 10^{a_{i0} + a_{i1}x_{i1} + a_{i2}x_{i2} \dots} \quad (1)$$

where y<sub>i</sub> - one of the strength parameters;

x<sub>i1</sub>, x<sub>i2</sub> - geophysic parameters;

a<sub>i0</sub> - a<sub>i2</sub> - polynomial coefficient;

Type of the function (1) has been chosen on the basis of regression analysis of strength parameters of different lithologic types. Coefficients of the equation (1) for the definite coal field are being calculated by the method of least squares, with utilization of

particular ultimate strength values obtained in laboratory by core testing.

Thus, for Elga coal deposit there are following equations of evaluation σ<sub>cm</sub> and σ<sub>t</sub> of permafrosted coal rock:

$$\sigma_{cm} = 0.4605 \times 10^{\frac{4.1 - d_y - 0.5\Delta H^{0.63}}{d_r}} + 0.4605 \times 10^{-2.3\Delta I_y + 3.1} \quad (2)$$

$$\sigma_{cm} = 0.5 \times 10^{\frac{3.1 - d_y - 0.5\Delta H^{0.63}}{d_r}} + 0.5 \times 10^{-2.3\Delta I_y + 2.1} \quad (3)$$

where  $\Delta H$ - difference between borehole depth and depth of virtual measurement being conducted.

$I_r$  - normalized value of natural radioactivity, in relative units;

$\delta_r, \delta_v$  - rated and virtual borehole diameters

Reliability of evaluation of strength by logging finding was checked by being compared with the results of laboratory core testing.

There is percentage root-mean-square error of strength property evaluation: for  $\sigma_{cm}$  -  $\delta = 13\%$ , for  $\sigma_t$  -  $\sigma = 11\%$ .

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## THE EDUCATION NEW STATE STANDARD AND THE CHILD'S RIGHTS ENSURING FOR THE QUALITATIVE EDUCATION

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The ethno – cultural education has been declared, as the considerable, the social, and the educational challenge, which is being considered, as the human rights and the nations' possibilities realization field in the national Russian regions. «The Content Ethno – Pedagogization and the Education Technologies Model» has already been developed by the creative staff of the Pedagogical Institute of the Yakut State University. The teaching and the education ethno – cultural technologies application program, having developed with due regard for the consumers wishes, will be claimed in the regional education system. All the given technologies, separately, have already passed the wide approval in the Sakha Republic (Yakutia) schools. The teaching collective method technology, which is being created the rational and the efficient conditions for the universal competences, the general educational abilities and the skills formation, having promoted the self – developing personality upbringing, is one from the most efficient and the perspective one from the recommended ones, in connection with the transition for the FSTSs.

**Keywords:** technologies, teaching, upbringing, personality, ethno – pedagogics

The Russian Federation formation national doctrine (e.g. 2000) has already defined «the Russian peoples ethnic and the cultural – nationally originality and the unique identity, their cultures humanistic traditions preservation and the support», as one from the State's main tasks.

Thus, the most significant education tasks have already been formulated in the Russian education modernization Conception for the period up to the 2010 year: the civil responsibility and the legal self – consciousness, the spirituality and the culture, the initiative, the independence, the tolerance, the ability to the successful socialization in the society and to the active adaptivity on the labor market schoolchildren's formation. All these and the same tasks have already been designated in the development State program Conception of the Sakha Republic (Yakutia) formation for 2007–2011 –es. The RF Constitution regulations (e.g. the Articles: 1, 2, 13, 29, 43, 44, 45) and the RC (Ya) Constitution (e.g. the Articles: 22, 32, 34, 42, 46), having guaranteed the rights to the ethno – cultural originality and the unique identity reproduction, to the mother tongue teaching, to the conditions creation for the mother tongue, the national cultures and the originality and the unique identity preservation and the development provision are being confirmed in all these documents.

Thus, the ethno – cultural education has been declared, as the significant social and the educational challenge, which is being considered, as the human rights and the peoples' possibilities realization field.

The ethno – pedagogics, as of its right, is being recognized by the national salvation pedagogics, having presented the poly – cultural education basis under the cultures dialogues conditions. Exactly, on the one hand, «the human individual consciousness formation is being taken its place, and he defines his place in the already existing picture of the world» [1, the Article 17], but, on the other hand, «the plurality and the tolerance regulations preservation and the improvement» [1, the Article 18] are being taken their place under the regional ethnic culture influence.

«The Content Ethno – Pedagogization and the Education Technologies Model» has been developed by the creative staff of the Pedagogical Institute of the Yakut State University. This project realization, to our mind, will be allowed to be reached the following results, having needed in the education contemporary standards:

- «Our New School» program regulations realization (e.g. D.A. Medvedev);
- each school and every teacher will become good (e.g. A.A. Fursenko);
- the spiritual, the creatively self – developing and the tolerant to all the other cul-



tures personality upbringing, who is quite able to be worked in the commands;

– the high level achievement of the general – cultural, the personal – social competences, the high quality knowledge, the general and the occupational education level rise, as in the separately taken educational Institution, well as in the whole educational system.

In this connection, the teacher personality role is being constantly increased, as well as the demands to his professionalism are being constantly increased. We have found out the significant methodological explanation of the teacher personality role, as the teaching process subject at the Academician G.N. Volkov: «It is quite impossible to be appeared without any knowledge at the loved ones. It is quite impossible to be mad, dirty, lazy, oppressed, scared, and envious... It is quite impossible to be the manipulated person» [2, the Article 181]. Not only the deep psychological demands to the teacher's personality, but and the new educating teaching vision have already been reflected in this small moral code: the classical didactics is quite able to become the contemporary one only in the unity with the life, the pupils' social and the cultural environment. The main idea is being contained in this short and the clear statement on the fact that the only deeply moral man, having sincerely loved the children, his homeland and the state, having freed from any stereotypes and, above all, – he, having respected the peoples' customs and the traditions, is quite able to teach and to bring up the pupils. For all this, he has to be able to teach and, simultaneously, to bring up in the integrated process: as by the main content, well as by the teaching technologies, and, moreover, by his example.

The educating teaching methodology, inherent in all the peoples and the ethnoses, has already been reflected in the interethnic harmony Model by G.N. Volkov: the minimum – program – is the interethnic consent, the optimum – program – is the international solidarity, the maximum – program – is the international harmony reliably functioning

ethno – pedagogical model creation. At the same time, we hope, that the developed, with due regard for the consumers' wishes, the teaching and the education ethno – cultural technologies use program will be demanded in the regional education system.

The intercultural harmony ethno – pedagogical model development necessity has been caused by the following contradictions in the contemporary educational situation: the teaching and the curricular material content widening, the insufficiently efficient teaching technologies; the school orientation for the teaching function and, consequently, the teaching process vast educational possibilities ignorance; the pupils' abilities natural potential and the school life limited atmosphere; the interactive learning technology vast possibilities in the pupils' socialization and its restricted application in the practical learning; the society needs in the rising and the coming generation familiarization with the general – national and the universal values, with the nation's national culture and the traditions, and the teachers' insufficient preparation and their training for the teaching and the educational process ethno – pedagogization.

The ethno – cultural education is the Russian state education organic constituent part, as the poly – ethnic country, the multi – dimensional socio – cultural and the organizational – pedagogically phenomenon, having based on the activity, which is directed at the ethno – cultural values creative mastering (e.g. the language and the literature, the history and the cultures, the peoples' spiritual heritage). So, the continuous ethno – cultural education technologies introduction is quite necessary at the general and the vocational education all the levels, in the family and in the Sakha Republic (e.g. Yakutia) peoples vital and the life activity social sphere.

This project's aim is the following:

– the learning self – developing and the harmonious personality upbringing, as the ethnos subject and the multiethnic state citizen in the activity of the continuous self – perfection in the small staffs.



The ethno – pedagogical model is being based on the following principles:

- the national upbringing role rise, as the young man psychical and the moral preparedness and the readiness formation mechanism to live in the quickly changeable world;
- the teaching value – informationally field dialogicality, having based on the respect to the trainee's position;
- the education humanitarian nucleus widening, by means of the Russian culture moral – spiritually potential inclusion into the educational process.

The given education model is being applied the completely approved solutions and the corresponding procedures:

- a) the pedagogical process maximum approaching to the population's life;
- b) the school subjects content enrichment by the local history material;
- c) the teaching technologies perfection, having taken into the consideration the children's ethno – psychological peculiarities and the specific features (3);
- d) the teaching and the upbringing at the mother tongue.

It goes without saying, the upbringing does not substitute the extra – study educational work in the in the educational process, on the contrary, it repeatedly intensifies its efficiency.

As the obtained experience has been shown, the most efficient technologies of the project realization are the following:

- the interactive learning and the interactive upbringing technology, or the collective teaching method (CTM);
- the «Satabyl» (e.g. «The Skills and the Abilities Formation») efficient technology;
- the familiarization technologies to the aesthetics and the healthy way of the living.

The teacher is making the educational space in the interactive learning process, where each personality is carrying out the learning and the trainer, that it is promoted his the quickest adaptation in the staff. The learnings' all the essential forces and the

abilities harmonious development, their mental and the intellectual, the spiritual – morally, the volitional – emotionally and the activity spheres are being taken its place in such activity process (4). The given technology introduction is being created the rational and the efficient conditions for the universal competences, the general study abilities, the skills and the habits formation, having promoted the self – developing personality upbringing and the education.

The «Satabyl» efficient technology, as the human activity methods development pedagogical instruments, is being presented itself the moral – spiritually and the labor upbringing and the education integration (5). The given proper economy management has been achieved under the Northern severe conditions, owing to the people activity qualitative and the universal methods development special experience accumulation. The given technology is being promoted the patriot's qualities formation, in the full measure, as it is closely connected with the Yakutia peoples' life and the labor tradition.

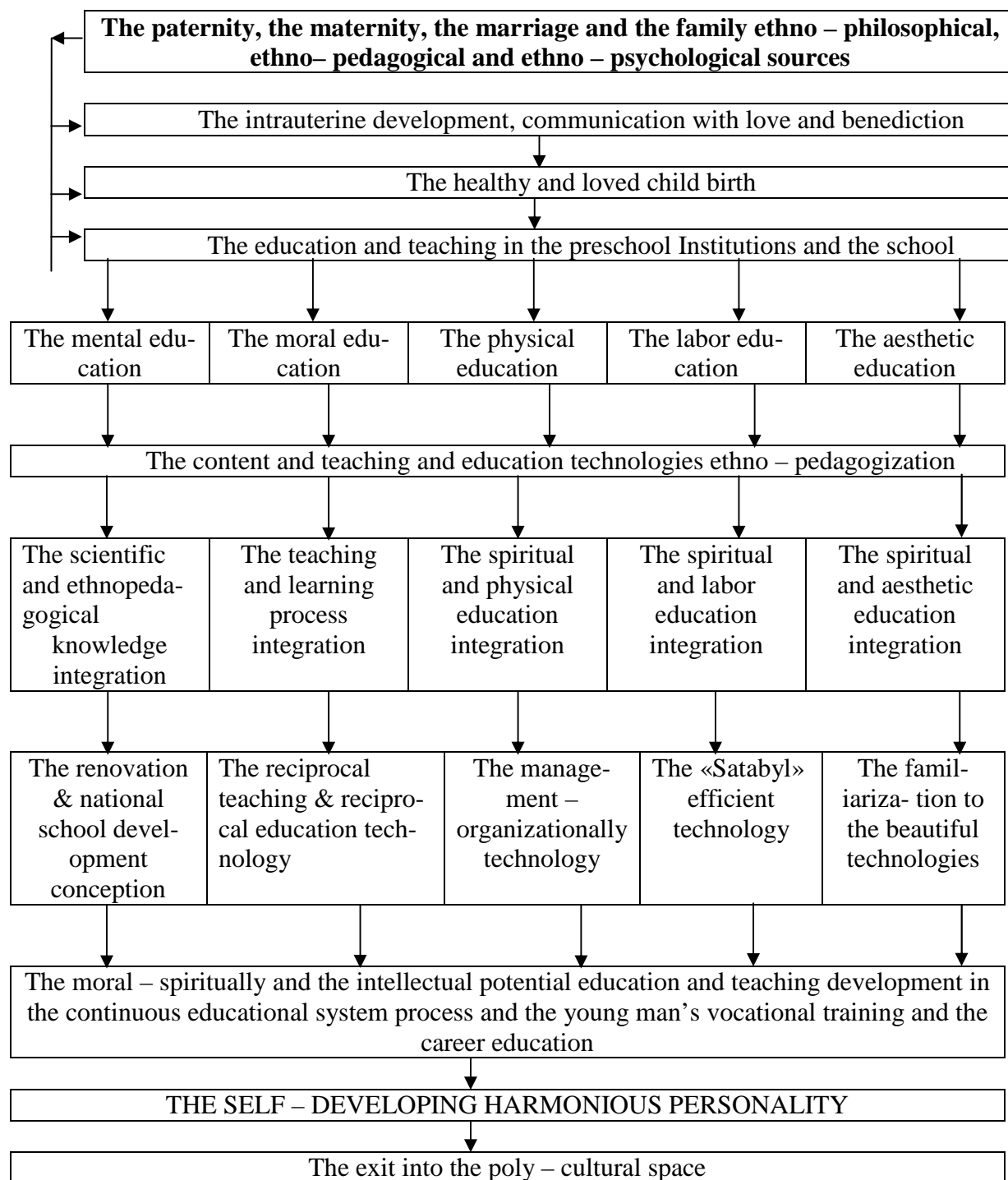
The familiarization technologies to the aesthetics and the healthy way of the living are being directed at the personality's highest necessities formation and the development, the spiritual renovation on the basis of the traditions, the native land culture, and also the universal values. At present, the moral – spiritually enthusiasm, the spiritual symbols canonization, the world's ethnic picture aesthetic consciousness process is being proceeded on in the Sakha Republic (e.g. Yakutia). For all this, the way to the universe cultural code of the beautiful perception has already been opened up.

So, the national, and the original culture, having interspersed with all the life spheres and the human activity, is being exerted the influence upon it through its forms and the types, having brought up and having formed it, from the ethics, aesthetics, and the moral point of view. The aesthetic education is being carried out, by means of the communication with the art, the human inclusion into the beautiful, the elevated creation in all

the life spheres. The Yakutian peoples' spiritual symbols are being based upon the environmental nature eastheticism, having al-

ready become the human nature humanization source (6).

### The Content Ethno – Pedagogization and the Teaching and Education Technologies Model



The healthy – developmental technologies are being rendered the integral humanistic influence upon the personality, upon the physically healthy, the enriched spiritually personality, by means of the familiarization to the physical culture studies and the sport, including to the national types of the sport (7).

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## BASIC TENDENCIES AT THE MODERNIZATION OF PROFESSIONAL-PEDAGOGICAL EDUCATION IN GERMANY

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In this article there were represented the results of reforming of German system of preparation of pedagogical personnel subject to conditions of Bolognese process. There were revealed base tendencies at the development of modern pedagogical education in Germany. There was drawn a conclusion to the effect that realized domestic and all-European measures, which are directed to the improvement of the system of preparation of students have one market selectivity that consist in rising of the quality of preparation of specialists and creation of more favorable conditions for their professional and personality development.

**Keywords:** Bolognese process, pedagogical education, preparation of teachers in Germany, tendency, The Conference of Ministers of Cultural Affairs (CMC).

The research of the problem of preparation of pedagogical personnel in Germany allowed revealing base perspective directions of development of German pedagogical education in conditions of Bolognese process.

One of the leading tendencies of development of pedagogical education in German is the search for optimal correlation between centralized and decentralized government of the system of institution of higher education that carry out preparation of pedagogical personnel.

Germany is the federative state that includes in its structure 16 lands, which are its subjects. According to the constitution the competences at the sphere of realization of state powers and carrying out the state tasks are distributed among the federal center and subjects. Federal lands have special privileges, the sovereignty at the sphere of culture (kulturhoheit). That means that the solving of the educational problems, science and culture mainly concern to the competence of lands. Federal lands have the right of lawmaking at the sphere of school, high education, education of adults and at the sphere of rising the qualification. Therefore the reception of legislative acts and direction of education mainly concern to the sphere of competence of lands. Such decentralization of direction of educational system of German, on one hand ensures variety, competitive and allows orienting at the decision of local problems, and force to maximally take into consideration the peculiarities of federation's subjects and to organize the process of preparation of spe-

cialists according to their concrete necessities, but on the other hand causes the big number of differences at the educational system.

Over the last decades the federation in their representors at the different structural institutes has broadened their rights and competencies at the sphere of professional education and scientific researches. This searched out legislative confirmation at the different articles of constitution. The manifestation of attempt to find optimal correlation between the centralization and decentralization of direction of pedagogical education in Germany is the development by CMC the federal lands of the standard of content of pedagogical education by the subjects of pedagogical cycle. In spite of that fact that this standard has recommendation character, it is the principle guideline for ministries and educational institutes of federal lands. The meaning of this document is that it allows formulating the goals and tasks of pedagogical education, which should be carried out at the process of preparation of teachers. In addition it creates the base for the verification of the level of progress of these goals and simultaneously values the quality of carrying out the assigned task. By the ministries of Culture of federal lands there was taken an attempt with the help of this standard to ensure, to rise the control of quality of pedagogical education and to coordinate the activity of institutes of higher education by the preparation of pedagogical personnel. Other manifestation of this tendency is the recep-

tion by C.M.C. of federal lands the agreement of preparation and attestation of teachers in Germany, which became the base for the agreement "About mutual recognition of documents about teachers' education"[1].

One of the peculiarities of preparation of teachers in Germany is that fact that the specialization of teachers is carrying out not only according to teach subjects, but also to type of school. As school educational in Germany is the business of federal lands, then each of them has the right to organize the preparation of teachers of different specialization according to the type of school that have places at this territory. Therefore that the accepted agreement ensures the defined unity and comparability of the systems of qualifications of teachers, CMC singled out 6 types of specialization of pedagogical personnel that received the recognition federally. Besides this, the stimulus to the centralization of the system of higher education of Germany, including pedagogical, was caused by the initiative of creating to 2010 year the European space of higher education. At the limits of this initiative the federal center recommended to carry in considerable changes into the process of preparation of pedagogical personnel, which are assisted to European collaboration about the guaranteeing of the educational quality.

Thereby in Germany there was made an attempt to find optimal correlation between the centralization and decentralization of direction of system of higher education at modern conditions. Therefore now existed system of direction of education in Germany is often called the cooperative federalism.

Other tendency of development of pedagogical education in Germany is connected with the creation of new structures at the institutes of higher education, the activity of which is directed to the optimization of the process of preparation of teachers at the institutes of higher education and to the coordination of activity of different institutes that assist at the teachers' preparation.

Let's register that at the seventies at the majority of federal lands there occurred the

integration of high pedagogical schools with the universities. It caused the changes in the structure of preparation of teachers for all types of schools and gave to the pedagogical education the new status, concentrating it at the universities. But while this there were not taken into consideration of organization of process of preparation of teachers, because at the universities there was no such organizational structure as pedagogical department of faculty. In connection with it the conference of chancellors of institutes of higher education at the May of 1995 required to carefully revise modern forms of preparation of pedagogues, to establish pedagogical centers under the universities and to revive pedagogical institutes side by side with the universities or under the universities.

Indeed commissions by the questions of education of separated federal lands also recommended creating the centers of the preparation of teachers, which would solve the problems of practice-oriented and professional preparation of pedagogical personnel into the cooperation with the school and university.

One more tendency of development of pedagogical education is the integration of practice into the process of education at the university. The preparation of teachers in Germany consists in 2 phases. The first phase is the teaching in the institute of higher education includes theoretic preparation of future teachers. Second phase is the student practice (referendary) begins after the end of teaching at the university and after the passing of the first state exam and organizationally is not connected with the first phase of preparation. Nowadays such approach to the organization of preparation of pedagogical personnel is severely criticized from the society, because first and second phase of preparation of teachers occur practically independently from each other. The first phase is oriented mostly to the theoretic preparation at the institute of higher education and doesn't allow students to correlate studying theory with the practice and to verify the rightness of the chosen profession. The rupture between

phases of education lowers the effectiveness of preparation of teachers. According to it at many pedagogical institutes of German there are taken attempts to integrate the practical component into a process of theoretical preparation at the institute of higher education.

In the capacity of one more tendency of development of pedagogical education can be called the broaden of the list of pedagogical specialties, including professions of social pedagogue, social psychologist, pedagogue-consultant, pedagogue-therapist, pedagogue of the center of social rehabilitation, teacher of corrective classes, teacher for the work with the gifted children etc.

The tendency on all-European scale is the introduction of multilevel system of preparation of teachers according to the requirements to the participants of Bolognese process [2].

At the limits of multilevel model of education after the ending of undergraduate (1 level) graduating students have an opportunity to leave the institute of higher education and start a professional activity. It should be noted that successful passing of the program of first level ensures getting of professional qualification, but is not a condition for getting a teacher qualification. The right to hold office of teacher gives a studying at second level with the aim of getting internationally recognized academic degree of master and professional qualification of higher level, including qualification of teacher. On the expiration of studying at the limits of multilevel model is also possible the writing and defence of a thesis by the one of chief subject that is provided teaching at the third (doctor) level.

Next tendency is the development and improvement of existed system of continuous (after diploma) pedagogical education as the realization of conception of studying during all life, ensuring the possibility of constant rising of professionalism level of pedagogues. According to it in Germany there were started to function carefully organized and developed programs, which are directed to the systematic rising of qualification of pedagogical personnel or getting by them supplementary specialties.

Thereby revealed tendencies of development of pedagogical education in German, testify to that fact that the development of system of preparation of teachers occurs at two directions. On the one hand there are realized domestic measures, which are directed to the improvement of system of preparation of specialists, and on the other hand there are realized measures that satisfy requirements, which are demanded to the participants of Bolognese process.

In spite of that carrying out reforms have different character, they all have one market selectivity – to rise the quality of preparation of specialists, to create more favorable conditions for their professional and personality development.

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*Materials of Conferences***INTENSIFICATION OF EDUCATION  
AS THE REASON OF APPEARANCE  
OF STUDENTS' MORBIDITY**

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In conditions of social-economical crisis the problems of children in Russia stay critical to the limit, and their urgent solutions are very necessary. There still continues unfavourable tendencies at the demographic processes, children's level of health. The problem of protection and promotion of health of children stands very critical.

The health of schoolchildren is at the direct relation from the conditions of education, nourishment, motion activity, right interchange of load and rest, conditions of family upbringing. While this the huge importance has the taking into account of positive personality traits of students and pupils.

The level of health of child population at the region causes concern of specialists. By the statistic facts only 20% of children are healthy. 80% of them have functional abnormalities and aberration in the condition of health, the percent of chronic pathology is very high. The majority of children of 6-7 age are not ready to school.

At the same time health of each person is defined with the relation of external and internal action his organism on the one hand, and with the possibilities of organism to resist undesirable influences, protect itself from them, and if it's possible to intensify the influence of healthy factors on the other hand. The degree of success of this activity – the removal of harmful influences (the correction of environment) and the rise of stability to them (the train, the rise of adaptive abilities of organism) – defines the direction of efforts to safe and strengthening of health.

In consideration of factors that have unfavourable influence on health (pathogenic factors), at the aspect of health protection of students, it's necessary to divide them into two big groups: factors, which are connected with the educational process, educational establishments (they are often called "insideschool"), and all remainder factors, which potentially have influence on the students' health.

On the basis of many researches and of the practice of Yakimanskaya I.S. there singled out some of general pathogens that doing no good to the students' health: the low level of motivation to the saving and strengthening of individual health; the contraction of conception of health; the influence of unfavourable for the health anthropogenic factors; the absence of integral and purposeful system of forming the students' culture of health; the imperfection of legislative, normative – legal base, which regulates the activity by the protection of health of population, particularly of children

and teenagers of school age; the incompleteness of health culture of teachers, the problems of their health level.

If they speak much about the students' health and try to do its maintenance and strengthening, then to the problem of teachers' health they don't attend. It's hard to wait for noticeable successes in the care of students' health without change the attitude to the teacher's health.

Side by side with such factors as the genitive conditionality, unfavourable social, ecological conditions of development and others like them, unfavourable and essential influence to the students' health has other group of factors – "insideschool" that have direct attitude to the problem of health of preserve educational technologies. With the negative influence of these factors, to which we can attribute intensification and irrational organization of educational process, discrepancy of teaching methods of age possibilities of students etc, specialists connect with till 40% of child – teenage pathology. We should take into account that the tiredness of lesson is not the result of some one reason (the difficulty of material or psychological tension), but it's a defined combination, the sum of different factors.

The intensification of educational process goes different ways. The first is the increase of number of academic hours (lessons, out of school activities, optional classes etc). Actual school load (by the facts of Institute of age physiology Russian Academy of Education, the Science center of health protection of children and teens of Russian Academy of Medical Sciences and the a number of regional institutes), particularly at the lyceums and gymnasiums, at gymnasium classes, at the classes with the profound learning of some subjects, is 6,2-6,7 hours a day at the primary school, 7,2 – 8,3 hours a day at the middle school and 8,6 – 9,2 hours a day at the secondary school. The important increase of educational load in such institutions and classes does not pass away: these children often have big prevalence and evidence of neuropsychic abnormalities, big fatigability that is accompanied with immune and hormone dysfunctions, lower resistibility to diseases and other abnormalities. Among the students of these schools there 1,2 - 2 times more children with lower functional eyesight, chronic pathology, than in the mass school (though in the mass school everything is not good). In the majority of researches there noted the clear dependence of abnormalities at the health level on the exchange and intensity of educational load.

The other variant of intensification of educational process is real decrease of number of hours while the preservation or increase of volume of school material. The frequent consequence of intensification is the appearance the states of fatigue, tiredness, overwork. Just overwork causes preconditions of de-

velopment of acute and chronic abnormalities of health, the development of nerve, psychosomatic and other diseases.

The danger for health of this state was shown by G.N.Speransky. According to his researches if child has the syndrome of fatigue, which is expressed by the lowering of capacity of work, heightened distraction, irritability, sluggishness or, on the contrary, by the motive and speech excitement, headache, the loss of appetite or its extreme increase and by many other symptoms, then even the nine-hour sleep can't decrease the fatigue. At that time there have been already developed the whole complex of measures of struggle against the excessive fatigue.

Of course the fatigue can't be explained with some one factor, it is explained with the combination of different reasons, among which the considerable place hold mental and physical overload that are inadequate to the possibilities of this organism, the static position of body while working, "monotonia". The phone of development of fatigue is usually an indifferent or oppressed emotional state.

Specialists have proved that the health of child, its social-psychological adaptation, normal growth and development generally defined with the environment, in which he spends rather big time. For child from 6 to 17 this environment is the school as the environment of education, because with the stay at the educational establishments there connected more than 70% of time of child's wakefulness. At the same time at this period there occurs the most intensive growth and development, the forming of health to all remain life, the organism of child is more sensible to the exogenous factors of environment.

While the analyzing the forms of assessment of health and physical state of students we can draw a conclusion that students have chronic diseases, and also acquired diseases at the period of education at the comprehensive school. Answering a question "What do you consider we should change in school to improve the students' health?" student recommend to decrease educational load.

The calculation of individual peculiarities of students promotes the protection of children's health, but in practice it creates the difficulties at the realization of this process, because one pedagogue gives lessons to big group of students.

To individualize the educational activity it's necessary: to differentiate it, that means to group students at the base of their peculiarities or complexes of these peculiarities for teaching by the different educational plans and programs; to individualize the educational activity inside the group; to teach at the individual different rate: fast or slow.

At the pedagogy there especially critical stands the problem of realization of personal oriented education. As I. S. Yakimanskaya thinks, the admission of student as the main character of all educational process is the personal oriented pedagogy. For building a

model of personal oriented education she considers that it's necessary to distinguish following concepts. Different level approach is the orientation to the different level of complexity of program material that easy to access for pupil. The differentiated approach is the separation of groups of children at the base of external (more exact mixed) differentiation: by knowledge, abilities, the type of educational establishment. The individual approach is the distribution of children by the similar groups: progress, abilities, social (professional) direction. The subject-personal approach is the attitude to each child as to uniqueness, unlikeness, individuality. At the realization of this approach firstly work should be systemic, enveloped all educational levels. Secondly, there is necessary to have a special educational environment as the educational plan, organization of conditions for manifestations of individual selectivity of each student, its steadiness, without what it's impossible to talk about educational style. Thirdly, we need specially prepared teacher who understand and share goals and values of personal oriented education.

By the personal oriented education we mean that type of educational process, that has the personality of student and personality of teacher that single out as its subjects; the aim of education is the development of child's personality, his individuality and unlikeness; at the process of education there take into account value orientations of child and structure of his beliefs at the base of which there formed his "inside model of world", while this the processes of education and teaching mutually conform to the count of mechanisms of cognition, the peculiarities of mental and behavioral strategies of students, and relations teacher-student are based at the principles of collaboration and freedom of choice. While the preparation and carrying personal oriented lesson the teacher should single out basic directions of his activity, advancing at the first shot the student, and then activity, defining his own position. It's important to note that practically all now existed educational technologies are external oriented relative to the personality experience of students. Personal oriented approach at the education is impossible without exposure of subject experience of each student, that means his abilities and skills at the educational activity. Pedagogy, which is oriented to the personality of student should single out his subject experience and give him an opportunity to choose the ways and forms of educational work and the character of answers. While this there are estimated not only results, but also the process of their progress.

The model of personal oriented school is rather different from other existed models and pedagogical systems. Firstly, that it give to a child the big freedom of choice at the process of teaching. At its network not student adapts to a established educational style of teacher, but teacher who is possessed of different technological instruments, coordinates his ways and methods of work with the cognitive style of educa-

tional of child. Personal oriented lesson in contrast to traditional firstly changes the type of cooperation "teacher – student". From the command style teacher goes over to collaboration, orienting at the analysis not so much results, as procedural activity of student. There changes the position of student, from the assiduous execution to the active creativity, his thinking becomes different: reflexive, that means directed to the result. The disposition that forms at the lesson also changes. The most important thing is that teacher should not only give knowledge, but also creates optimal conditions for the development of students' personalities. What are the differences between of personal oriented lesson from the traditional?

1. Definition of objectives. The aim is the development of student, creating such conditions that at the each lesson there will form the educational activity, which transforms it into a subject that is interested in learning, self-development. At the lesson there is regular dialogue – teacher – student.

2. The activity of teacher. Organizer of educational activity, in which student basing at the combined groundwork retrieves independently. Central figure – student! Teacher specially creates the situation of success, empathizes, encourages.

3. The activity of student. The student is the subject of teacher's activity. The activity goes not from the teacher but from child. There used methods of problem-searching and project education, which develops the character.

4. The subject relations "teacher – student". Working with the whole class teacher actually organizes the work of each creating conditions for development of personality abilities of student, including forming of his reflexive thinking and own opinion.

While the preparation and holding of personal oriented lesson teacher should single out basic directions of his activity, spotlight the student, and then the activity, defining his own position.

Thereby for the protection and strengthening of health of comprehensive schools' students there is necessary to use technologies of personal oriented education, which means special construction of study text, didactic and methodological material to its use, types of study dialogue, forms of control of personality development of schoolchild. Pedagogy oriented to the personality of student should reveal his subject experience and give him an opportunity to choose ways and forms of study work and character of answers. While this there are assessed not only results but also the process of their progress.

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#### VALUE ATTITUDE TO THE PERSONALITY OF STUDENT AS THE BASE OF CONSTRUCTIVE BEHAVIOUR OF TEACHER AT THE CONFLICT

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Educational system of school is the complicated developing system. Its essential characteristic is the conflict and weak predictability. The types of pedagogical conflicts at the works of Russian pedagogues and psychologists are singled out and analyzed at the base of different classification signs: by the character of sides, which were drawn into the conflict; by the source of conflict; by the time of passing. So, at the works of A.J. Ancypov depending on what kind of subjects enter into interaction, there are singled out conflicts at the system "pupil-pupil"; "pupil-teacher"; "pupil-parent"; "pupil-administrator"; "teacher-teacher"; "teacher-parents"; "teacher-administrator"; "parents-parents"; "parents-administrator"; "administrator-administrator" (Ancypov A.J. The prevention of conflicts at the school collective. Moscow: Vados, 2004.). M.M. Rybakova singles out the following types of pedagogical conflicts: *conflicts of activity*, which appear on the occasion of educational and outside educational activity of pupil; *conflicts of behavior (actions)*, which appear on the occasion of the pupil's breach of school rules and outside the school rules; *conflicts of relations*, which appear at the sphere of emotional-personality relations of pupils and teachers (Rybakova M.M. The conflict and interaction at the pedagogic process. Moscow: Prosveshenye, 1991.). The reasons of pedagogic problems are divided into *objective* (social, normative-legal, generally pedagogical, organizational-active and others) and *subjective* (psychophysiological, psychological, social-psychological). At the works of V.E. Chydnovski and L.I. Sutormina there were established that from the side of *teachers* the reasons of conflicts are: inability of managing of their own negative emotions, emotional instability; the rigidity of thinking (conservatism); subjectivism at the valuation of pupils' actions; inability or unwillingness to take into consideration the age peculiarities of pupils etc. (Chydnovski V.E., Sutormina L.I. The experience of studying the pedagogical conflict as the factor of formation of sense vital orientations of teacher // Psychological science and education. 2003. N4.)

The analysis of researches of modern scientists by the problems of pedagogical conflicts allowed us to suggest a hypothesis about that one of the reasons of inadequate reaction of teachers at the conflict situations is ingenerated value attitude to the pupil's personality. By the **value attitude** we understand the steady personality-essential education, at the base of which lies the humanistic centration of pedagogical mind, emotional-positive attitude to the personality of pupil, the direction of teacher to the practical realization of value of development of the child's personality.

Our research was carrying out by the financial support of **the grant Of Russian Humanitarian Science Foundation (project N 09-06-71602 a/C)**. There were observed that while the traditional approach to the professional preparation of future teachers, which formed at Russian teachers' training colleges, students have different types of attitude to the pupils: from formal and emotional to cognitive. And only several students to the end of the studying have value type of attitude to the pupils.

At the course of use special developed diagnostic program there were singled out important characteristics of every of singled out type of attitude.

Students with the **formal attitude** to pupils have no desire for the dedicated development of pupil's personality. The result of pupils' education they considered to connect with the getting of good marks. As the base means of development of pupil there was examined the training, carrying out a big number of exercises. For pedagogues of this group there was typical the impulsivity of emotional reaction to the pupils' actions at the conflict situations up to the desire for immediately change, correction of behavior or the personality of child. Students had the prevalence of everyday knowledge. Future pedagogues with the formal attitude to pupils at their work used communicative education. At the process of interaction with children they demonstrated inconsequent style of communication, at the conflict they could change their tone of voice. With respect to the pupils who were participants of conflict teacher more often stood indifferent, cold, suspended "adult".

For the students with **emotional-positive attitude** to pupils there was typical situational interest to the studying of process of personality's development of pupil. At the practice they manifested election emotional attitude to children, singled out "favorites", who they treats kindly, forgive them a lot of things, stood at their side at the conflict. At their work future teachers of this group used mainly concrete knowledge that were gotten by their own experience, imitated teacher, used prepared algorithms, which were digested at the institute of higher education, not always correlating their own actions with the age possibilities and individual peculiarities of pupils. Future pedagogues gave their preference to traditional methods of teaching with the including of elements of interest and playing

methods. They had the prevalence of empirical style of giving the material. At the process of interaction with pupils there were used democratic and liberal styles of communication. At the conflict situations such pedagogues treated pupils either from position "From above" (the position of patronizing parent) or from position "from below" adaptation. The high level of development of emotional component of attitude in the aggregate with recognition of shortage of their own knowledge and experience led to that future pedagogues were afraid to do harm by their interference to the relations of pupils; at the whole number of cases that led to the helplessness of students, non-intervention into the conflict.

Students with the **cognitive attitude** to pupils manifested expressed interest to the digesting of knowledge, which opens different aspects of pupils' development, the problems of their teaching and education. At the practice teachers of this group had dominant desire for use scientific knowledge and adequate means of pedagogical activity. Pedagogues had appearing emotions that reflected cognition activity of children, the presence of fast and right answers, successes, progress of pupils. Motivational installations of students were characterized with the positive mood to work with children, the desire for development of personality qualities and abilities of pupils. At the relations with the children they had the prevalence of authoritarian and democratic style of communication. The position, which were stand with the respect of pupil at the conflict situation was the position "near, but not together". Future pedagogues with the cognitive attitude to the pupils at their work often used the methods of problem teaching. The teaching that was realized by them undoubtedly had the developmental character, but it could not be called personality-oriented at all, because the questions of the calculation of individual peculiarities of children there were not attended a lot.

Students with the **value attitude** to pupils had intelligent, deep, wide interests, which are connected with the studying of the conformities to development of child's personality. They carried out the choice and the transformation of digested knowledge, demonstrated the variability of their use and the width of the carrying over to the new conditions at the practice. At their work pedagogues proceeded from the interests of concrete pupil and from the perspectives of his development. The position that was stood by the students of this group with the respect of pupil at the conflict situation was the position "near", the position of friend, helper. Teacher tried to come apart the reasons of appeared conflict, to understand the motive of behavior of each of the conflicted sides. There was the prevalence of democratic style of communication. The basic tactics of behavior consisted in the unobtrusive, natural creation of conditions that requires from the pupil the development of his own abilities at the constructive solution of conflict. Its general task students



of this group considered the organization of develop personal-oriented education, which promotes the development of pupils' personalities. There were used different technologies: dialogue, research, information-communication, active, technologies of problem education, technologies of individualization and differentiation of education. Pedagogues oriented themselves to the personality model of building relations with pupils with the point of rest to their interests, abilities, subject experience. At the process of teaching and education of pupils students tried attend a lot to all pupils of the class, independently from the characteristics of their progress. Future teachers with the value attitude had big interest to the analysis of their own experience. Difficulties at their professional activity they considered as the consequence of inadequacy or absence of means of their realization. For some students with value attitude to the personality of pupil there had been opened the horizon of their own professional activity, specific way of organization and value and normative layer, which required not only reflection but also transcending.

At the course of forming stage of experiment we have proved that the conversion to the value type of attitude there is carrying out more effective while the realization of complex of interconnected psychological conditions, to which were rated following: 1) including the own experience of future pedagogues to the structure of educational situation as the condition of recognition and change of attitude to the personality of pupil; 2) mediation of forming of value attitude of future teachers to the personality of pupil changing the activity of students; 3) organization of combined reflexive communication between the subjects of educational process (pedagogues and students) as the environment of forming the general group fund of value-essence formations; 4) broadening and conversion of value-essence sphere of future pedagogues into the studying-professional generality of pedagogues and students as the space of cultivation of senses and personality values of participants of educational process.

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#### **THE PLANING OF TACTICAL PREPARATION AT THE PROCESS OF IMPROVEMENT OF SPORTING MASTERY OF JUDOISTS**

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Theoretical analysis, the generalization of foremost practical experience, the analysis of training studies has shown that the tactic of carrying out attacked activities at the fight is still the weakest part at the system of wrestlers' preparation (N.M.Galkovski,

1985; R.A.Piloyan, A.V.Eganov, V.M.Igumenov, 1982; U.A.Shahmuradov, 1999 and others.). It's observed that even qualified sportsmen have serious errors at the level of tactic preparation. At the judo there is no enough work that is devoted to learning of preparation activities in the competitive fight. Particularly this is about questions of planning of parts and types of tactic-technical preparation of judoists of different age groups.

The solution of existed blanks requires the analysis, the generalization of foremost experience of coaches' work, which is connected with the planning of time at the training process to the studying and improvement of tactic actions at the judo. The solving of this problem was carrying out by the use of the whole number of methods of research: theoretic analysis, questionnaire, mathematical-static treatment of foremost facts. Coaches voiced that basing on their experience by the percent ratio of factual (how many do you plan now) and necessary (how many it is used to be) time for planning three types of tactics: 1) tactics of leading of competition; 2) tactics of leading the fight; 3) tactics of preparation actions for the carrying out the sprint by the judoists. Meanwhile it's necessary to mention that the ratio of these types tactical-technical preparation as the year cycle of preparation is connected with the length of service and also with the problems that are solved at every part of studying process.

In the issue of questionnaire of coaches with the length of service of pedagogical work from 4 to 25 years, which were carried out while the studying and teaching sessions the following facts were gotten: to the tactics of competition leading there is planned 17,9%; to the part of tactics of leading the fight - 27,8%; to the tactics of preparation actions of carrying out the hold – 54,3%. Such situation testifies the bigger mean at the system of training of tactics of preparation actions.

Should be noted the tendency to the rise of planning with the age of judoists by the types of tactics of leading the competitions and tactics of leading the fight. The reverse tendency was revealed by the tactics of preparation actions for the carrying out the hold. At the youthful age to the part of tactical preparation there is allocated 64,3%, at the age of juniors this numeral lowers till 54,5%, and what concerns men to this part in their preparation there is allocated 44,2%. The difference lowers from year to year at the limit of 10%.

The tactics of preparation actions of carrying out the hold is defined among all types. Therefore, the bases of this type of tactic should be digested at the initial phases of studying. But at the planning of tactical preparation of men to the tactics of preparation actions of carrying out the hold there is allocated almost a half of the whole time (44,2%). Thereby from all types of tactical preparation the greatest meaning has



the tactics of preparation actions of carrying out the hold.

There should be considered as actual the studying of the questions of planning of the improvement of preparation actions at the system of training of judo. We always single out the following parts at the structure of preparation of judoists: physical, technical, tactical, integral, theoretic, psychological of the mean of active rest and renewal. The greatest time at the training there is allocated to the means of improvement of technic (28,63%) and to the physical preparation (25,57%). The integral preparation (free wrestle in the stand position, in the lying position and in conditions competitive, control-training fight by the rules and by the changed rules of competition) is 13,3%. Tactical – tactics of competition, tactics of leading the fight, tactics of preparation of sprint are accordingly 3,92, 4,15 and 4,07%, that in the sum forms 12,1%.

To the other types of preparation of the mean of active rest, renewal theoretic and psychological preparation at the whole system of training there are allocated from 2,15 to 9,83 %. From the part of physical preparation dominant are the means general physical preparation – 14,75%, against the means of special physical preparation, which are 10,82%. To the point, from the three parts of tactic preparation to the tactic directed to the improvement of tactics of sprint in the stand position there is allocated excellently identical time and accordingly is 3,92; 4,15; 4,07%. At the sum it forms 12,14%.

Thereby the analysis of training study revealed the quantitative ratio of used different means at the system of preparation of judoists of high qualification.

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#### INNOVATIVE FORM OF INTERACTION OF ADAPTIVE JUDO AND THE SPORT OF HIGH ACHIEVEMENTS

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In spite of some success of last years the achievements of Russian judoists at the international competitions can't be considered as rather stable. There is no world's leadership for a long time of Russian school of judo that is particularly visible standing out against a background of rising competition.

The base of national judo now is formed with the state sector (groups, sections and departments of judo at the composition of junior sport schools, colleges of Olympic reserve, schools of high sportsmanship, and also sections under the urban and municipal institutions). Organizations of this sector particularly concentrated at the big-time sport. The mass sport from their side is considered not as independent social meaningful activity but as the preparation of sport reserve for the high sportsmanship. In the private (commercial) sector (groups, sections and specialized clubs) the mass sport is not popular because of orientation of the club to the well provided client. The real potential have noncommercial organizations (federations, associations, partnerships), accumulated possibilities of state, social and private sector. Just exactly these organizations can successfully realize the interests of state, society and business, because their competence includes big-time sport, mass sport and also special directions of sport and sports and fitness programs.

Nowadays in Russia there are near 1200 physical-sport clubs for physically challenged people. The number of people who go in for adaptive physical education and sport reaches 95,8 thousands of people. There were created 8 junior sports and fitness schools for physically challenged children. At the same time in Russia there are more than 10 millions of physically challenged people and the great number of them needs the holding of rehabilitation event just by the means of physical education and sport.

Adaptive judo at the base of material arts is magnificent base for the solving the problem of development physically challenged children's and adults' strength, dexterity, coordination, satisfaction of need in motion, in the tactile and psychological communication for the rise of social adaptation, the strengthening of emotional-volitional sphere and the whole physical health.

The conversion to new qualitative forms of development of national judo, which is based on the law of transition of quantitative changes to the qualitative ones, presents the *innovation*, as new phenomenon, novelty at the frames of some system, which causes meaningful changes in practical activity. Such approach means stimulating not only of innovative activity but also creates key directions of activity for the judo's development.

The interaction of sport of high achievements and adaptive physical education is cyclic. The cycle is represented as the inversion of force and counterforce at the sport of high achievements and at the adaptive physical education. This inversion consists in that the meaningfulness and influence of sport of high achievements and of adaptive physical education always changes their influence on the train process, providing the priority either one or another direction of activity of judo's development. Meanwhile their diversity and integration occur. Thereby the influence of every direction intensifies.

At the judo the evolution of interaction of directions of sport of high achievements and adaptive physical education can be represented with the cycle family of S-shaped (logistical) curves, because at the defined point of this interaction the transition of influence of one direction to another occurs, as the result evolutionary processes are accompanied with the irreversible changes (deep reconstruction of structure, replacement of federation's leaders), which brings to the new formations.

As the result of evolution there occurs the conversion of influence of different directions of activity of judo's development to the *physical development*

and *the level of sport achievements* of judoists. Every direction corresponds the single part, but their interaction as the cycle possible only because of their overall behavior. Therefore it's necessary to continually search stimulus of development not only of sport of high achievements, and also of mass and adaptive judo, simultaneously influencing on the overall behavior that have this directions for the rise of effectiveness of national judo in whole.

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## TO THE QUESTION ABOUT CLASSIFICATION OF SENTENCE'S MEMBERS TO THE MAIN AND SECONDARY IN ABAZIN LANGUAGE

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In this article theoretic problems of qualification and classification of main and secondary members of sentence in the researches of famous linguists of XIX – XX century are being analysed and an attempt of definition of their peculiarities on the material of youngwriting Abazin language.

**Keywords:** the main members of sentence, predicate, subject, coordination

The problem of sentence's members is being learnt rather actively for about long time. At the beginning of XX century academician N. J. Marr affirmed that members of sentence were formed earlier than parts of speech were, that parts of speech appeared at the base of members of sentence and so apart deeply should be learnt the syntax of language. "Parts of speech had not existed, - he wrote. - Little by little from the members of sentence singled out nouns that act as the base of action's formation, verbs transitive and intransitive; nouns by their functions became, while acting as definition, adjectives that also singled out; nouns (certain group of nouns) became pronouns..." [1; 417]. For the last century to the questions of qualification and classification of sentence's members were devoted a lot of researches, at these base appeared and were formed different directions and schools. But there are a lot of arguable and undecided questions in the sphere of syntax. And, firstly, it concerns such problems as qualification signs of sentence's members and their classification to the main and secondary.

Words in the structure of sentence expresses conceptions, which are correlated with existed reality, are formed with the concrete affixes of different grammar categories, which characterize their relations and connections at the defined syntactical structure. Therefore, they have semantic, grammatical and functional meaning.

In modern linguistic science there are different theories concerning what is the

member of sentence and what status it has inside the communicative and predicative syntactical unit. While the definition of essence of sentence's member close to all their disagreements the majority of researchers consider that the functional part is principle – one word at the structure of sentence can be subject, predicate etc, it depends on what syntactical function it has in these concrete case. While the definition of status of sentence's member (main and secondary) there are a lot of disagreements between the researchers.

A number of researchers consider that conceptions "The main member of sentence", "the secondary member of sentence" still have no rather clear definition in the grammatical system of language. For example, A. A. Holodovich wrote that "such hierarchy (main, secondary) originally existed, apparently, as the result of compromise between purely logical and perely linguistic view to the essence of sentence: sentence represents judgement (in that appearance, in which it were understood by the logic), and all that represents judgement is the principle in the sentence; all that is singled out in the sentence that not based on the logic foundations is secondary..." [3; 293]. On the other hand famous syntaxist V. A. Beloshpakova affirmed that " differential sign, at the base of which the members of sentence are traditionally divided into main and secondary, is entry or nonentry to the predicative base of sentence, participation or nonparticipation to its creation" [4; 84].

To summarize existed basic syntactical propositions about qualification of sentence's members one can single out three conceptions: a) conception of unimodality of sentence, b) conception of multimodality of sentence.

In traditional grammar the conception of multimodality of sentence (presence of two main members – subject and predicate) affirmed long time ago [5]. This conception is considered to be a base not only for European (particularly Slavonic) languages, at the material of which was developed the theory about main and secondary members of sentence, but for Iberian-Caucasian, particularly Abkhazian-Adyghe, normative grammar of which was developed at the base of theory of multimodality of simple sentence [6,7].

There are other conceptions in syntactical theory, particularly when the main member is only subject (or only predicate), and, on the contrary, when to the main members of sentence refers direct (and sometimes indirect) object.

The conception of unimodality of sentence has two varieties. First affirms that “subject is always primary word in the sentence” [8; 70] and stands absolute or independent definiendum and doesn't act like a definition to any other word” [9; 27]. F. F. Fortunatov defined subject as independent by meaning part of word combination, and predicate - as dependent “part of finished word combination” [10; 183]. Opposite opinion have A. A. Holodovich, S. D. Kacnelson and others. S. D. Kacnelson wrote that “dominance” of predicate is provable in contrast to subject and that “in substantial plan verb predicate is more than lexical meaning. Expressing defined meaning, it at the same time contains a model of future sentence” [11; 88]. In Abkhazian-Adyghe linguistics the conception of unimodality of sentence (in the variant: only predicate is the main member of sentence) is found in the works of U. S. Zekoh [12].

The contrast of the conception of unimodality of sentence is the syntactical theory, which makes the status of main member of

sentence not only to subject and predicate, but to the object too (basically to direct object, but sometimes to indirect one too). This theory in some modification is represented in the works of famous linguists N. F. Yakovlev and D. A. Ashhmaf [13], Z.I.Kerasheva [14; 9-52], B. H. Balkarov [15; 22-28], R. N. Klychev [16; 127-160], H.K.Aristav [17] and others.

The complexity of qualification of some members of sentence as main and as secondary in Abkhazian-Adyghe language is connected with the peculiarities of ergative construction, and, therefore, with the essence and structure of transition verb in these languages. If we don't strive for the deep analysis of peculiarities of different classifications of sentence's members, the subject will be found as one of the principle elements of semantic and structurally grammatical organization of sentence in any of afore-cited conceptions. In the thirties of XX century professor A.N.Genko wrote, that “its (sentence's) composition includes as a minimum two members: that one, which expresses itself the view of object or person and is named as subject of sentence, and another one that expresses itself the view of sign (or the sum of signs), which is connected to the subject, is named as predicate...” [6; 190].

The subject in syntactical theory often is defined semantically. Generally it can be formulated as: the subject is the member of sentence, which expresses subject [18; 478]. But “interpretation of subject through the conception of subject is the explanation one unknown through another, because the conception of subject provided to be fuzzy and indirect. We can find not less variety of subject than types of subject: there are distinguished subjects of motion, condition, sensory perception, and also grammatical, logical, psychological” [19; 178]. The majority of existent definitions are combined to the following: subject is the compulsory member of sentence (word, word combination or other syntactical construction), which has grammatical semantics of subject that is de-

finied in sentence with the help of sign – predicate.

By its meaning, occupied position in the sentence and ways (facilities) of expression the subject in Abazin language has different descriptions.

Clearly that in modern Abazin language names are not declined, there is no grammatical category of case, and that is why grammatical relations between subject (as object) and predicate are formed with the help of class-personal affixes. Between the verb-predicate, on the one hand, and subject (direct and indirect objects), on the other hand, “exists steady double-sided connection:

a) person, class and number of verbal indicators of grammatical subject and object depend on person, class and number of direct and indirect objects that attend in the sentence;

b) the possibility of attendance direct and indirect objects in the sentence, in turn, depends on structure of verb-predicate: if there exist signs of direct and indirect object, they will be able to exist in the sentence as its individual members; if in the verb-predicate there are no signs of direct and indirect objects, they will not be able to exist in the sentence” [16; 135]. In other words, subject, direct and indirect objects and their proper signs (of subject, direct and indirect object) agree with in the person, number and class in the absolute majority of cases. Subject (and also objects), on one hand, directs grammatical form of predicate (predicate agree with subject), on other hand the essence of verb-predicate defines the possibility of appearance in the structure of simple sentence of direct and indirect objects. This “steady double-sided connection” between the subject, objects and predicate academician A. S. Chikobava at the beginning of XX century offered to name “coordination” [20; 243], later this term was used by other linguists (Shvan-skii, Raspolov, Tihonov and others). There exist other names of this type of connection : “coupling” (Zolotova G.A.), “predicative connection” (Muhin A. M., Aristava H. K).

Structure and grammatical analysis of simple sentence of Abazin language gives us grounds to say, that objects (both direct and indirect) by their grammatical characteristics in the structure of sentence are almost not differ from the predicate: they also govern the form of predicate with the help of class-person formant, they also occupy the same places that subject occupies, they are also expressed by the same parts of speech and as the subject does they are also have no special grammatical form etc. Thereby famous linguists recognized the conception of multimodality of sentence to be more corresponded peculiarities of sentence in Abkhazian-Adyghe languages.

But, while all aforesaid peculiarities of sentence in Abazin language, we can't but mention the main thing – in contrast to object the possibility of appearance in the sentence apart expressed (by word or syntactical construction) subject doesn't depend on essence of verb-predicate – it (subject) occupies its syntactical position both while transitive and intransitive verbs-predicates. Subject, as predicate is, is the independent member of sentence that is not dependent (about presence and absence) on any other structural component of communicative and predicative syntactical unit. Hence main members of sentence in Abazin languages should be recognized only subject and predicate. They should be recognized as structural base of simple sentence in Abazin language, though forming components are undoubtedly both direct and indirect objects.

Subject in the simple sentence of Abazin language can be placed at the beginning, in the middle and at the end of predicative-communicative unit, its syntactical position was not fixed, but it more draws towards the beginning of sentence.

While the transitive verb-predicate the usual order of words in the sentence is like this: *subject – indirect object – direct object – predicate*, what represents mirror reflection of succession of their class and person signs (formants) in the structure of transitive predicate. *Пывыджь наскъан атишы агъвра*



*axъapцIamI* «Two came up and put on the horse the bridle». In these case subject *цIамыджь* «two» occupies absolute beginning of sentence, and its class and person formant *-p-* (3-е л. мн. ч.) stands between two parts of complicated base of predicate *цI-a-хъa-p-цIamI* «put on it », after the signs both of direct (*цI-*), and indirect (*-a-*) objects.

While the intransitive verb-predicate the order of words in the sentence and their formants in the structure of verb concur: the subject draws towards the beginning of sentence, and its formant stands in absolute beginning of corresponded predicate, indirect object (or indirect objects) follows after it and occupies position between subject and predicate, its formant stands after the sign of subject before the base of verb. *Асабу ацIва дацхIamI* «Child nibbled at apple ». Subject *асабу* «Child» occupies syntactical position of beginning of sentence, and its sign *ц-* (3<sup>rd</sup> person, singular) also stands in absolute beginning of predicate *ц-a-цхIamI* «nibbled at». Indirect object *ацIва* «apple» stands after the subject, its formant *-a-* (3<sup>rd</sup> person, singular, class thing) stands after the sign of subject.

The subject can carry different types of definition, absolute majority of which are prepositive. Therefore in these cases formally the subject doesn't stand at the absolute beginning of sentence – it follows before the attribute (single or whole combination, and sometimes expressed with infinit construction). But in these situation between the base members of sentence (subject, direct and indirect object, predicate) it (subject) provided to be the nearest to the absolute beginning of sentence. *Йдучвам анецц уцIала йырчвын* «Small room was full of people». The position before subject or absolute beginning of sentence is often occupied by adverbial modifier. *Ауат зымцIва хIанрылга ачккwa ацIахIхIахын хIададжвыквылхтI* «When everyone had finished it, we harness the bullocks and left home».

Thereby, both while transitive and intransitive verb-predicate the most usual place of disposition of subject in Abazin language is the position of beginning of sentence. The

rest of positions (middle and end of sentence) are occupied rarely by the subject of Abazin language, but these positions are not impossible or breach of offer of words in the sentence.

In modern Abazin language the subject is more often expressed by the noun, substantivized adjective or participle and also pronoun. Other parts of speech can be also realized in the syntactical position of subject, but occur very seldom.

The syntactical position of subject can be occupied by word combinations, infinit constructions, phraseological units, and also the whole sentence, which is singles out as a whole syntactical construction in the composition of simple sentence. All of them have their own peculiarities while the realization of facility of subject, but occur much more seldom than afore-cited.

The subject in the modern linguistic literature that is devoted to the problems of syntax is often defined differently. «Firstly, discrepancy and insufficient clarity of theory of predicate are conditioned by that in linguistic tradition as in Russian one and in foreign there are exist two approaches to the understanding of essence of predicate. According to one of them as the predicate can single out only finite verb, and connected with it infinitive can correspond only supplementary verb member (Shahmatov). In compliance with other approach the subject includes not only finite verb but also dependent on it infinitive (Ovsyanico-Kylikovskii)... Besides, there is no united approach to the formal varieties of subject, to the classification of verb constructions. So to single out the types of English predicate we should choose one of the following sign: the structure of predicate (Vynikurova; Ganshina and Vasylevskaya; Gygadlo and others; Haimovich and Rogovskaya), morphological belonging of its principle part (Ivanova and others; Irtenyeva), or both signs at the same time (Ilyish), or structure and semantic (Barhudarov and Shteling; Smirnickii, 1957)» [19; 183-184]. Terminological confusion occurs often – there are found cases, when the



same phenomenon has different terms and on the contrary different linguistic phenomena are expressed in one term by different authors. All these complicate the definition of essence of the predicate and its semantic and structure and grammatical peculiarities in different languages.

In these work we act on the premise that in “the realty there are double-essence phenomena: on the one hand there exist objects, things, but on the other hand there exist actions of these objects and things... Use in role of predicate the nouns that mean the ideas of things and the verbs that mean actions gives us an opportunity to characterize the object (subject of sentence) from two different sides, from the side of its behavior or signs, the bearer of which is the object, and from the side of action, which are accomplished by it” [21; 3]. Hence it is reasonable to subdivide predicates into two basic types – verbal and nominal. Such classification accents our attention not only on semantic side of word (or words), which plays syntactical function of predicate, but also takes into consideration grammatical peculiarities and possibilities of this word. For example, in Abazin language the function of predicate can be done not only by auxiliary finite verb, but also by denominative one, which, as the derivative from the nominal part of speech, by its structural and grammatical characteristics are not differ from static verb, due to its own class and person prefixa and so-called suffix of predicativity. This suffix is the formant of time category, finiteness and static nature at the same time.

Predicate in Abazin language, while expressing modal-time an subject-object relations, is organizing center of sentence. In it, as it was noticed by the researcher of Abkhazian language H.K.Aristava, “grammatically concentrated syntactical functions both nominal and verbal components of sentence of another languages (for example, Russian)” [17; 122].

The main syntactical position of predicate in Abazin language is the end of sentence. But it doesn't mean that predicate

can't occupy other syntactical position. Depending on its semantic meaning, urgent segmentation, peculiarities of speech's organization (rhymes in poetic works) predicate can be situated both at the beginning and in the middle of sentence. Last in the absolute majority of cases is conditioned.

The main form of expression of predicate is the verb that due to its polysynthetic essence has big syntactical opportunities. But not any verb (not all existing in modern Abazin language grammatical forms of verb) can play the role of predicate. The main verbal form, which occupies syntactical position of predicate, is finite verb. It can be dynamic or static, transitive or intransitive, auxiliary or denominative. The function of predicate can be made by infinite-interrogative forms of verb. The rest of verbal formations (infinite verbs and infinite constructions) can't express time independently, are not used in syntactical position of predicate in Abazin language (except cases, which are conditioned by context, situation) because that they don't have defined semantic and completed meaning.

By its structure and component composition predicate in Abazin language can be simple or composite<sup>1</sup>. Predicate is simple when grammatical and substantial meaning that are some of its basic characteristics as the member of sentence are expressed by one word. Such in Abazin languages are finite and infinite-verbal verbs. *Адгъыл зырхарджьуа йчIвынI* «Acres belong to that who work it». *Ахча зцарду агъыч дичешвинI* «Who have a lot of money is afraid of thieves ». *Уысасчвакwa анбацах, Абдулкварим?* «When your guests left, Ab-

<sup>1</sup> In the special literature there exist other classifications and also occur other terms. For example, P. A. Lekant prefers terms “simple predicate” and “difficult predicate”, what is really justified, if we take into consideration the great number of forms and structure types, which belong to composite predicates. The researchers of Adyghe languages H. E Djasegev, B. M. Kardanov, H. H. Urusov, A. M. Kambachokov at the material of Kabardinian language single out three types of predicate: simple, composite, compound [7; 180] etc.

dulkerim?»). «Швынхын атипсцара миква ипажва?» - лхІван арыпхьагІв асабиква дырцІаІамІ «How did you pass your holidays?» - teacher asked her pupils».

In the cases when substantial meaning is expressed with one word (or with form of word), and grammatical meaning with other word (as usual by auxiliary component) predicate is called composite. In modern Abazin language composite predicates can be verbal and nominal.

The ideal form of expression of simple predicate is finite verb. While this, dynamical verbs (both ordinary and relative) make their syntactical function in seven verbal-tenses forms of indicative mood, syntactical ones – in two forms.

Simple verbal predicate in Abazin language can be also expressed by other finite forms of verb – admittable, imperative, optative, subjunctive, hypothetical moods and by different interrogative forms<sup>1</sup>.

In the syntactical position of simple verbal predicate are also natural interrogative forms of verb, and it can be not only interrogative forms of finite verb with the indicative semantic, but also verbs of infinitive-interrogative formation (adverbial-verbal and relative-interrogative), which is not natural for affirmative not interrogative verbal forms. Proper formations have their own grammatical and function peculiarities, what can be object of other research like composite (nominal and verbal) predicate.

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<sup>1</sup> Analogous forms at the material of closely related Abkhazian language are detailed described by H. K. Aristava [17; 122-133].

## PECULIARITIES OF MANIFESTATIONS OF LINGUISTIC INTERFERENCE IN CONDITIONS OF ABAZIN-RUSSIAN BILINGUALISM (ON THE WORD COMBINATIONS)

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Interferent phenomena while learning Russian language by abazins-bilingual are observed everywhere, where exists the difference between the systems of mother tongue and learning language, including the word combinations.

Main hardships and the majority of mistakes were connected with the studying of grammatical categories of number, gender and case of compound elements of Russian language's word combination, and also valency and semantic volume of words.

**Keywords:** interference, Abazin language, Russian language, word combination.

Use or transference of peculiarities of one language (usually mother tongue) to another one (studying language) is called interference in the linguistics (D. E. Rosental, 1976, p. 132). The twofold process of simultaneous use and overcoming of peculiarities of mother tongue while studying the second language (as often as not Russian one) marks out the problem of reasonable control of interference and defines tasks of their interconnected studying.

The systematic studying of grammatical interference in the domestic linguistic began in the early sixties of XX century with the works of U. Rozencveig and L. M. Uman (U. Rozencveig, L. M. Uman, 1962). At the material of russian-french bilingualism authors examined the origin and the specific of morphological interference.

The critical survey of grammatical, mostly morphological, interference was presented in the works of U.A. Jluktenko (U.A. Jluktenko, 1974).

In the literature there were also elucidated some aspects of syntactical interference. Authors of the majority of works give consideration to interactions of concrete languages generally at the level of separate syntactical categories – syntax of word combinations, the order of words, different types of subordinate clauses.

The questions of linguistic interference at the material of Russian and Abkhazian-

Adyghe languages were first risen at the end of fifties and at the first half of sixties of the XX century in the works of the professor N. B. Ekba (N. B. Ekba, 1963; 1975; 1993), and later at the material of national-russian bilingualism in the researches of Z. U. Blyagoz (Z. U. Blyagoz, 1977), R. N. Klychev (R. N. Klychev, 1985), M. H. Shhapaceva (M. H. Shhapaceva, 2005) and others.

Interference become apparent everywhere, where exists the difference between the systems of mother tongue and learning language. These differences consist in:

1) presence identical linguistic phenomena, for example, both in the Russian and Abazin there are verbs in the past completed and past incomplete time;

2) presence of linguistic categories, which are character:

a) only for Russian language (category of gender, syntactic connection of agreement etc);

б) only for Abazin language (preverbs, postpositions, classes, grammatical category of possessive case etc).

The interference actively becomes apparent in pronunciation and word usage. In some Abazin children's speech there is an accent, which arises because of overlay of phonetic system of mother tongue to Russian. For example, there is no positional reduction of vowels in Abazin language, that's why Abazins pronounce unaccented vowels very

clear. In modern Abazin language the status of phoneme has only two principal vowels: “a” – of lower rise of middle row, which in compare with Russian vowel “a” is pronounced more openly, but more narrowly, and more short (irrational) “ы”. Remainder vowels, which nowadays are used in Abazin language (и, е, о, у), correspond new formations and still they are not self-sufficient phonemes. They are used in borrowed words or parallel with the diphthongs, from which they were appear.

There is a difference between the pronunciations of consonant in two languages. Thus in Abazin at the end of the word voiced consonants are not deafened, and dull sounds are not vocalized. In Russian speech of Abazins we see the same thing. «In the phonetic system of Abkhazian-Adyghe languages, there are absent pointed vowels “e” and “и” as the independent phonemes. Besides, in these languages palatal character and solidity of consonants don’t depend on position of consonant in the word – palatal are palatal in any position, solid are solid in any position, too” (R.N. Klychev, 1985). In Russian language the phonematic shape of soft and solid sounds has another character. Therefore, in Russian speech of Abazins mistakes, which are connected with positional indifference of language to opposition solidity-softness, arise very often. It was noticed at the end of thirties by one of the founders of phonology by representative of Prague phonological school N. S. Trubeckoi. He said: “Listening to somebody else’s speech, while the analysis of audible we involuntarily use usual for us “phonological sieve” of our own mother tongue. So far as our “sieve” is provided to be unsuitable for somebody else’s language, in so far as so many mistakes and misunderstandings arise. We give to the sounds of foreign languages incorrect phonological interpretation, because they are let through a “phonological sieve” of our mother tongue” (N. S. Trubeckoi, 2000).

In the sphere of vocabulary more frequent are mistakes in use of words, vocabulary volum of which are not coincide in

studying languages. Thus, to Russian words *приехал*, *пришел*, *прибыл* in Abazin language corresponds only one word *əɟlaɪmI*; *класть*, *ложить* – *ыквцIара*; *брать*, *взять*, *получить* – *ɟлахвара*; *отвезти*, *отнести* – *гара*; *война*, *сражение*, *ссора* – *айсра*; *резкий*, *острый*, *звонкий* – *цIара*; *сладкий*, *вкусный* – *хьɟIа* и т.д.

Interference becomes apparent at all levels of language, including the syntactic level. In this work the tasks of interference are examined at the material of word combinations of Abazin and Russian languages.

In conditions of abazin-russian bilingualism interference is conditioned by large quantity of factors, among of which we can single out the following:

1. Presence of structural divergences between the Abazin and Russian languages as consequence of their belonging to different language groups: Abazin to agglutinative, Russian to inflexional. The last explains us the presence in each language its own system of phonetic, lexical and grammatical facilities, that have specific peculiarities, the calculation of which in the process of their use in the act of communication is really necessary. Insufficient knowledge of these peculiarities is the reason of low level of practical proficiency both in Abazin and Russian languages.

2. Existing of bilingual learners’ linguistic experience of proficiency in mother tongue, which does not only help but also hamper proficiency in second language, because of the straight transfer of solidly formed speech skills of use of the mother tongue to the studied language. Students who don’t know the phenomenon of valency of word, who don’t know the semantics and stylistic peculiarities of words’ use, often use in their Russian speech the straight translation of principal meaning of used in some situation Abazin word, with the result that comes out *пришел ногами* (щапIыла дгIайтI) in spite of *пришел пешком*, *уехал читать* (апхьара дцатI) in spite of *уехал учиться*, *сердцем подумал* (гвы айтатI) вместо



*догадался, ударил в сердце* (йгвы дастI) in spite of *обидел* etc.

3. One of the essential factors of interference's manifestations is a psychological barrier, which forms the mistakes in Russian speech, with the result that students are pressed for shyness in communication at Russian language. In connection with this problem teacher should know everything about interference.

Out of mistakes, that can be met in Russian speech of students and that have the phenomenon of language interference as the principal reason, very big layer form syntactical mistakes, therefore we can single out syntactical (syntagmatic) interference separately.

Syntagmatic transference interference is connected to the breach of compatibility of elements of second language in the speech circuitry under the influence of corresponded models of compatibility of mother tongue. Interference is revealed while the perception or realization of following principle types of word combinations:

1) Russian prepositional – Abazin unprepositional. There are no prepositions in Abazin language, with the result that their functional load remain incomprehensible or indistinct until it will be fasten in the process of practical presence (both oral and writing) language. Indeed, the order of succession of components of word combination is often different, especially in attributive complexes, in which in Russian language definition, that is expressed with noun, stands basically postposition, but in Abazin language it stands only preposition: *доски для окон* – *ахъышв агъвкв*; *блюде с полки* – *акIъарышвта йыхвынгылаз ачIат*; *картофель с поля* – *рхъа клартIоф*. In the cases when the facility of definition is carried out by adjective, in Russian language the usual place of its disposition is the position before the defined word, though postposition of adjective is not expected. In Abazin language in the similar attributive word combinations the adjective always stands after the defined noun: *светлая комната* – *пец лаишара*; *кислое*

*яблоко* – *чIва чIвкъъа*; *трудная задача* – *хIисан баргвы*; *широкая улица* – *урам тыбгIа*; *высокое дерево* – *цIла хIгIа*; *золотые часы* – *сахIат хъапиц*;

2) Russian word combinations, compound components of which have case form, and Abazin ones, components of which have no case form: *страница дневника* – *амшгIвыра анапа*; *видеть друга* – *анбжъагIв йбара*; *угол дома* – *атдзы ашухъа*; *недалеко от дома* – *атдзы йачвыхъарамкIва*. The absence of case forms of compound components of word combination at Abazin language can be explained by the absence of case system in whole. Meanings of cases of Russian language in Abazin language are reproduced with different preverbs, postpositions and order of succession of words;

3) in Russian language – word combination, but in Abazin language – complicated word. For example: *овечья шкура* – *уасчва*; *пять пальцев* – *хвачва*; *каменная ограда* – *хIахъвгвара*; *войлочные сапоги* – *амсы*.

In Russian and Abazin languages occur difference between the frequency of use one or another part of speech in the structure of word combination. For example, word combinations which include numerals are equally used in both languages. It concern only to cardinal and ordinal numerals. Meanwhile it's necessary to mention the following: in Russian language ordinal numerals conform to defined word in genre, number and case, but in Abazin they remain without changes. There is no syntactic connection of agreement in Abazin language, but it exists in Russian. Syntactic connection of words is carried out with other facilities – with coordination, with order of succession of words, with semantic parataxis. The frequency of use remainder of numerals' discharge in Abazin language is smallish.

Word combinations with participles are widely spread in Russian language; these word combinations express defined relationship, that are complicated with the indication of time and of active of passive voice. In

Abazin language the frequency of use participle in similar word combinations is also big. But in Abazin language there is category of gender, abazin verb is indifferent when it comes to voices. Thereby, participle have no passive and active voices.

Syntactic difference between Russian and Abazin languages becomes apparent at the order of disposition of sentence's parts with respect to each other, at the types and forms of grammatical connection of words in word combination. There is rather free disposition of parts of sentences in Russian language. In Abazin language there are defined limitations to separated parts of sentence. Thus, predicate as usual occupies absolute end of the sentence; definition, which is expressed with the adjective, always follows after the defined word; definition, which is expressed with the noun, substantivized word or participle, occupies the position before the defined part of sentence.

In Russian language the facility of predicate can be carried out with all independent, and in some cases service parts of speech, but in Abazin language verb is the only part of speech, which can fully function as a predicate. Noun parts of speech in the position of predicate are covered with different classes, personal and temporal affixes and become verb.

Transferrative interference at the speech is conditioned by specific of system of mother tongue, and its typical manifestations are character for all members of these linguistic generality.

Transferrative interference cause mistakes at the use of grammatical forms in syntactical word combinations: taken away for the expression of thoughts Russian words are collided to the grammatical model of Abazin language, in the issue words are used at the misplaced for these construction form, and sometimes syntactic structure of word combination provided to be alien.

Comparative analysis of factors of Russian and Abazin languages demonstrates that one interlingual difference can be methodically relevant for bearers of one of compara-

tive languages and irrelevant for bearers of other. Thus, for example, adjective in Russian language in contrast to adjective in Abazin language, has the categories of gender, number and case. These difference is methodically relevant for Abazin audience, but irrelevant for Russian one. Abazin students, who are not used to distinguish categories of case, gender and number of adjective, don't distinguish them in Russian language, with the result that mistakes appear in the system of agreement of Russian words: *красивый дочь, большой машина, чистый окно* etc. In Abazin language adjectives are not conformed to defined words as it happens in Russian language but unite with the noun to one grammatical word: *пхIа пидза, машина ду, хьышв цкьа*. The most difficulties appear in those cases, when grammatical gender of word in Russian language is morphologically unmarked. In these cases all Russian words, that end to -ь (the soft sign), Abazin students apprehend as the words of male gender. For example: *мой вуаль, горячий печь, маленький мышь* in spite of: *моя вуаль, горячая печь, маленькая мышь* etc.

Analogous situation can be observed in the prepositional-case system of languages. Russian combinations of names with prepositions have no correspondence in Abazin language. The meanings of Russian prepositions in Abazin language are transferred with directional and locative preverbs, postpositions, different grammatical categories, order of succession of words.

Thus, in Russian language word combinations with dependent noun in the genitive case are rather different by the character of expressed relations. This is because of that in genitive case are used a lot of prepositions: *из, из-за, из-под, от, с, до, у, без, для, ради, около, ввиду* etc. In contrast to Russian one Abazine language has no system of declination and dependent noun in the composition of word combination can't have grammatical form of some case. For example, spatial meaning of preposition «из» and generative case in such word combinations of Russian language as «выехали из леса» in



Abazin language are expressed with directional preverb «*ɬla*»: «*абна йɬлаɬɬɪ*».

The analysis of word combinations in Russian and Abazin language shows that side by side with their likenesses there are divergences that cause interference in the Russian speech of Abazins.

Structure-typological analysis of word combinations in Russian and Abazin language allows to do the following resume:

1. Reported in the process of studying of Russian language of Abazin students the information about features of likeness and differences between the analysed languages allow not only to specify the presentation of students about the languages, but also – by the way of prevention of possible interference – to promote more reliable learning of Russian language;

2. Establishment of likenesses and differences between Russian and Abazin languages carries theoretical character, but at the same time it is necessary for definition of methodical relevance;

3. Teaching of identical versions of word combinations is not a methodical problem, because the level of transfertative interference is minimal.

Materials of researches show that the majority of mistakes fall on the grammar, particularly on the wrong use of syntactic connection between the components of word combination in Russian language.

#### **Mistakes at the agreement**

The big percent of mistakes in the oral and writing speech of students is wrong agreement of dependent word with the principle. We can single out the most typical mistakes.

1. The breach of agreement in gender:

а) use of adjective, pronoun, numeral in the form of male gender with the male gender noun: *большой помощь, белый ночь, хороший память, маленький мышь*;

б) use of adjective, pronoun, numeral in the form of female gender with the male gender noun: *крупная конь, длинная путь, хорошая дядя, с красивой юношей*.

The reason of similar mistakes is the absence of grammatical category of gender in Abazin language and substitution of its meaning with the category of class, which is characterized with absolutely different peculiarities.

в) breach of agreement of predicate, which is manifested with the verb of past tense, with the subject: *доктор* (more often the female doctor) *пришла сразу же; молодежь долго танцевал и песни пел*;

г) wrong combination of definition, which is manifested with the participle, with the defined word: *учитель, открывшая дверь, была готова к поездке; медведь, проспавшая в берлоге всю зиму, вышла на охоту сейчас*;

д) mistakes while the substitution of noun with the the personal pronoun of singular third person: *мама работает на хлебозаводе. Он приходит домой поздно*.

2. The breach of agreement in numeral:

а) breach of agreement in numeral between the definition and defined word, which is expressed with the plural noun. Although, combinative possibilities of Russian language differ from the mother tongue, some words are used by students without necessary semantic correction, by the influence of habits of mother tongue.

Thus, nouns *ворота, чернила, сани, ножницы* in Russian language have the only plural form, but in Abazin language these nouns have both plural and singular forms. Therefore in Russian speech of students are observed cases of wrong use of such nouns as: *она принесла мне маленькую ножницу; малыш пролез через большое ворота*;

б) breach of agreement in numeral between predicate and homogenous subjects: *высокий дуб, береза и тополь качался от ветра, приехал отец ученика и несколько свидетелей*.

#### **Mistakes at the government**

1. Mixing of prepositions «в» and «на» in combinations with verbs of motion: *поехать в юг; приехать из моря, готовить в кухне*;

2. Use of accusative case with the verbs that govern genitive case: *она не заслужила это высокое звание; мы ждали письмо от брата с армии; поступило заявление от ученика;*

3. Addition of excess preposition: *мы смотрим на телевизор; все радовались от моих успехов;*

4. Omission of prepositions «в» and «на» in combinations with verbs that govern accusative case with these prepositions for the designation of place, where the action is directed: *иду речку; запрыгиваю машину; вбегаю комнату;*

5. Mixing of prepositions «с» and «из»: *девочка ушла с класса; со съезда делегаты направились на возложение; во время дождя из крыши капало;*

6. Mistakes in use of prepositions «в» and «на» in combinations with verbs that govern prepositional case: *участвовать на олимпиаде; сидеть на машине за рулем; хорошо разбираться на компьютере;*

7. Use of preposition with the noun, which means implement or mean of action: *малыш хочет писать с ручкой; он рубил дрова с топором.*

As researched material shows, the most difficult grammatical material for Abazin students is learning of case system of Russian language. Case mistakes that are issued with interference of peculiarities of mother tongue are held rather long in the students' speech.

Learning of language models, which are used for constructing of sentences of different structure, supposes learning of grammatical connection between the components of sentence, because structural essence of sentence so that words in its composition form the circuitry of syntactical connection. Therefore, the learning of sentence's structure first means learning of syntactical connections of words. Meanwhile the connection of words is the main difficulty for the students of national school, what shows mistakes that are made while the construction of Russian sentences. As we have already said the majority of these mistakes by their char-

acter are connected with peculiarities of agreement and government.

For the development of effective, preventing possible mistakes in the students' speech methodic of learning syntactical connection of words in Russian sentence it is necessary to take into account, that developed inflexional system of Russian language causes very difficult character of syntactical connections and sentences. The connection between words is carried out with different grammatical facilities and ways; dependent words are characterized by the variety of grammatical forms. Thus, while the agreement the form of dependent word entirely depend on form of principal word.

If we take into account that in Abazin language the agreement of words in the word combination's and sentence's structure have different character than in Russian, hardships that students have will become clear.

More difficult is the character of government. While the agreement the form of dependent word is prompted by the form of principal word (that is defined with the formal indications); but while the government formal (grammatical) indications of joining the connection of words are not object.

We should take into consideration the process of learning conformities to syntactical connections of words in Russian sentence by the Abazin students progresses with the interfering influence of mother tongue. Just exactly the influence causes the majority of mistakes in the forming of syntactical connections of words.

The analysis of condition of teaching of syntax of word combination of Russian and Abazin language allows to make following summaries:

1) realization of principles of succession and availability secures by the phased learning of syntax;

2) word combination as structural unit of modern Russian and Abazin languages helps to learn the forms of words in their principle syntactical function;

3) learning of different ways of connection of words leads to the learning of norms

of words' compatibility in the composition of sentence, and it causes the development of skills of coherent speech;

4) the connection of words in the sentence should be learned practically. That means that the functioning of one or another grammatical facility of connection should be shown interactive at the process of constructing of sentence.

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## THE NEW PARADIGM FOR PEDAGOGY

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In this work new scales and criterions of assesment of value and knowledge are suggested. As the *model* there is suggested to take *the glass of some liquid*. The height of filled and empty parts of glass are marked accordingly Lk (k – know) and Ld (d – don't know). It is considered that liquid that is situated in the glass is the “*liquid of knowledge*”.

As the *criterion* of knowledge assessment there is suggested to take the relation of Lk to Ld. This relation is marked by the **K** letter and is called the *factor of quality*. The dependence of quality factor on the degree of mastering of knowledge is created with nonlinear estimation scale of knowledge.

Nonlinear scale has a great potential for the objective estimation of different kind of value and the definition of truth. Among the numerous deserving scales it allows to objectively choose the most deserving person in the case of such mental and intellectual procedures as election to the senior position, awarding of the rank, academic degrees, awarding of prizes etc.

**Keywords:** knowledge assessment, criterion, factor of quality, acquisition, estimation scale

The picture of world's development during the last century shows that along with the successes there also occur invisible defects. Two world wars, the global warming, the breach of ecological balance and harmony between the economic and spiritual development, wide spreading of weapons of mass destruction etc testify to the presence of defects and mistakes in the development of humanity. All this cataclysms are the results of wrong decisions that are solved at the global and local level. One of the west thinker has characterized philosophy of the development of last century like this: *when the last tree is cut, when the last fish is caught, when the last river is poisoned, people will understand that money is not edible*.

All these deviations from the straight and narrow testify firstly to that fact that the

educational attainment of elite stratum of the planet is not enough high for the harmonious development. Secondly old methods of knowledge assessment (and value) have lost their power, and there is the need for the new methods of knowledge assessment.

In these work there are suggested new scales and criterions of assessment of knowledge and value. Before the description of the essence of new scale it's necessary to examine the essence of old system of knowledge assessment. For this aim as the *model* it's suggested to take *the glass of liquid*. Let's mark the height of full part of glass as Lk, empty part as Ld, and the overall height as Lo. Let's suggest that liquid that is situated in the glass is the “*liquid of knowledge*”. Apparently that the overall height of glass is equal the sum of full and empty parts:

$$Lo = Lk + Ld \quad (1)$$

From this simple formula we can get valuable results.

**1. Classic scale of knowledge assessment.** If we divide both parts of formula (1) to the Lo and the ratio Lk / Lo mark with **a** letter, we'll have a formula:

$$a = 1 - Ld / Lo \quad (2)$$

Here, **a** is the ratio of height of full part of glass to the Lo and it can be called as coefficient of *relative filling*, or more exactly, of *digestion of knowledge*. As we see from the formula (2) the meaning of this coefficient

changes at the interval (0-1). Ratio Ld / Lo characterizes undigested part of knowledge, that is relative *shortage of knowledge*. It's easy to understand that the coefficient of

relative digesting (**a**) here act as criterion of knowledge assessment. As:

a) in case when **a** = 1, that is when  $L_k = L_o$ , educational material has been digested to the 100%;

b) in case when **a** = 0,5 material was digested to the 50%, that is  $L_k = L_o / 2$  or  $L_k = L_d$ ;

c) in case when **a** = 0, that is when  $L_d = L_o$ , educational material hasn't been digested and  $L_k = 0$ ;

For example, if the knowledge can be assessment with the 100 point scale and students gather at the average 100 points (or almost 100 points), that means that the educational system is irreproachable (case a). If students gather about 50 points (40-60 points), that means that the educational system has the middle condition (b). If students gather points between 0 and 10, that means that the educational system is paralyzed (case c).

In the case of 5 point scale the height of glass  $L_o$  is divided to five equal parts and is numbered with the integers from one to five.

That students who mastered the program 100 %, are assessed with the «5». That students who mastered the program 60 % , are assessed with the «3». The dependence between the discrete marks and the degree of digesting creates the estimation scale. In that case this dependence is linear and can be called *linear estimation scale* of knowledge.

It's necessary to note that the classic scale of estimation has very big shortages. While the high meanings of **a** (0,8 -1) resolving power of the scale of knowledge assessment of individuals is very low. More exact and objective estimation scale is necessary.

**2. The new scale of knowledge assessment.** In contrast to the classic estimation scale, for the new scale as the criterion it's supposed to take the ratio  $L_k / L_d$ . In the previous articles [1-2] this correlation was called *the factor of quality* and was marked with **K** letter.

If we divide both sides of formula (1) to the  $L_k$  we will receive the formula:

$$L_o / L_k = 1 + 1 / K$$

This formula can be written like:

$$L_k / L_o = 1 : (1 + 1 / K)$$

As the ratio  $L_k / L_o$  is the relative digestion – **a**, then the last formula can be written like:

$$a = 1 : (1 + 1 / K) \quad (3)$$

The dependence of the **K** quality on the **a** is nonlinear, that is with the increase of **K** the relative assimilability **a** grows nonlinearly. For the reason of the formula (3), the new scale can be created. For this aim it's enough to build a dependence of **a** on **K**. Here **K** acts as a new criterion of knowledge assessment, because:

a) in case when **K**  $\gg 1$ ,  $L_k \gg L_d$ , the educational system is irreproachable.

b) in case when **K** = 1,  $L_k = L_d$ , the educational system has the middle condition.

c) in case when **K**  $\ll 1$ ,  $L_k \ll L_d$ , the educational system is absent or it is paralyzed.

In the first case (a) the digested part of material is much more than undigested one. In the second case (b) they are equal. In the third case (c) the digested part of material is much lesser than undigested one.

The essence of new scale is that while the approaching of the quality factor **K** to the endlessness the parameter **a** comes nearer to its max meaning. As the coefficient **K** changes in the interval (0-  $\infty$ ), then for the differentiation of knowledge of individuals

are opened up big possibilities. The change of **K** meaning in the wide interval creates new possibilities for comparison and estimation of mental and intellectual abilities of individuals. For example, if one of the students has answered to 490 question out of 500, and other student has answered to 499 questions, in classic scale of estimation this difference is 9, and in new scale it is 450. As we see, by the classic scale the difference of assessment between two students is little, but in the new scale this difference is rather big.

It's clear that for intellectual people the meaning of **K** is big. There is no doubt that at the average meaning of **K** for professor is bigger than for the associate professor. Apparently, from the earthly rational beings the biggest **K** has prophets, because their decisions has the power throughout the millenniums.

In conclusion we can consider that obvious advantage of nonlinear scale over the linear creates the necessary condition for the substitution of the paradigm of pedagogy using as the estimation criterion the **K** factor. Nonlinear scale has a great potential for the objective estimation of different kind of value and the definition of truth. Among the numerous deserving scales it allows to objectively choose the most deserving person in the case of such mental and intellectual procedures as election to the senior position, awarding of the rank, academic degrees, awarding of prizes etc.

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## PYRIDINE AND PHENOL ADSORPTION FROM THE GAS PHASE ON SURFACE OF TITANIUM SUB-GROUP OXIDES

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The research of pyridine and phenol adsorption from the vapor phase showed that possible adsorption sites of the mentioned adsorbents are the hydroxyl groups of the surface oxides of  $\text{TiO}_2$  (rutile and anatase modifications), and  $\text{HfO}_2$  - sites of Bronsted type and coordination-unsaturated metal atoms - sites of Lewis type.

High initial heats of phenol adsorption from the vapor phase indicate coordination mechanism of interaction. Heat treatment leads to a change in the number of acid sites and their strength. It is indicated by the data of pH-metry. There is an increase in the basic properties from  $\text{TiO}_2$  (rutile) to  $\text{HfO}_2$  while maintaining acidic samples – pH isoelectric state from 3,8 to 5 respectively.

The number of the acid and basic sites is calculated based on quality of irreversible linked pyridine and phenol at 473K.

The most number of the acid sites is on the surface of rutile, and the most number of the basic sites is on the surface of anatase.

The number of acid and basic sites on the oxides of zirconium and hafnium is approximately the same. It is possible to rank the oxides upon the strength of acid sites:  $\text{ZrO}_2 > \text{HfO}_2 > \text{TiO}_2$  (anatase).

**Keywords:** oxides, adsorption, sorption-desorption isotherms, bond strength, acid and basic sites.

The maximum value of pyridine and phenol adsorption from a vapor phase on  $\text{TiO}_2$ ,  $\text{ZrO}_2$ , and  $\text{HfO}_2$  is determined. Relation between a hydrogen index of an isoelectric state of metal oxides surface and an adsorption of pyridine and phenol at them is found. The change in concentration of acid sites and the difference in their force are estimated.

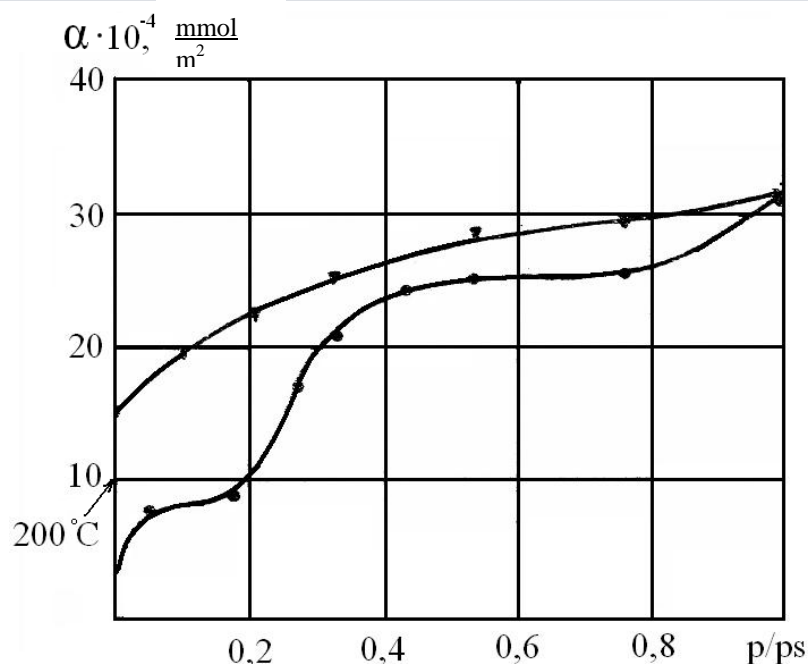
### Experimental Part

The adsorption of phenol and pyridine vapors was studied in statistical vacuum conditions. An adsorption sleeve with spring tungsten scales served as the reactor. Spiral sensitivity:  $4,2 \cdot 10^{-4}$  g/mm. Measurements were performed using cathetometer KM-6. The pyridine pressure was measured with a help of U - shaped manometer, at the phenol adsorption was used McLeod gauge. After the adsorption, desorption of vapor adsorbates was carried out by means of gradual decompression by the removal of a part of vapor in forevacuum system.

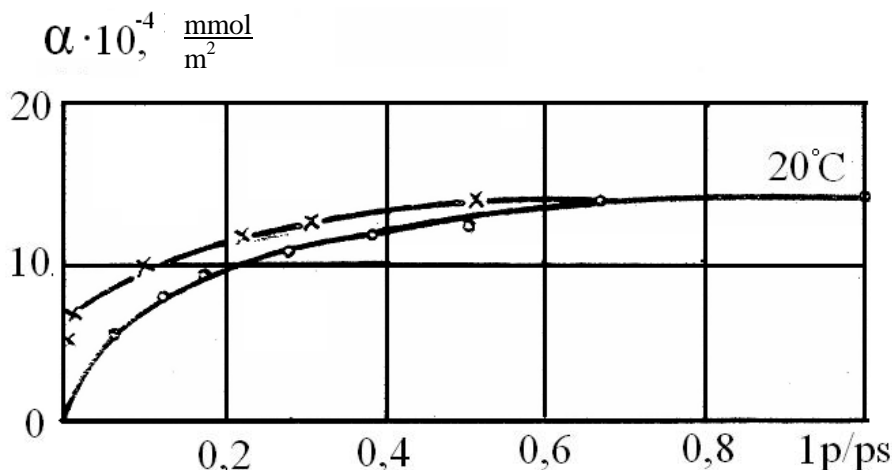
### Outcomes Discussion

The method of adsorption of molecules, mainly organic acids and bases, is used for the characteristic of the acid-base sites of solid surface.

For pyridine and phenol adsorption from a vapor phase the full sorption-desorption isotherms of phenol and pyridine on the investigated oxides are received (fig. 1, 2). At pyridine adsorption, the isotherm has the S-shaped form; at phenol adsorption, the isotherm form is typical for monomolecular adsorption with a convex initial section. At small relative pressure the dependence of adsorption rate on the value of a sample's specific surface is visible: it is possible to rank them upon the value of  $S_{\text{specific}}$ :  $\text{TiO}_2$  (anatase)  $> \text{ZrO}_2 > \text{HfO}_2 > \text{TiO}_2$  (rutile) – 159;45,7;35; 11,4  $\text{m}^2/\text{g}$  respectively [1]. And the time of adsorption equilibrium of phenol and pyridine is 3 hours, 1 hour and 30-45 minutes. It allows us to say that at small relative pressure sorption is mainly defined by the surface factor, and structural features begin to appear only after the formation of several molecular layers [2].



**Figure 1.** ● Sorption - ▼ - desorption isotherm of pyridine on  $\text{ZrO}_2$  at 293 °K



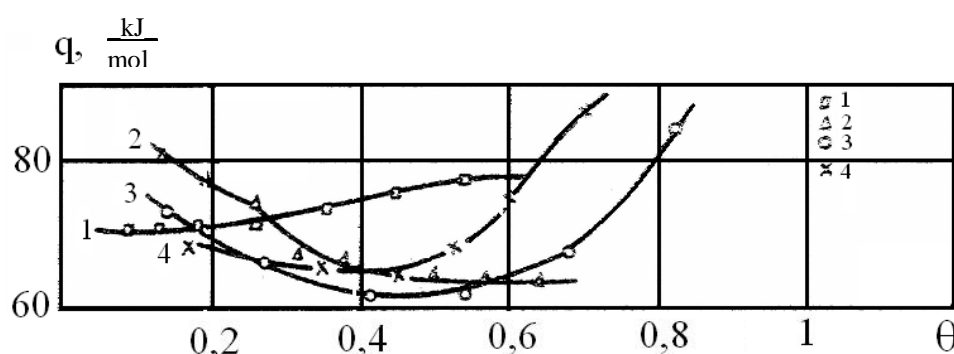
**Figure 2.** ● Sorption - x - desorption isotherm of phenol on  $\text{HfO}_2$  at 293 °K

At bigger relative pressure ( $p/p_s = 0,7 \div 1$ ) the multimolecular pyridine adsorption takes place. The delay in desorption is observed, and a hysteresis loop is formed, and the hysteresis continues throughout the range of relative pressures. All experimental isotherms of pyridine, presented in logarithmic coordinates of the Brunauer-Emmet-Teller equation, look like straight lines up to  $p/p_s = 0,3$ , this fact enabled us to calculate the amount of adsorbed substance at a monolayer covering.

For the detailed investigation of interaction in the mentioned gas-adsorbent systems the heats of adsorption were calculated using the Clapeyron-Clausius equation. The initial heats of pyridine adsorption are (20-34) kJ / mol, that can be characteristic for a case of hydrogen bonding. The latter may result from the interaction of proton hydrogen of free hydroxyl groups on the surface with free electron pairs of nitrogen atom of pyridine functional group [3]. The calculation of vapor-phase phenol showed the high initial heats of adsorption of 71-83 kJ / mol (Fig. 3).

This fact indicates the existence of the adsorption sites with high activity on the surface of the investigated oxides. According to [3], the adsorption of phenol molecules with lone-electron pair can proceed to donor-acceptor mechanism which is especially probable in the oxides of titanium subgroup elements with unfilled d - orbitals of the atoms Ti, Zr, Hf ( $\text{II}^{\text{nd}}$  type sites). In this case, the energy and the character of donor-

acceptor interaction, i.e. the degree of electron transition from the molecule to the metal atom, strongly depend on the interaction partners and may vary largely. The proportion values of the heats of pyridine adsorption from n-hexane and from the gas phase indicate a lack of coordination bonds of that adsorbate, but they do not deny the presence of Lewis sites in any case [4].



**Figure 3.** Differential heats of phenol adsorption from a vapor phase: 1 on rutile, 2 on anatase, 3 – on zirconium oxide, 4 – on hafnium oxide

The molecule platform in the adsorbed layer indicates the different interaction of the adsorbed molecules with a surface (table 1). At adsorption from the vapor phase, the adsorbate molecules are exposed to such factors as the adsorbate area, and the area of vapor phase, which, actually, can be neglected. Ultimately, it is energetically profitable for adsorbate to adsorb "flat".

In order to clarify the bonds' character of the adsorbed pyridine and phenol molecules with an adsorbents surface, it is interesting to look at the results of investigation of adsorption from a vapor phase. Under pumping-out at temperature 293 K and pressure  $133,3 \cdot 10^{-5}$  Pa (53-36,5 %) of the adsorbed pyridine and (50-22,5%) - phenol remain on the oxides surface.

With increasing the pumping-out temperature up to 473 K (38,6-21,7 %) of pyridine and (41-11,2 %) of phenol remain. Ac-

cording to the amount of irreversibly linked pyridine and phenol at 473K, the number of acid and basic sites is calculated. The  $\text{TiO}_2$  (rutile) possesses the greatest number of the acid sites:  $20 \cdot 10^{17}$  per  $\text{m}^2$ , and number of the basic sites equals  $3,7 \cdot 10^{17}$  per  $\text{m}^2$ . The anatase surface contains slightly more basic sites, than the acid ones ( $14,69 \cdot 10^{17}$  per  $\text{m}^2$  and  $12,3 \cdot 10^{17}$  per  $\text{m}^2$  respectively). The number of the acid sites on  $\text{ZrO}_2$  and  $\text{HfO}_2$  is ( $5-9 \cdot 10^{17}$ ) per  $\text{m}^2$ , and the number of the basic sites is ( $3,1 - 3,6 \cdot 10^{17}$ ) per  $\text{m}^2$ .

According to the force of the acid sites, it is possible to rank the investigated samples:  $\text{TiO}_2$  (rutile) >  $\text{ZrO}_2$  >  $\text{HfO}_2$  >  $\text{TiO}_2$  (anatase). This is indicated by the data on hydrogen index of an isoelectric state of oxides [1], the phenol and pyridine adsorption from n-hexane [4] and the data on bond strength of phenol and pyridine with the surface oxide from the gas phase.

Table 1

Data of pyridine and phenol adsorption from a vapor phase  
on oxides of elements from titanium sub-group

oxides	Pyridine												
	273 °K						293 °K						Number of chemisorption sites of adsorbates x 10 <sup>17</sup> per m <sup>2</sup> (desorption at 473 °K)
	Monolayer capacity α <sub>m</sub> ·10 <sup>-3</sup> mmol/m <sup>2</sup>	ω, g/g	Quantity of irreversibly connected adsorbates at 273 °K		Quantity of irreversibly connected adsorbates at 473 °K		Monolayer capacity α <sub>m</sub> ·10 <sup>-3</sup> mmol/m <sup>2</sup>	ω, g/g	Quantity of irreversibly connected adsorbates at 293 °K		Quantity of irreversibly connected adsorbates at 473 °K		
			α·10 <sup>-3</sup> mmol/m <sup>2</sup>	%	α·10 <sup>-3</sup> mmol/m <sup>2</sup>	%			α·10 <sup>-3</sup> mmol/m <sup>2</sup>	%	α·10 <sup>-3</sup> mmol/m <sup>2</sup>	%	
TiO <sub>2</sub> (r)	2,4	68,8	2,59	57,6	1,43	31,8	5,6	53,6	4,59	53,4	3,33	38,7	20,04
ZrO <sub>2</sub>	0,8	57,3	0,63	42,6	0,37	24,7	0,8	50,7	1,59	48,5	0,9	27,6	5,43
GfO <sub>2</sub>	2	85,3	3,73	61,5	1,37	22,6	2,4	69,6	2,24	36,5	1,6	26,1	9,64
TiO <sub>2</sub> (an)	3,8	43,4	4,36	54,3	1,39	17,3	8,2	25,4	3,6	38,4	2,04	21,8	12,3
phenol													
TiO <sub>2</sub> (r)	11,99	13,8	6,04	50,04	1,64	13,7	5,5	30,0	1,25	22,5	0,62	11,2	3,73
ZrO <sub>2</sub>	85,8	2	80,5	93,7	33,2	38,6	1,83	90,8	0,71	38,8	0,5	28,9	3,2
GfO <sub>2</sub>	34,14	4,9	33,8	98,9	16,4	47,9	1,44	115,7	0,72	50,2	0,6	41,8	3,6
TiO <sub>2</sub> (an)	9,7	21,2	8,56	88,2	2,91	30,1	7,8	17,1	2,8	36	2,4	31,1	14,7

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## HOW OLONETS ZEMSTVO USED THE FINNISH EXPERIENCE IN IMPLEMENTING STOLYPIN'S AGRARIAN REFORM

Badanov V.G.

In article positive organizational-technical and cultural and educational activity земских establishments of Olonetsky province in carrying out of an agrarian reform of Stolypina in Russia is investigated. With a view of reform propagation Olonetsky zemstvo began to refer actively to achievements of the Finnish landowners. Taking into account the Finnish experience the Olonetsky provincial zemstvo has developed the activity plan on agricultural production lifting in edge. Experience of the next Finland owing to the various reasons has not received then a wide circulation, however preconditions for the further advancement by the way of agriculture modernisation then nevertheless have been put. There is no First World War, development of a country economy of farmer type in Kareliya, has gone, most likely, successfully as the most expedient form of agrarian manufacture in the northern it is soil-environmental conditions.

**Keywords:** zemstvo, Finland, agrarian experience, reform of Stolypin, agriculture, modernisation, farmers

Following the revolutionary events of 1905-1907, the cornerstone of the Russian government's economic programme was the agrarian reform launched by the Prime Minister P A Stolypin. Its intention was to accelerate the bourgeois modernisation of Russia's agriculture and to stabilise the social and political situation in the countryside. Its main aim, especially in the initial stages, was to break down the *obshchina*, the village commune, and force the creation of a broad stratum of petty landowners in the countryside.

The legal basis for this new agrarian policy was Nicholas II's decree of 9 November 1906, which acquired the force of law following its approval by the 3rd State Duma on 14 June 1910. The most important measures in this complex reform were: that peasants could leave the commune with an allocation of land and property and establish individual farms on this land, the carrying out of land improvements without leaving the communes, and the organisation of peasant settlements on the periphery of the empire. A great deal of attention was also paid to the technical aspects of agricultural production.

It is well known that Stolypin's agrarian reform went well in some areas of the country, and ran into difficulties in others. It was implemented most actively in areas where there was no agrarian overpopulation (the Lower Volga region, Novorossiia and Siberia), as well as in areas which bordered on territories where private property in land

already predominated (Belorussia, Novgorod, Pskov, Smolensk and certain other Western guberniyas).

Karelia, which had an extensive border with the Grand Duchy of Finland, was also influenced by its neighbour to the West, although, for a variety of reasons, this influence was not decisive. But despite the fact that individual farming did not become widespread in Karelia during the course of the reform, the conditions for its further development were laid in that period. Had World War I not intervened, it seems likely that the process would have succeeded as the most expedient way of practising agriculture, given the soil and climatic conditions of the North.

In Soviet historiography, there was a characteristic bias towards studying the social and political aims of Stolypin's agrarian reform rather than its economic and specifically technical aspects. This meant that researchers overlooked the positive organisational, technical, agronomical and educational activity undertaken by zemstvo institutions in Olonets gubernia. It was these institutions, in effect, which catalysed agriculture's shift to an intensive path of development in this region. The zemstvos did a great deal to help the peasants realise the advantages of farming their own land rationally.

By the late 19<sup>th</sup> – early 20<sup>th</sup> centuries, neighbouring Finland had accumulated a great deal of experience in intensifying agricultural production in natural and climatic



conditions similar to those of Karelia. The first attempt to draw the attention of Olonets gubernia's rulers and zemstvo circles to the achievements of Finnish peasants was made in 1881 by M N Ostrovsky, the newly appointed minister of state properties (and brother of the playwright A N Ostrovsky). Having visited an agricultural exhibition in Turku, he shared his impressions and ideas about what he had seen with G G Grigor'ev, the governor of Olonets guberniya. The Minister had been particularly impressed with the Finns' achievements in raising livestock, and especially in breeding highly productive breeds of cattle. Ostrovsky observed: "The example of Finland shows that livestock-rearing in Northern Russia, with its abundance of meadows, could flourish. At present however, in many Northern guberniyas, including Olonets, livestock-farming is still in a far from satisfactory state." Ostrovsky stressed that "in Northern areas the development of livestock-farming is closely linked with the improvement of agriculture in general."<sup>1</sup> The Minister suggested that the governor got together with zemstvo bodies to plan measures for improving cattle breeds, and specifically, the purchase of pedigree animals to be placed free of charge with reliable farmers.<sup>2</sup>

At that time, however, there was no stable development or growth in livestock-rearing and milk production in Olonets gubernia. This was in contrast to another Northern gubernia, Vologda. There, a very strong butter-producing industry was created between 1870 and 1890, thanks to the efforts of N V Vereshagin, an outstanding lone enthusiast. Its output was not only as good as Finnish products, but on occasion was even superior.<sup>3</sup> Although Olonets governor

Grigor'ev had drawn the attention of the zemstvo bodies to Minister Ostrovsky's suggestions, no noticeable steps were taken towards implementing them. This stemmed firstly from the fact that, at that time, the Olonets zemstvos' financial resources were being directed towards overcoming the consequences of the poor harvest of 1880-81 and towards the extension of primary education and rural medicine. These were seen as priorities by the local political figures. Secondly, at the time the zemstvo lacked the requisite organisation and personnel for intervening in agriculture. It had neither agronomists nor stockbreeding experts, nor did it have the necessary infrastructure.

It was only from the mid-1890s that zemstvo members in Karelia started to budget on a regular basis for agricultural needs, primarily in order to bring in specialist agronomists and vets. This followed the personnel changes in zemstvo institutions as a result of the counterreform of 1890 and was given impetus by the serious food crisis in Central Russia of 1891-92.

Having embarked on a radical reform of Russia's agrarian sector, Prime Minister Stolypin sent out two circular telegrams to zemstvo bodies requesting active support for the government's measures. The first one was immediately after the publication of the decree of 9 November 1906, and the second was sent out in 1910, once the socio-political aspect of the reform was already exhausted, and Russia's rulers had become concerned solely with implementing technical measures. The zemstvos responded favourably to the Prime Minister's request, and took on a significant part of the work not only of publicising the agrarian reform, but also of providing practical assistance to country-dwellers.<sup>4</sup> Zemstvo bodies in Karelia were no exception

<sup>1</sup> National Archive of the Republic of Karelia (NARK) f. 12, op. 2, d. 5/13, l. 230-231

<sup>2</sup> *ibid.* l. 231

<sup>3</sup> Specifically, at the 1st All-Russia Dairy Farming Exhibition in St Petersburg in 1879, Vologda creameries won 45 prizes, beating the Finnish masters who, up to that time, had been considered the best. The Petersburg press remarked that "The exhibits from Vologda were a complete surprise to us, and revealed our total

ignorance of our own production. It is not only the Finns and Germans who can produce to exhibition standard, but also Russians, forest and tundra-dwellers from Vologda to boot". State Archive of Vologda Oblast', f. 18, op. 71, d. 2394, l. 2 ob.; f. 34, op. 1, d. 14/81, l. 2-3

<sup>4</sup> G Gerasimenko, *Zemskoe samoupravlenie v Rossii*, Moscow, 1990, pp. 36-37

Table 1

	Expenditure in thousands of rubles						
	years						
	1900	1905	1906	1911	1912	1913	1914
Expenditure on agronomists	5,9	20,2	23,6	57,2	60,7	85,1	100,4
Expenditures on veterinary surgeons and fel'dshers	15,3	26,1	31,0	35,3	36,5	37,6	42,9
Expenditure on measures to improve agricultural productivity	15,3	59,9	69,9	41,8	52,3	62,7	80,7
Grants to agricultural associations	0	0,40	0,70	0,95	1,47	1,95	3,22
Expenditure on fostering economic well-being	22,1	83,3	97,1	111,1	118,3	153,1	187,8
Total expenditure on rural economic needs	58,6	189,9	222,3	246,35	269,27	340,45	415,02

in this regard, and significantly increased their financing of the countryside.

Table 1 shows how Olonets zemstvo institutions' spending developed over the years:<sup>1</sup>

As we can see, zemstvo expenditure on the economic needs of the countryside in Olonets guberniya rose by 7.1 times over the period, and this growth embraced a wide range of productive, personnel and organisational measures.

The Stolypin reforms created the objective conditions for Karelia to make use of the experience of agrarian reform accumulated in Finland. To popularise the reform, zemstvo figures in Olonets began to make frequent reference to the achievements of Finnish farmers. The chairman of the Povenets uezd zemstvo assembly, E A Bogdanovich, reporting in 1906 on measures to improve peasant living standards, laid great stress on the advantages of individual farmsteads and their greater suitability to local conditions. He stated directly that "the Finns can work won-

ders on exactly the same sort of soil as we have".<sup>2</sup> Repeating his report subsequently at a session of the guberniya zemstvo assembly, Bogdanovich added that the law of 9 November 1906 meant that "the way to raising peasant welfare has now been opened". At the same session K K Veber, a guberniya agronomist, argued that the main reason for the wretchedness and backwardness of agriculture in Olonets lay in the conditions of common land tenure, "where the land's temporary occupier's sole concern is that it doesn't lie fallow".<sup>3</sup> One of the zemstvo deputies declared, "In our region, it would take decades and an enormous investment of time and money to get the land into a condition where it would yield big harvests. The landholder will only invest that effort and capital if the land is his property, so that even if he does not see the benefits of his labour, at least his children will."<sup>4</sup> As a result of

<sup>1</sup> Source: *Byudzhety gubernskogo i uezdnykh zemstv Olonetskoy gubernii za 1868-1916 gg.* (Petrozavodsk 1917) pp. 196-199, 206-207, 210-213, 215-219.

<sup>2</sup> 'Obzor postanovleniy ocherednogo gubernskogo zemskogo sobraniya. Vopros ob obshchinnom i podvornom zemlepol'zovanii', *Vestnik Olonetskogo gubernskogo zemstva*, No. 4, 1907, p. 26.

<sup>3</sup> Ibid. p. 27.

<sup>4</sup> Ibid. pp. 28-30.

these debates the guberniya zemstvo assembly passed a resolution which stated: “A move to individual land tenure is the only way to raise the well-being of the peasants”.<sup>1</sup>

The Olonets uезд zemstvo agronomist N A Bodalev also remarked that Finland had played a large part in the local population’s realisation of the need to move over to individual land tenure. Having been there on trade and other business, peasants had seen “that you can raise a flourishing garden on the rocks, so long as ownership is vested in one person”.<sup>2</sup>

Material on the agrarian reform and the Finnish experience of intensifying agricultural production appeared regularly in *Olonets Guberniya Zemstvo Herald*, which began publication in 1907.<sup>3</sup> Between 1908 and 1914 both the guberniya and the uезд zemstvos organised annual special agricultural tours to Finland. The groups would be led by the zemstvo agronomist, and would contain 5 – 6 large-scale peasant farmers and an interpreter (or sometimes a local Finnish specialist who spoke good Russian). The group members would look round the most advanced farms, and get to know how they organised their stockyards, fodder production, and breeding stock selection. They also learned about the activities of Finnish cooperators, visited collective butter-makers, peat and moss-processing enterprises, agricultural equipment hiring stations and land improvement projects. The Finns’ thorough stock-breeding work, their special pedigree books with lists of bulls and productive cows, the associations for verifying breeding bulls, the

constant competitions and exhibitions with prizes for stockbreeders, made a particular impression on the Olonets delegates.<sup>4</sup>

The Olonets visitors even noted the distinctive aspects of the Finnish household farm economy related to the special part played by livestock rearing. One of the Olonets peasants who had been on a visit to Vyborg guberniya in June 1911 later told K K Veber, a zemstvo agronomist: “What surprised us was the fact that there, every farmer knows how much feed each of his cows has eaten, how much it cost, how much milk she gave over the year and even when she calved, whereas here, you can see, not many farmers could even say how many cows they had in the shed without asking the wife.”<sup>5</sup>

Even while the Stolypin reform was being prepared, the Olonets guberniya zemstvo was using the Finnish experience in drawing up its plan, finally approved in 1906, to increase agricultural production. As in Finland, the cornerstone of this modernisation was to be the development of dairy farming. There was special stress on developing fodder production by expanding the planting of grass and land improvements, as well as by improving cattle breeds and organising commercial butter production. Another important task was to raise the standard of cultivation by acquainting peasants with progressive agricultural techniques, new machinery and equipment.

The zemstvo bodies started to encourage the planting of grassland by giving out grass seed to peasants. In 1902-1903 the guberniya zemstvo alone bought and distributed free of charge to peasants 78 puds of clover and timothy-grass. However, by the beginning of the 1910s the zemstvo agronomists had become convinced that this approach was not enough in Olonets guberniya, where, as one of them put it, “the peasants submit to

<sup>1</sup> Ibid. p. 30.

<sup>2</sup> *Trudy VIII agronomicheskogo soveshchaniya pri Olonetskoy gubernskoy zemskoy uprave*, Petrozavodsk, 1913, p. 195.

<sup>3</sup> See e.g. M Komarovskiy, ‘Poezdka v Finlyandiya’, *Vestnik Olonetskogo gubernskogo zemstva* 1907, Nos. 18-22; K Veber, ‘Pervye shestinedel’nye kursy po molochnomu khozyaystvu, maslodeliyu i skotovodstvu, pri Povenetskoy ferme’, Ibid, 1910, no. 12, p. 25; A Gagman, ‘Proekt premirovaniya obraztsovykh krest’yanskikh khozyaystv’, Ibid. 1911, No. 9, p. 29; G Gul’tman, ‘Deyatel’nost’ kontrol’nykh soyuzov Finlyandii v 1915 g.’, Ibid., 1916, No. 18. pp. 119-120.

<sup>4</sup> K Veber, ‘Osmotr olonchanami khutorskikh khozyaystv v Finlyandii’, Ibid., No. 21, pp. 14-17, No. 22, pp. 23-26; OGV 19 June 1910, 4 July 1914.

<sup>5</sup> K Veber, *Osmotr olonchanami khutorskikh khozyaystv v Finlyandii*, *Vestnik Olonetskogo gubernskogo zemstva*, No. 22, 1911, p. 24.

fate, and harvest nothing but sedge". They set up model grass fields with seed rotation over several fields. Gradually, the peasants began to show interest in growing grasses as a worthwhile part of farming. By 1917 in the Karelian uezds there were 154 hectares under grass, or 0.3% of the total sown area of the guberniya.<sup>1</sup>

The zemstvo also tried to strengthen fodder production for livestock by introducing peasants to land improvement measures, widely practised in Finland at that time. In 1903 Olonets guberniya established a special fund for dealing with waterlogged holdings. Resources were made available from that fund for investigating and developing parcels of land which might be suitable for land improvement.<sup>2</sup> In 1908 the Olonets zemstvo officials' initiatives came to the attention of Nicholas II. Governor N V Protas'ev's annual report described the investigations, initiated with treasury and zemstvo resources, into "the numerous lakes and rivers, with the aim of lowering the level of the lakes and draining the land in order to turn the reclaimed land into meadow as done in Finland". The Emperor highlighted this passage with his own hand as "useful".<sup>3</sup>

In 1911 the guberniya zemstvo took on K I Viganda, a specialist on draining marshes and cultivating meadows, and subsequently instructors on farming marshland joined the staff of the uezd zemstvos.<sup>4</sup> By 1914 in the Karelian uezds of Olonets guberniya some 42 strips of land showing how to work marshland and 45 plots demonstrating how to improve hay yields in dry valleys.<sup>5</sup> The most active response to zemstvo initiatives was among the inhabitants of Povenets uezd, in the very north of the guberniya, where the shortage of hay was particularly severe. In 1905 just 4 peasants had been working

marshland to grow hay in this area, but by 1910 this had risen to 45 peasants.<sup>6</sup> Farmers like I S Gaydin of Shun'ga village and I D Fedotov of Pokrovskaya village in Myandusel'ga volost' became well known in the uezd for their farming practices. By systematically applying land-improvement measures, they were able to supply their livestock with feed even in the years with the worst harvests. Their work received public recognition. The guberniya zemstvo journal noted that "the results they got on their marshes inspired not only the brighter peasants in their own village and neighbouring villages to imitate them, but also peasants from more distant villages in their volost'. Once they had become convinced that harvests that could be gained this sort of reclaimed meadow more than repaid the resources and efforts expended ... they themselves started reclaiming marshland for meadows."<sup>7</sup> On 6 December 1912 Nicholas II decreed that the leading farmers I S Gaydin and I D Fedotov be awarded silver medals "For Diligence" on Stanislav ribbon.<sup>8</sup>

From 1902 onwards, following the example of the neighbouring country, the zemstvos had started to establish breeding stations in the uezds in order to improve cattle breeds. Activity in this area in particular increased during the agrarian reform period. Zemstvo specialists were sent on trips to Finland, paid for by the Main Administration for Land Usage and Agriculture of Russia, in order to purchase stud bulls of Eastern Finnish breeds, as the breeds best suited for Olonets guberniya. Particular preference was given to regions of Eastern and Northern Karelia and Kuopio guberniya, as their climatic and soil conditions, landscapes, and abundance of lakes and marshes were very similar to those of Olonets. For example, in 1912 the livestock specialist S A Vinogradov was sent

<sup>1</sup> Sotsialisticheskaya industrializatsiya Karel'skoy ASSR, Leningrad 1935, p. 22

<sup>2</sup> NARK f. 12, op. 1, d. 4/53, p. 8

<sup>3</sup> NARK f. 1, op. 1, d. 106/1, p. 191

<sup>4</sup> NARK f. 12, op. 1, d. 2/13, p. 37

<sup>5</sup> Olonetskaya guberniya. Statisticheskiy spravochnik. Petrozavodsk 1913, pp. 334-335

<sup>6</sup> Otchet gubernskogo zemskogo agronoma za 1911 g., g., Petrozavodsk, 1912, pp. 66-67

<sup>7</sup> Zemskaya agronomicheskaya pomoshch' v Olonetskoj gubernii, Vestnik Olonetskogo gubernskogo zemstva, 1910, No. 1, p. 8

<sup>8</sup> OGV 1912, 26 December

to the agricultural fair at Joensuu to get a consignment of bulls, needed in order to open new breeding stations in areas of individual household farming. By 1913, in the Karelian uezds of Olonets guberniya there were 43 breeding stations with 46 bulls, 35 of which were Eastern Finnish and 11 of which were cross-breeds. There were around 2.5 thousand cattle in the dairy herds around these stations.<sup>1</sup> The zemstvos began to organise regular exhibitions of dairy and draught animals, with prizes for those farmers who exhibited the best specimens of cattle and horses. However, this was just the beginning of a painstaking process of selection, since a special zemstvo study showed that elite bulls of Eastern Finnish stock only comprised 7% of all the breeding bulls in the region by 1913.<sup>2</sup>

On zemstvo initiative, certain advanced farms were used as the basis for creating special control points on the Finnish model for thoroughbred cattle, which laid down the external appearance, the quantities and types of feed they required (crude, fresh, concentrated and so on) over a given period of time, increases in live weight and milk yields. It is interesting to note that one of the first such points in Olonets uezd was opened in 1911, by Andrey Ivanovich Zakonov, a Karelian peasant from Spiridon Navolok village in Vedlozerskaya volost', immediately on his return from a visit to Finland.<sup>3</sup> He also asked that the uezd uprava take his nephew, to whom he intended to leave his farm, on a visit to the neighbouring country. Zakonov stated that "this will mean that we understand each other on the farm and what I am now bringing in will develop on a firm basis".<sup>4</sup>

The zemstvo creameries were one of the most successful ways in which the Finnish experience was inculcated. The story of one of the first of these creameries, in Veshkelitsy village, Syamozerskaya volost', Petrozavodsk uezd, is typical. In 1901 the zemstvo sent the village a mobile workshop, equipped with a separator. It was headed by V Popova, trained by the well-known butter manufacturer N V Vereshagin. By June 1901 a butter-making farmers' association, involving 32 individual farmers, had formed around the workshop, and by the end of the first summer season more than 43 puds of butter had been produced at the creamery. The produce was sold through the uezd zemstvo stores in Petrozavodsk, and some of it even reached St Petersburg. Thanks to the creamery, the income of the 32 association members from livestock farming almost tripled. By 1902 the association had grown to 65 permanent members, with a further 40 occasionally selling excess milk to the creamery. Having played an important role in spreading the idea of butter-manufacturing, the association in Veshkelitsy broke up in 1907 as private creameries began to appear. By that time there were already 6 separators in the village and its surrounding area and butter-making had gained a firm foothold.<sup>5</sup>

Another zemstvo creamery, opened in 1903 in Spiridon-Navolok village, Olonets uezd, eventually provided the basis for founding the Kroshnozerskoe agricultural association, which by 1913 had 30 separators producing 260 puds of butter.<sup>6</sup> Using these separators, the creameries were able to produce batches of high quality butter - "Parisian", "Holstein" and "sweet cream", which sold well in Petrozavodsk and St Petersburg. It was reported that in the capital Olonets

<sup>1</sup> Olonetskaya guberniya. Statisticheskii spravochnik. Petrozavodsk 1913, p. 336

<sup>2</sup> Olonetskaya guberniya. Statisticheskii spravochnik. Petrozavodsk 1913, p. 238

<sup>3</sup> Ob agronomicheskikh meropriyatiyakh Olonetskogo uezdnogo zemstva, Vestnik Olonetskogo gubernskogo zemstva, No. 24, 1911, p. 15.

<sup>4</sup> K. Veber, Osmotr olonchanami khutorskikh khozyaystv v Finlyandii, Vestnik Olonetskogo gubernskogo zemstva, No. 22, 1911, p. 26.

<sup>5</sup> OGV 10 May, 28 July, 23 October 1901; 19 October 1902; I S Molosovkin, Soobshcheniya iz uezdov. Veshkelitsy, Vestnik Olonetskogo gubernskogo zemstva, No. 16, 1908, p. 20.

<sup>6</sup> NARK, f. 12, op. 1, d. 4/48, p. 51



butter would fetch “a very high price” (up to 20 rubles for “Parisian” butter).<sup>1</sup>

Thanks to help from the zemstvos, commercial butter production became firmly established in the economy of the Karelian village, as the data show. In 1902 there were only 5 separators in Olonets guberniya, in 1905 there were 17, and by 1912 there were already 268.<sup>2</sup> It is notable that it was Povenets uezd, which bordered on Finland, which led the way here by a large margin. By 1912 it had 143 creameries – more than half the total for the guberniya.<sup>3</sup> The zemstvo agronomist K K Veber remarked that the Povenets uezd dairy industry “has reached a scale where it is starting to get noticed”.<sup>4</sup>

In order to acquaint peasants with the latest developments in agricultural technique as practised in Finland, special exhibitions were set up to demonstrate improved agricultural equipment and machinery. By 1912 winnowing trains had been established in every uezd, with a total of 53 machines (winnowers, separators, screening machines). The guberniya zemstvo and the Olonets and Povenets uezd zemstvos also had points where agricultural equipment could be rented.<sup>5</sup>

Many peasants began to follow the example of Finnish farmers, and gathered moss to use as warm bedding for their cattle in the winter. On 19 December 1912 a general meeting of the Kroshnozerskoe agricultural association (Vedlozerskaya volost', Olonets uezd) applied to the Main Administration for Land Usage and Agriculture for assistance in setting up a turf and moss processing plant

for making bedding. The uezd zemstvo assembly immediately granted 50 rubles for setting up the plant.

In 1911 a local activist, assessing the results of the measures taken by the Petrozavodsk uezd zemstvo to promote agrarian techniques, wrote: “Previously we had to foist grass seed onto peasants free of charge, now they will buy it at the going rate... Previously nobody wanted to use ploughs which were given away for nothing, but now 30 to 50 of them are sold each year, and most of the inhabitants of certain villages (Iviny, Besovets) have gone over to working the ground with ploughs. The same can be said about winnowing machines, of which 20 are now sold each year. A particularly important step forward has taken place in butter-making. Since the appointment of the travelling butter-making instructor, the number of peasant creameries (if we may call them thus) has grown rapidly, and there are now 70 separators in use in the uezd, bringing their owners a very tangible income. But butter-making is not only important from that point of view; it also inculcates in the peasant the desire to improve the whole farm, by planting grass for feed, by improving livestock and its feeding and so on. If someone were to follow the development of the countryside attentively and compare the countryside now with how it was 15 years ago, I think he would find massive changes.”<sup>6</sup>

Nevertheless, despite some tangible results in the development of peasant farming, the main aim of the Stolypin reforms, which was to create a broad stratum of individual farmers, was not achieved in Olonets guberniya in the short period of time history granted this new agricultural policy. The official statistical data for 1914 in Table 2 below bear this out:<sup>7</sup>

<sup>1</sup> Obzor Olonetskoy gubernii za 1901 g. Petrozavodsk, 1902, p. 6; OGV 23 June 1901; III agronomicheskoe soveshchanie, Vestnik Olonetskogo gubernskogo zemstva, No. 12, 1910, p. 19.

<sup>2</sup> V Buzin, S Vinogradov, Materialy po issledovaniyu zhivotnovodstva v Olonetskoy gubernii, Petrozavodsk, 1914, p. 24.

<sup>3</sup> Olonetskaya guberniya: Statisticheskii spravochnik, p. 336.

<sup>4</sup> K Veber, Pervye shestinedel'nye kursy po molochnomu khozyaystvu, maslodeliyu i skotovodstvu, pri Povenetskoy ferme, Vestnik Olonetskogo gubernskogo zemstva, No. 12, 1910, p. 25.

<sup>5</sup> Olonetskaya guberniya. Statisticheskii spravochnik, pp. 335-336.

<sup>6</sup> F.I. Ziadyan', Neskol'ko slov o 15-letney deyatelnosti agronomii v Petrozavodskom uезде, Vestnik Olonetskogo gubernskogo zemstva, No. 20, 1911, p. 32.

<sup>7</sup> I. Naymark, Obzor agronomicheskoy pomoshchi khozyaystvam edinolichnogo vladeniya Olonetskoy gubernii za 1914 g., Petrozavodsk, 1915, p. 7.

Table 2

Uezds	Total land area (000 desyatins)	Total area under cultivation (000 desyatins)	Total number of peasant house- holds	Of which total number re- formed
Petrozavodsk	1438	814	11393	8
Povenets	3721	604	4559	176
Pudozh	1853	683	6562	12
Kargopol	1955	956	15185	193
Vytegra	1049	446	10185	153
Lodeynoe Pole	885	338	9388	107
Olonets	853	411	7768	318
Total for the guberniya	11754	4252	65040	967

Thus, across Olonets guberniya as a whole in 1914 individual farmers and peasants who had separated from the commune comprised just 1.5% of total peasant households (members of communes and individual farmers). This was about eight times lower than the average for European Russia as a whole.<sup>1</sup> However, we should not fail to notice that the highest proportion of individual farmsteads in the region was to be found in the two western, Karelian uyezds of the guberniya, Olonets (4.1%) and Povenets (3.9%), where Finnish methods of farming were best known.

The process of creating individual peasant farms in Olonets guberniya was hindered by several factors. The almost complete absence of a landowning nobility meant that the agrarian question was basically a question of the relationship between peasants and the state, and was therefore less acute than in regions with landowners. Another important factor was the fact that the peasants' main money incomes were not gained from the land at all, but from various handicrafts. In Karelia, with its severe weather conditions, agrarian capitalism was little developed, and communal traditions, which enabled peasant households to survive extreme

situations, were well entrenched. To the local peasants, the commune retained a psychological, philosophical and even religious significance as a kind of basic value given from above.

Communal landholding itself in Karelia had a rather complicated and confused character, because of the predominance of group agriculture at the time when the land reform was carried out in 1866. Around 90% of the settlements formerly attached to state or mining enterprises were lumped together with other villages to receive their recorded land allotments.<sup>2</sup> At the same time there was frequent discord about apportioning the parts of the holding suitable for pasture, hay-making, and clearance, and the parts under forest. Distributing land under such circumstances was very difficult, and demanded significant expenditure on the state's part. On this question N V Protas'ev, the Olonets governor, wrote to Prime Minister Stolypin on 16 August 1910 as follows: "The unsatisfactory nature of the way land was apportioned to former state peasants in the past acts as a huge brake on peasant aspirations in this regard. It is by no means rare in Olonets guberniya to find between 40 and 100 hamlets lumped to-

<sup>1</sup> See: *Krizis samoderzhaviya v Rossii, 1895-1917*, Leningrad, 1984, pp. 367-368

<sup>2</sup> See P. N. Pershin, *Zemel'noe ustroystvo v dorevolutsionnoy derevne*, Voronezh, 1928, vol. 1, p. 302.

gether in a single set of deeds as the owners of a land allocation. Moreover, this allocation will contain land which is held by just one hamlet, land which is held in common by several hamlets, as well as land jointly owned by all the hamlets mentioned in the deeds. Struggling against this form of land holding is one of the most pressing tasks of the peasant institutions of Olonets guberniya.”<sup>1</sup>

The complex situation of Russo-Finnish relations during this period also had its effect on the process of moving Karelian agriculture over to a system of individual farmers. On the one hand, in the wake of the revolution of 1905-1907, Russia's governing circles led an assault on Finland's autonomy, whilst in the Grand Duchy, aggressively nationalistic circles became more active under the banner of pan-Finnism.<sup>2</sup> This situation gave rise to mutual mistrust and hindered the development of firm and close relationships between the farmers of the two countries. Even in zemstvo circles, which overall had a positive view of Finnish farming practices, there were dissenting voices raised. For example, one zemstvo figure, hiding behind the initials A.G., wrote in the official guberniya zemstvo journal in 1910: “We are presented with the example of Finland: everything is fine there, the country is prospering, everything is in exemplary order, the farmsteads are unparalleled and so on. But is there many of them? Are there not also completely landless people there? How much flour is Finland buying from us, and then selling back to us as if it was their own?... But even if everything is fine there, it cannot serve as an ex-

ample for Olonets guberniya. It may be next to us, but the climate is moderated by the sea, cherries and plums will grow there whereas we cannot even grow decent apples in Olonets. In butter production only Vologda guberniya can compare with Finland. Olonets is not going to become a granary.”<sup>3</sup> At the same time, the author did not recommend any practical steps for improving the agricultural sector. The situation which had emerged was clearly not conducive to Russian Karelia adopting the positive agricultural experience of neighbouring Finland.

<sup>1</sup> NARK, f. 1. op. 1, d. 106/1, pp. 217 ob.-218

<sup>2</sup> See E. Yu. Dubrovskaya, *Protivoborstvo panfinnizma i russkogo velikoderzhaviya v Karelii (po materialam istochnikov kontsa XIX – nachala XX vv)*, *Voprosy istorii Evropeyskogo Severa*, Petrozavodsk, 1991, pp. 55-64; V. I. Musaev (compiler and introduction), “Finnizatory” i “obrusiteli”, *Dokumenty po istorii bor'by za vliyanie v Karelii (konets XIX – nachalo XX vv)*, Nestor. Zhurnal istorii i kul'tury Rossii i Vostochnoy Evropy No. 12. *Finno-ugorskie narody Rossii. Problemy istorii i kul'tury*. St. Petersburg, 2007, pp. 47-71.

<sup>3</sup> A. G. Kogda chto budet? *Vestnik Olonetskogo gubernskogo zemstva*, No. 22, 1910, p. 16.

## FACTORS PROVIDING STEADY POSITION TO SHOE ENTERPRISES IN COMPETITION ENVIRONMENT OF OPEN MARKET

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The life cycle of any product (including a pair of shoes) is a concept that describes product sales, profit, customers, competitors and marketing strategy since putting the goods on the market until their removal from the market.

The market situation is changing at every stage of the life cycle and requires a corresponding change in the strategy and tactics of enterprise activity in the market that is of particular importance.

A footwear manufacturer must plan his production strategy, based on the possibility to use marketing elements to optimize the structure of the product life cycle.

Different companies take different approaches to devising the strategy of goods production depending on customer needs, available resources, market conditions, etc. Moreover, the same company can use different strategies for different goods. The strategy selection is usually based on the product competitiveness.

**Keywords:** marketing, products (services), shoes, merchandising, promotion, price, competition

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The market situation is changing at every stage of the life cycle and requires a corresponding change in the strategy and tactics of enterprise activity in the market that is of particular importance.

The main products have 4-5 stages, before disappearing from the market:

- Presentation (launch);
- Growth (development);
- Maturity (stabilization);
- Decline (decline and updating products);
- Death (death and the start of goods relaunch cycle).

A product life cycle depends on the number of substitutes, their competitiveness, as well as on the right management decisions aimed at developing supporting activities to optimize the structure of the product life cycle. The main activities to optimize the structure of the product life cycle include: proper use of various elements of marketing at various stages of product life cycle; production strategy of the enterprise.

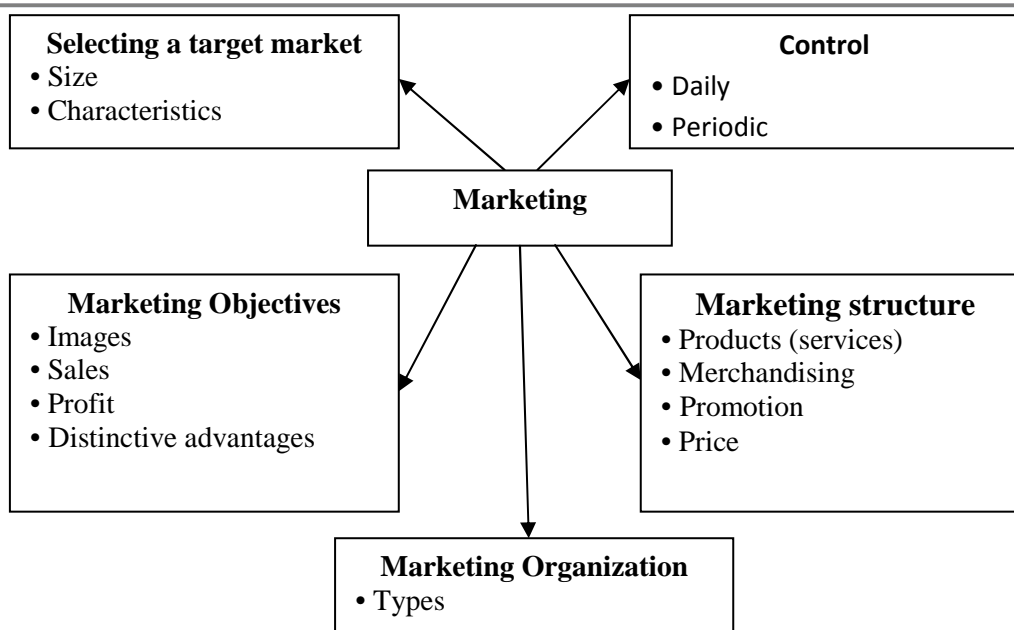
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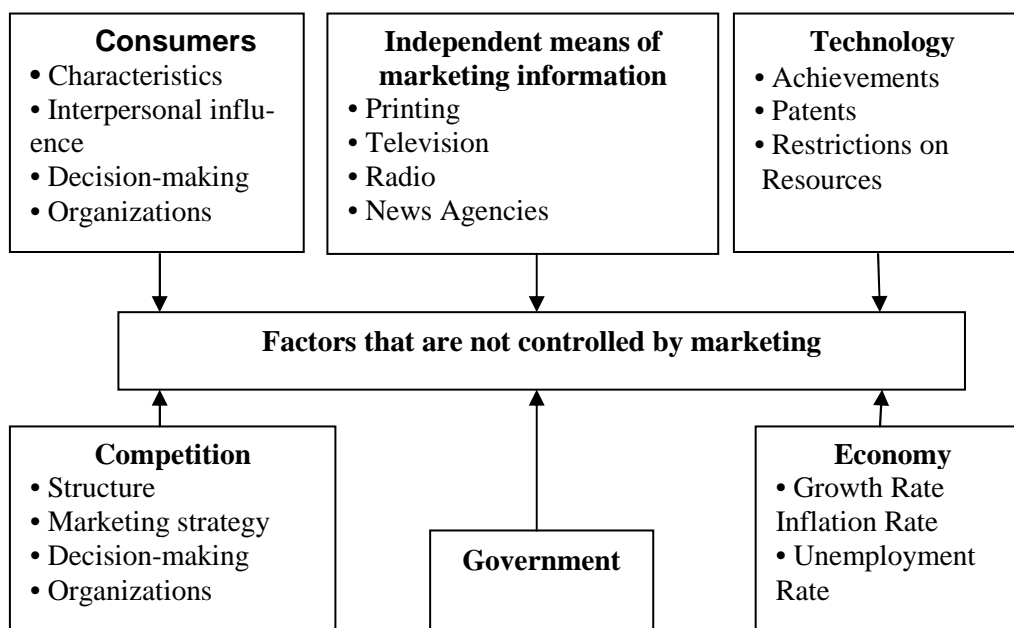
Different companies take different approaches to devising the strategy of goods production depending on customer needs, available resources, market conditions, etc. Moreover, the same company can use different strategies for different goods. The strategy selection is usually based on the product competitiveness.

The development of new combinations of goods is based on targets and strategies of enterprises and is accompanied by the analysis of the enterprise position, resulted in making a decision on the probable diversification of its activities. The consideration of the factors that are controlled by marketing (Figure 1), as well as the factors that are not controlled by marketing (Figure 2) is a prerequisite for the strategy devising.

Thus, the product life cycle management is the process of product management from the product concept to its utilization. When this process is efficient, the enterprise is able to operate profitable innovations, to accelerate the development of new products, to launch them shortly and constantly improve their quality, while reducing their production costs.



**Figure 1.** Factors controlled by marketing



**Figure 2.** Factors uncontrolled by marketing

Five stages in the footwear life cycle require permanent change of pricing strategy. A product life cycle is characterized by fluctuations in sales and profits from its sale. Thereafter, the price will vary depending on what stage of life cycle the goods are at. Thus, we can conclude that the price set by

the enterprise for the goods depends on the production costs, supply and demand, as well as the population solvency, pricing and market strategy of the enterprise, product quality, interchangeability of goods and their life cycle.



*Materials of the Conference***PECULIARITIES OF BANK'S WORK AS A SYSTEM**

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The diversification of bank operations can be subdivide into several principle groups subject to their content and means, which are enabled while their embodiment: 1) passive operations (accumulation of financial means); 2) active operations (accommodation of financial means); 3) mediatory operations; 4) consulting and other nonoperation services. Let's examine the composition and content of these operations.

Passive operations allow bank to attract provisionally free financial resources of creditors and other clients. In composition of passive operations we can extract following principle groups: workaroud of investments and deposits (till claiming, time-critical and others) from the jural and physical grantors, opening and leading of rated, current and other accounts of jural grantors; drawing up from commercial banks or from Bank of Russia (interbank credits); emission of noninvestment valuable paperwork (deposit certifications, bills etc).

Commercial bank has rather effete control of these operations because the initiative of accommodation means to the investments starts from the investors. While this as practice shows investors are interested not only in repaid by bank percentage of investment but also in reliability of saving of trustee to the bank means, so bank change of interest amount by investments in this case is not an effective way of action to the sum of investments and other analogous attracted resources.

Passive operations of other groups, on the contrary, occur on bank's initiative and are an effective way of fast attraction of coarse financial resources. But these operations are put into effect usually at the money-market, in connection to this resources that were drawn by this way are more expensive than deposits of equal term, thus they are used often as the last resort while the appearance of financial difficulties.

Bank emission of investment (that is long-term and(or) giving the property ownership at the issuer's effect) valuable paperwork (stock and obligations of different types) us not one of the passive operations because drawn by this way resources bank has the right to contemplate and contemplates them as its own, though does not repay by them defined sums (percents, coupons, dividends etc) at the expence of profit.

Active operations mean the use sui juris drawn and own features for the perception of adequate gain. Basic ways of active operations are: credit arrangement of different types to the jural and physical grantors on the defined term, for the different goals and on

different conditions; investments to the valuable paperwork (obligations, stock etc), which were discharged by state or by other jural grantors, that are operations with valuable paperwork sui juris and on their own fat.

Auxiliary role is played by other types of active operations, for example investments into material assets (estate property etc), project financing (innovative, hazardous). The embodiment of passive and active operations in the aggregate allows bank to perform a function of credit institute. Disposable income of bank by these operations occurs because of difference interest rates (margin) of active and passive operations.

Mediatory (commission) operations give to bank an opportunity of getting income in the form of commission charge, pay for service etc without using own or attracted resources. The basal types of mediatory operations are:

1. rated and spot attendance of clients, that means leading of rated, current and other analogous counts of clients and embodiment by their commission accounts with another clients;

2. mediatory (broker) operations with the valuable paperwork, foreign exchange etc by the commission and at the expence of clients;

3. confidential (trust) operations (control of clients' assets by the authority commission during defined period);

4. emissive and depositary service (participation in emission and prime accommodation of new issues of valuable paperwork of clients and in organization of their following circulation).

Carrying out of operations by the rated and spot attendance of clients allows bank to realize the function of institute of standard, to assist money circulation in the state.

The last group of operations in bank is consulting and other nonoperational services (is also called paid services) practically is not bank operations at all, because it does not include any operations with cash assets (reception, advance, remittance etc) in any of their forms. Such services are: information service (consultations by economical, financial, jural and other questions); compiling of methodical materials and project-estimate documentation by the clients order; farming of placement and equipment (safe etc). Income by these services in the form of pay for the services is the result of assignment material, labour (intellectual) and informational resources of bank to the clients' use.

While the realization of passive operations bank not only attracts from without some sum of fund, but also spend while this labour (craft of bank workers, who ingeniously accepts deposits, - in corpore, craft of other workers in - some proportion), material (amortization of placements, furniture, office equip-

ment, consumption of stationary etc) informational (информационные (census about clients, the condition of deposit or interbank market etc) and energy (lightning, heating, power supply of office equipment, computers etc) resources. Such situation occur while the analysis of other types of bank operations.

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**Materials of the Conference****STRUCTURAL BASIS OF HUMAN LIFE**

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In the base of human life is circulation of fluids with different composition: cell production, motion in tissue channels, connective tissue and vessels, filtration from capillaries and reverse motion with conservation of connection with external environment. The circulation is organized by proteins and their complexes with different substances (proteins, carbohydrates, lipids, nucleic acids and another), including cells (polyprotein complexes capabling to self-reproduction). Their polyformed networks cover water solutions of inner environment and convert them into jellies with different solidity, regulate their composition and motion (gel $\leftrightarrow$ sol) by integral gradient of

physiological activity of cells and tissues (oncotic, osmotic, hydraulic and mechanic pressure), form skeleton of intracell and intercell spaces, walls of tissue channels and vessels, divide spaces between cells and border tissues (epitheliums, mesotheliums, endotheliums) on polyformed compartments with local features of structure. Human development is accompanied by changings of his circulatory system accordingly complication of organism structure: division of moving, changing inner environment on polyformed compartments and connective channels creates conditions for local concentration of different proteins and cells in their walls, specialization of their changing and more effective functional cooperations (proteins, cells, tissues, organs, systems, apparatuses).

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## ELECTRONIC TRANSFORMER WITH THE FREQUENCY REGULATION

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Electronic transformers, particularly, transistor transformers are widely used in different electronic devices: in inventors, translators of frequency, secondary sources of power supply.

There are known, for example, electronic welders of inventor type with the one-cycle or two-cycle (bridge) transistor inverter, which is loaded to the welding radio-frequency (till 100 кГц) transformer: «Transpocket 1400» – production of Austria, «Castolin GmbH» – Germany: «DC200A1» – Technothrone, Russia: «Inverter U 130-S» – Linkoln, USA and others.

Welding transformer in the mentioned devices is connected through the one-cycle or two-cycle rectifier to the smoothing throttle and load (electric arc), with the shunted inverse diode. The control system has closed system of regulation with the pulse-width modulator (PWM).

While this the use of expensive transistor modules with the opto-isolator and individual sources of

displacement of each module makes more difficult and expensive the installation. To the shortages we should attribute the limited functional possibilities, because the regulation of frequency of exit voltage is suitable in the short range and basically in the inventors of resonant type, that is with the in-series the load condenser, and also higher losses because of saturation in the chain of supplementary transformer.

In the [1] there offered the new universal principle of direction of force transistors, which allows to decrease losses and to widen the functional facilities of device.

The work of device is carried out by following way.

While the plugging of the installation the self-excited oscillator 7 transforms the direct-current voltage at the input to the voltage of rectangular shape of high (till 100 kHz) frequency. This voltage transforms into the secondary winding 11, 12, 13 and thereby comes to the synchronizing entry of modulator 26, which corresponds the type microcircuit. Subject to signal of task  $U_3$  and factual signal of feedback  $U_\phi$  (fig.1) exit signal of modulator transforms the symmetric “meander” of voltage of winding 13 to the sign-changing impulses, “wideness” of which decreases while the increase of signal of task  $U_3$ .

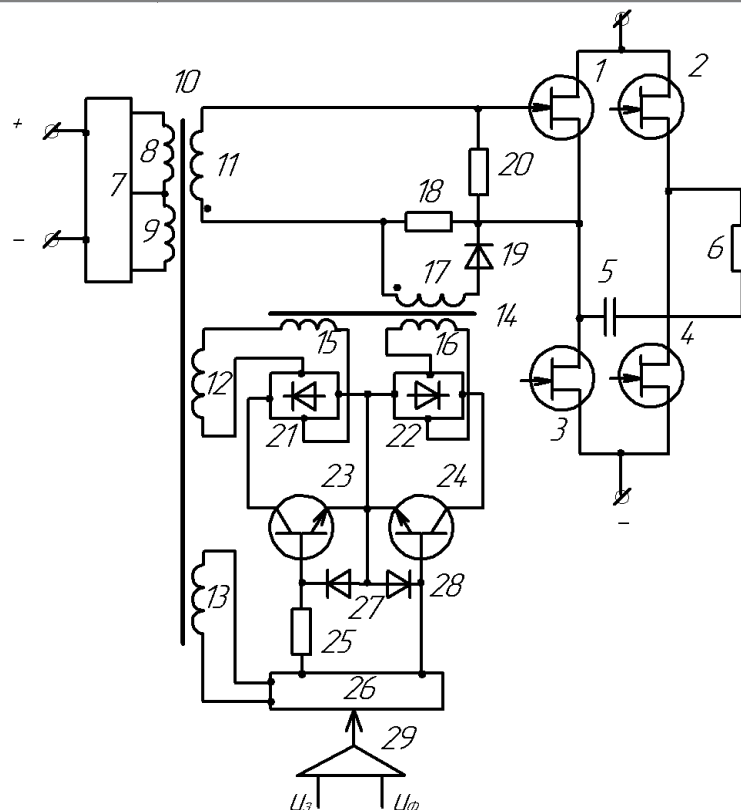


Figure 1. Scheme of transistor transformer

At the limit minimal "width"  $t \geq t_b$ , where  $t_b$  – time of blocking of the transistor of inventor.

Accordingly, modulating transistors 23 and 24 are turned out being open at the different intervals of time. These transistors shunt by turn the diode bridges 21 and 22.

The switching of transistor 23 leads to the voltage to the winding 15 of supplementary transformer, and its switching-off with the simultaneous switching of the transistor 24 leads to the blanking of transformer 14 and to the zero voltage at its all windings.

The voltage of winding 17 of supplementary transformer 14 is algebraically sum up with the voltage of operating secondary winding 11 of basic transformer 10, as the result at the operating inputs of inventor's transistors arises the voltage of unblanking and blanking. Since the windings 11 and 17 in the diagonal pair of transistors 1, 4 are connected with the ends, transistor pairs come unlocked antiphased, at the diagonal of inventor arises the voltage, the acting meaning of which is defined with the signal of task  $U_3$  at the input of automatic regulator, and the frequency is invariable and is set with the autogenerator 7, which can be carried out by any known scheme of autogenerator.

The condenser 5, which is turned on sequentially with the load 6, secures the absence of constant part in the voltage, what is very important if the load is the transformer (for example welding). The condenser 5 also secures the doubling of amplitude of voltage at the load, what is very important for welding transformers, because it improves the conditions of ignition of an arc.

It should be noted that the load can be any different but it can be transformer. In this case the condenser 5 can be excluded from the device. Indeed, introduced principle of direction of force transistor is universal and can be used for very different transistor transformers with the latitudinal impulse regulation.

Supplementary transformer unsaturable works in the conditions "switched on –switched off", what dramatically decreases losses and accordingly allows to decrease the power of self-excited oscillator.

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## Materials of the Conference

**THE ROLE OF MATHEMATICAL MODELING  
AT THE TEACHING OF NATURAL SCIENCES**

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In the article the attention is directed to the role of mathematical modeling in the education. There is accented the necessity of including into a programme of studies the integrated non-linear informative synergetic model underlining the synergetic, autowave model of Lotka-Volterra "predator-prey", models of fractals etc. Such knowledge leads to the integral thinking, allows to master new methods of work with any object very quickly, will make the professional mobility and adaptation.

Education includes several components. Naturally, on the first place, side by side with the training of morality, should be teaching of bases of studied

discipline that have place at the codifier. But not less important role, and in authors' opinion the principle role, should be played by the training of thinking. That means mastering and creation of innovations that are connected with the construction of adequate models of the visual environment and ourselves [1]. We can label non-linear equations (Navier-Stokes, Fokker-Planck, telegrapher) that are examined in the postnon-classical science synergy, power functions of Benua Mandelbrote, equations of Lotka-Volterra, equations of catastrophes' theory to the perspective in modeling processes in physics, chemistry, biology, biophysics, conceptions of modern natural science, ecology etc.

Mathematical modeling is the constructive approach to the research of one or another behaviour of objects or systems. Thus in geophysics while the studies of behavior of ionize component of atmosphere, particularly at ionosphere, we examined the equations of Navier-Stokes [2]:

$$\frac{\partial N_i}{\partial t} = q - \gamma N_i N_j - \alpha N_i^2 - \text{div}(N_i v), \quad (1)$$

where  $N_i$  – concentration of particles  $[O^+]$ ,  $[H^+]$ ,  $[O_2^+]$ ,  $[NO^+]$ ,  $[Mg^+]$ ;  $q$  – speed of ion formative,  $\gamma$  – coefficient interspecific interaction of particles;  $\alpha$  – coefficient of recombination;  $\text{div}(N_i v)$  – diffusion term. For hydrogen, for example, equation will be:

$$\frac{\partial [H^+]}{\partial t} = q_{H^+} + \gamma_2 [H][O^+] - \gamma_1 [H^+][O] + \frac{\partial}{\partial s} \left[ D_{H^+} \left( \frac{\partial [H^+]}{\partial s} + \frac{[H^+] \sin J}{H_{H^+}} \right) \right], \quad (2)$$

where  $J$  – magnetic inclination.

Let's add phrase for the temperature of ions to these equations:

$$\frac{\partial T_i}{\partial t} = \frac{1}{c} \left( Q_e - L_e - \frac{\partial}{\partial s} \left( k_e \frac{\partial}{\partial s} T_e \right) \right), \quad (3)$$

where  $k$  – coefficient of thermal conductivity.

The magnetic inclination  $J$  was taken from our model [2,3] of magnetic field of Earth, which is based on the equation:

$$V = R \sum_{n=1}^x \left( \frac{R}{r} \right)^{n+1} \sum_{m=0}^n [g_n^m \cos m\lambda + h_n^m \sin m\lambda] P_n^m(\cos \Theta), \quad (4)$$

where  $V$  – magnetic potential, which is created on the distance  $h = r - R$  from the spherical surface of  $R$  radius that was caused by the source inside the sphere;  $g_n^m$ ,  $h_n^m$  – coefficients of decomposition,  $P_n^m(\cos \Theta)$  – standardized added Legendre polynomials [2,3].

As the result we have distribution of parameters of magnetic field along the force tubes of Earth. These equations were solved numerically, with the method of marching on the implicit scheme. So far as these is the Cauchy problem we chose top and lower boundary conditions from the basis of force tube of magnetic field of Earth, initial conditions were taken

from the experiment. Задача решалась до периодичности. The model of type (1) were used by us, for example, for the rating of contribution of innovative component into the education [1], for the rating of number of free radicals in the animal and human while the electronic excited conditions [2], for the creation of algorithm of more widen version of model "predator-prey".

Autowave processes in physics and biophysics were investigated at the example of Lotka-Volterra [2,4]:

$$\begin{aligned}\dot{x} &= k_1 x - kxy \\ \dot{y} &= k'xy - k_2 y\end{aligned}\quad (5)$$

where  $\dot{x}$ ,  $\dot{y}$  - speed of development of population of hares and predators naturally;  $k_1$  и  $k'$  - coefficients of reproduction;  $k$  и  $k_2$  - coefficients of animal's death.

Models of type (5) were used by us for the medical aims, for example, the model of humoral im-

munity with the delay helps us to define the ratio of antigen-antibody at different phase of disease, what allows injecting a medicine at the right time to the fast recovery.

No less innovative and interesting are models of fractals. In the capacity of easiest variant was used model [5]:

$$N(\delta) = \alpha \cdot \delta^{1-D}, \quad (6)$$

where  $D$  – fractal dimension;  $\delta$  – step;  $N(\delta)$  – the length of indented line;  $\alpha$  – coefficient of inclination.

For the cluster one can use:

$$N = \rho \left( \frac{R}{R_0} \right)^D, \quad \text{где } N \rightarrow \infty, \quad (7)$$

where  $\rho$  - density of mass;  $R_0$  - minimal size of cluster.

Qualitative peculiarity of fractal objects is invariance of principle geometrical peculiarities of structures of wildlife and abiocoen while the scale changes.

Mathematic modeling of non-linear processes that occur in the open, equilibrium, dissipative systems, allows deeply learning of different kinds of phenomena of our world, that promotes improvement of quality of preparation of specialists, ensuring the priority development of theoretical researches in the institutions of higher education. All these give to students an opportunity of forming new type of thinking, which is directed at active, innovative transformations in the society, nature and technology.

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## Short Reports

## BODY SLIDING ON AN INCLINED PLANE

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By consideration of processes of falling of a body or sliding of a body without a friction downwards on an inclined plane the law of preservation of mechanical energy in a kind is used:

$mgh = mV_k^2 / 2$ , where  $h$  - initial height of a

body over a surface of the Earth,  $V_k$  - final speed.

We will designate length of inclined plane  $S$ , and a corner of its inclination to horizon -  $\alpha$ , then  $h = S \cdot \sin \alpha$ . According to the law of conservation of energy, final speed will be same: and in case of vertical falling, and in case of sliding on an inclined

plane:  $V_k = \sqrt{2gh}$  etc. It is said that the gravity in

all cases has made same work  $mgh$ . We Will imagine, that corner  $\alpha$  very is small. Then the body will appear on considerable removal from a place of vertical falling. Thus it will possess precisely same kinetic energy, as well as at vertical falling. At sliding on an inclined plane the body not only goes down to the Earth, but also moving work on considerable distance is made. Work at sliding should be more works at vertical falling.

At movement of a body without a friction on an inclined plane gravity  $P = mg$  can be spread out on two components: rolling force  $F_\alpha = mg \sin \alpha$  and normal reaction of support  $N = mg \cos \alpha$ . The square of time of sliding on an inclined plane is equal  $t_k^2 = 2S / a = 2h / g \sin^2 \alpha$ .

Work of roll down forces

$$A_a = F_a S = mgS \sin \alpha = mgh \quad (1)$$

It is possible to express through an impulse rolling forces  $I_a = F_a t_k$

$$A_a = F_a \cdot \frac{at_k^2}{2} = \frac{F_a^2 t_k^2}{2m} = \frac{I_a^2}{2m} \quad (1a)$$

Work of normal force we will write down through an impulse of force  $I_N = N t_k$

$$A_N = \frac{I_N^2}{2m} = \frac{N^2 t_k^2}{2m} = mgh \cdot \text{ctg}^2 \alpha \quad (2)$$

Since forces  $F_a$  and  $N$  orthogonal works of these forces are additive. Then total work of these forces can be found arithmetic addition

$$A_\Sigma = A_a + A_N = mgh(1 + \text{ctg}^2 \alpha) = \frac{mgh}{\sin^2 \alpha} \quad (3)$$

From (3) as the special case turns out gravity work at vertical falling ( $\alpha = 90^\circ$ ):  $A_\Sigma = mgh$ . At coal  $\alpha = 10^\circ$  work of gravity  $A_\Sigma \cong 33mgh$ .

If the inclined plane is rough, movement occurs to some factor of friction  $\mu$ . We will consider a case of spontaneous sliding of a body ( $\mu < \text{tg} \alpha$ ). In this case uniformly accelerated sliding will occur downwards under the influence of force  $F_\alpha = mg(\sin \alpha - \mu \cos \alpha)$ . Sliding time.

$$t_k^2 = \frac{2S}{a} = \frac{2h}{a \sin \alpha} = \frac{2h}{g \sin^2 \alpha (1 - \mu / \text{tg} \alpha)} \quad (4)$$

Speed in the end of an inclined plane

$$V_k^2 = 2gh(1 - \mu / \text{tg} \alpha) \quad (5)$$

The work made by a gravity, at sliding with a friction on an inclined surface.

$$A_{\Sigma}^T = \frac{m^2 g^2 t_k^2}{2m} = \frac{mgh}{\sin^2 \alpha (1 - \mu / \operatorname{tg} \alpha)} \quad (6)$$

At factor of friction  $\mu = 0$  we receive a parity (3). The relation of work with friction  $A_{\Sigma}^T$  to work of gravity  $A_{\Sigma}$  in the absence of a friction depending on relation  $\mu / \operatorname{tg} \alpha$  are resulted in table 1.

Table 1									
$\mu / \operatorname{tg} \alpha$	0	0,2	0,4	0,5	0,6	0,7	0,8	0,9	0,95
$A_{\Sigma}^T / A_{\Sigma}$	1	1,25	1,667	2	2,5	3,33	5	10	20

At factor of friction  $\mu = 0,9 \operatorname{tg} \alpha$  and coal  $\alpha = 10^\circ$  work of gravity  $A_{\Sigma}^T \cong 330mgh$ .

More detailed conclusion of formulas for calculation of work of various forces is resulted in [1,2].

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### WORK OF TURN AND WORK OF CENTRIPETAL FORCES

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Turn work is a work, which needs to be spent to change a direction of movement of a body (to turn a vector of speed  $V_0$  on some corner  $\alpha$ ):

$$A_{\alpha} = \frac{I_2^2}{2m} = \frac{I_0^2}{m} (1 - \cos \alpha)$$

where  $I_0 = mV_0$  - a body impulse. Under the same formula work of centripetal force pays off.

From the law of inertia Galilee (Newton's I law) follows, that any body shows resistance at attempts to set it in motion or to change the module or the DIRECTION of its speed. This property of bodies is called as inertness. To overcome resistance, it is necessary to make effort, i.e. to make work. The formula for calculation of work of change of speed of a body is resulted in all textbooks of physics. It is received on the basis of Newton's

II law for a resultant of force  $F_a = \sum F_i = ma$  in a kind

$$A = F_a \cdot S \quad (1)$$

As way  $S = at^2 / 2 = Ft^2 / 2m$  it is possible to express work through an impulse of force  $I_a = F_a t$

$$A = F_a^2 t^2 / 2m = I_a^2 / 2m \quad (2)$$

Let's define work, which needs to be spent to change the DIRECTION of movement of a body, i.e. to turn a vector of speed  $V_0$  on some corner  $\alpha$ . The author [1-3] named its WORK of TURN. At change of

a direction of movement at  $V_0 = \text{const}$  kinetic energy of a body does not change, but work should be spent, as the body shows resistance to attempt to change a direction of its speed. Change of a direction of movement we will make at the expense of action of

INSTANT FORCE  $F_2$  for what we will direct an interval of action of force  $t \rightarrow 0$ , and size of force  $F_2 \rightarrow \infty$ . Then we will receive instant force in the

form of  $I_2 \delta(t)$ , where  $\delta(t)$  - delta-function Diraka [4].

Turn work

$$A_\alpha = \frac{I_2^2}{2m} = \frac{I_0^2}{m} (1 - \cos \alpha), 0 \leq \alpha \leq \pi \quad (3)$$

For corners of turn, big than  $\pi$ , for example  $\beta = \pi + \alpha$ , considering periodicity of function  $\cos \alpha$ , it is necessary to turn work on a corner  $180^\circ$  ( $A_\pi$ ) to add work  $A_\alpha$ . Kinetic energy of body

$K_0 = mV_0^2 / 2 = I_0^2 / 2m$ . In table 1 work of turn  $A_\alpha$  depending on corner  $\alpha$  is resulted.

Table 1

$\alpha$	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$	$180^\circ$	$270^\circ$	$360^\circ$
$A_\alpha$	0	$K_0(2 - \sqrt{3})$	$K_0(2 - \sqrt{2})$	$K_0$	$2K_0$	$4K_0$	$6K_0$	$8K_0$

Thus, at turn of a body, moving on a circle, i.e. on one turn, work equal  $8K_0$  (eight kinetic энергий bodies) is spent.

In textbooks of physics for force  $F$  directed under some corner  $\alpha$  to moving  $S$ , the formula for moving work write down in a kind:  $A = F \cdot S \cos \alpha$ . In this connection assert, that the centripetal forces causing movement of a body on a circle (for example, Lorentz's force at rotary movement of a charge in a magnetic field, or force of gravitation at movement of the companion round the Earth on a circular orbit) do not make work, since they are always perpendicular to a vector of speed, and  $\cos 90^\circ = 0$ .

Companion movement is an infinite falling of a body by gravity. Companion movement to similarly movement of the body thrown from a tower in height  $h$  in a horizontal direction with initial speed  $V_0$ . At body falling to the Earth the gravity makes work  $A = mgh$ . Not clearly, why the gravity does not make work at companion movement. These processes are similar.

In work [3] conclusion of the formula for calculation of work of centripetal force  $F$  by three methods. The formula (3) as a result turns out. As  $mV_0^2 = FR$  (3) it is possible to copy in the form of  $A_\alpha = FR(1 - \cos \alpha)$ . At  $\alpha = 90^\circ$  it is received  $A_{90^\circ} = FR = FS$  - the usual formula for work, where  $S$  - the vertical moving equal to radius of an orbit. At one turn  $S = 4R$  and work will be equal  $A_{2\pi} = 4FR = 4mV_0^2 = 8K_0$ .

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*Materials of the Conference*

**VARIATIONS OF THE PSYCHOEMOTIONAL  
STATUS OF THE MIGRANTS FROM  
THE NORTH WITH THE DISCIRCULATORY  
ENCEPHALOPATHY**

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At the present time one of the actual tasks of our State is realization of the programme of the migration of the population from the Extreme North territory to the zones with favourable climate for living. Such regions for migrants from the North are Southern areas of Krasnoyarsk territory and Khakas republic. Thereupon necessity in estimation of the adaptive possibilities and health condition of the migrants arises, first of all of those people, who are at the after-working period.

The purpose of this research was an estimation of the psychoemotional status and cognitive functions of the migrants from the North, who are at the after-working period.

The somatoneurologic research was made with the estimation of the psychoemotional status with the help of inquirer of Eysenck and cognitive sphere according to the parameters of the higher brain functions

in 81 people: 68 migrants from the North with the signs of discirculatory encephalopathy (DE) and 13 people- without clinical manifestations of DE at the age from 55 to 56 years old (51-women; 30-men).

At the present time one of the actual tasks of our State is realization of the programme of the migration of the population from the Extreme North territory to the zones with favourable climate for living. Such regions for migrants from the North are Southern areas of Krasnoyarsk territory and Khakas republic. Thereupon necessity in estimation of the adaptive possibilities and health condition of the migrants arises, first of all of those people, who are at the after-working period.

The purpose of this research was an estimation of the psychoemotional status and cognitive functions of the migrants from the North, who are at the after-working periodall, it demands of special therapy, including the prescription of the medicine, improving the cognitive functions and normalizing the psychoemotional sphere. Using of the domestic medicine (pantocalcine and teraligene) on the outpatient basis will let to decrease the expressivity of the anxious disorders and stabilize the cognitive sphere.

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